IBM Communications Server for Data Center Deployment
on Linux

Node Operator Facility Programmer's Guide

Version 7.0

SC31-6778-04

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Note:
Before using this information and the product it supports, be sure to read the general information under Appendix C, "Notices," on page 749.

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This edition applies to IBM Communications Server for Data Center Deployment on Linux, Version 7.0, program number 5725-H32, and to all subsequent releases and modifications until otherwise indicated in new editions or technical newsletters.

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About This Book

IBM Communications Server for Data Center Deployment on Linux NOF Programmer's Guide contains the information required to develop C-language application programs that use the Node Operator Facility (NOF) API to manage IBM® Communications Server for Data Center Deployment on Linux resources. IBM Communications Server for Data Center Deployment on Linux, program product number 5725-H32, is an IBM software product that enables a computer running Linux to exchange information with other nodes on an SNA network.

There are two different installation variants of IBM Communications Server for Data Center Deployment on Linux, depending on the hardware on which it operates:

CS Linux
CS Linux operates on the following:

- 32–bit Intel workstations running Linux (i686)
- 64–bit AMD64/Intel EM64T workstations running Linux (x86_64)
- IBM pSeries® computers running Linux (ppc64)

CS Linux for System z®
CS Linux for System z operates on System z mainframes running Linux for System z (s390x).

In this book, the name CS Linux is used to indicate either of these two variants, and the term "CS Linux computer" is used to indicate any type of computer running CS Linux, except where differences are described explicitly.

This book applies to Version 7.0 of CS Linux.

Who Should Use This Book

This book is intended for experienced C programmers who write Systems Network Architecture (SNA) transaction programs for systems with CS Linux.

This book is intended for System Administrators and application programmers who use CS Linux.

System Administrators
System Administrators install CS Linux, configure the system for network connection, and maintain the system. They should be familiar with the hardware on which CS Linux operates and with the Linux operating system. They must also be knowledgeable about the network to which the system is connected and understand SNA concepts in general.

Application Programmers
Application programmers design and code transaction and application programs that use the CS Linux programming interfaces to send and receive data over an SNA network. They should be thoroughly familiar with SNA, the remote program with which the transaction or application program communicates, and the AIX® or Linux operating system programming and operating environments.

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More detailed information about writing application programs is provided in the manual for each API. For additional information about CS Linux publications, see the Bibliography.

How to Use This Book

This section explains how information is organized and presented in this book.

Organization of This Book

This book is organized as follows:

- Chapter 1, "Introduction to the NOF API," on page 1, provides an overview of the CS Linux NOF API and the functions it provides.
- Chapter 2, "Writing NOF Applications," on page 23, contains general information a programmer needs when writing NOF applications and information about compiling and linking the applications.
- Chapter 3, "NOF API Verbs," on page 43, provides a detailed description of each of the NOF verbs, including parameters and return codes.
- Chapter 4, "NOF Indications," on page 675, provides a detailed description of each of the indications that a NOF application can register to receive.
- Appendix A, "Return Code Values," on page 735, lists all the possible return codes in the NOF interface in numerical order and gives their meanings.
- Appendix B, "Common Return Codes," on page 743, provides information about return codes that are common to all the NOF verbs.

Typographic Conventions

Table 1 shows the typographic styles used in this document.

Table 1. Typographic Conventions

Special Element	Sample of Typography
Document title	*IBM Communications Server for Data Center Deployment on Linux NOF Programmer's Guide*
File or path name	**sna.err**
Directory name	**/var/opt/ibm/sna**
Header file	**nof_c.h**
Program or application	**snaadmin**
Command	**define_local_lu**; **cd**
General reference to all verbs of a particular type	DEFINE_* (indicates all of the NOF API verbs that define resources)
Option or flag	**-I**
Parameter	*opcode*
Literal value or selection that the user can enter (including default values)	`255`
Constant	`AP_MODE_READ_ONLY`
Return value	`AP_INVALID_FORMAT; 0`
Variable representing a supplied value	*a.b.c.d*
Environment variable	`LD_RUN_PATH`
Programming verb	CONNECT_NODE
User input	**snaadmin status_dependent_lu,pu_name=ETH0**
Function, call, or entry point	`ioctl`
Data structure	`NOF_CALLBACK`
Hexadecimal value	`0x20`

Graphic Conventions

This symbol is used to indicate the start of a section of text that applies only to the AIX or Linux operating system. It applies to Linux servers and to the IBM Remote API Client running on AIX, Linux, Linux for pSeries or Linux for System z.

This symbol is used to indicate the start of a section of text that applies to the IBM Remote API Client on Windows.

This symbol indicates the end of a section of operating system specific text. The information following this symbol applies regardless of the operating system.

What Is New for This Release

CS Linux Version 7.0 is a follow-on product to CS Linux Version 6.4, which continues to be supported.

Where to Find More Information

See the Bibliography for other books in the CS Linux library, as well as books that contain additional information about topics related to SNA and Linux workstations.

Chapter 1. Introduction to the NOF API

This chapter provides an introduction to the CS Linux NOF API. It includes the following information:

- Purpose of the NOF API
- Client/server operation
- NOF verbs and indications

For information about the CS Linux components and resources accessed by the NOF API, see *IBM Communications Server for Data Center Deployment on Linux Quick Beginnings*.

Purpose of the NOF API

The CS Linux NOF API provides access to a standard set of commands, called NOF verbs, that can be used to administer the CS Linux system from within an application program. These verbs enable you to define and delete resources, specify CS Linux parameters such as diagnostics levels and file names, start and stop defined resources, query the definition or current status of resources, and manage which servers on the CS Linux LAN can act as backup masters if the master configuration file server is not available.

In a client/server system, you can use any NOF verbs in an application running on a server. Applications running on Remote API Clients can use NOF verbs to query configuration or status information, but cannot use other verbs to modify the configuration or to start or stop resources.

The NOF verbs provide the same functions as commands issued to the command-line administration program **snaadmin**, or as records in a CS Linux configuration file. For example, the NOF verb DEFINE_LOCAL_LU is equivalent both to a **define_local_lu** command issued to the **snaadmin** program, and to a `define_local_lu` record in a configuration file; all three of them perform the same function, which is to specify the parameters of a CS Linux local APPC LU.

You can use the Motif administration program **xsnaadmin** to perform the same function as a NOF verb or an administration command (for example, to define a local APPC LU). However, this does not provide access to the full range of parameters included in some NOF verbs. For more information about using the Motif administration program, refer to the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

You can issue NOF verbs to any of the following targets:

- A running CS Linux node—to manage its resources or to monitor its operation
- A server where the node is not running—to query the stored configuration or to modify it for use when the node is next started
- The CS Linux domain as a whole—to define, modify, or query the configuration of domain resources (resources used to support particular user programs, such as CPI-C side information entries, which are not associated with a particular node).

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- The CS Linux invokable TP data file—to define information that CS Linux needs to start invokable (target) TPs, or to define other information relating to a TP (such as the level of security required to access the TP).

The NOF API enables you to do the following:

- Develop your own application programs to manage the CS Linux system
- Develop application programs that use the other CS Linux APIs so that they can also manage their own resources (for example, an APPC application can check that the communications link to its partner TP is active before attempting to allocate a conversation or can define the remote LU where its partner TP is located).

Node Configuration File

Configuration information for each CS Linux node is held in a text file on the computer where the node runs. This file includes information about the node's resources, and specifies which resources will be active when CS Linux is started. When you start the node, the file provides an initial definition of the resources that are available; you can then use the NOF API or the CS Linux administration tools to modify the running node's resources as your requirements change.

You can set up multiple configuration files, to store different CS Linux configurations for use at different times, and select which of these files to use when starting the CS Linux software.

Configuration in an APPN network is a dynamic process; you can add, delete, or modify resources as necessary while the CS Linux software is running. The configuration file provides an initial definition of the available resources and stores the current definition so that you can use it again when you need to restart the node, but it is not necessary to define the entire configuration before starting the CS Linux software.

Domain Configuration File

Configuration information for CS Linux domain resources is held in a single text file on the master server. You can set up multiple domain configuration files, to store different CS Linux configurations for use at different times, and select which of these files to use when starting the CS Linux software on the master server.

Configuration in an APPN network is a dynamic process; you can add, delete, or modify resources as necessary while the system is running. The domain configuration file provides an initial definition of the available domain resources and enables you to store the current definition so that you can use it again when you need to restart the system, but it is not necessary to define the entire domain configuration before starting the CS Linux software or to restart the software when you make changes.

Invokable TP Data File

Information that CS Linux needs to start invokable (target) TPs is held in the file **/etc/sna/sna_tps** (AIX) or **/etc/opt/ibm/sna/sna_tps** (Linux). This file can also provide other information (such as the level of security required to access the TP). The invokable TP data file resides on the computer where the TPs run.

CS Linux Components

CS Linux implements an APPN node to communicate with other nodes on the SNA network. This provides logical unit (LU) 6.2 support for APPC and CPI-C capabilities, as well as LU 0, 1, 2, and 3 support for 3270 and LUA communications.

CS Linux can operate as any of the APPN node types LEN, end, network, or branch network node, depending on its configuration. Certain functions are supported only on particular node types, as defined by the APPN architecture. These differences are indicated where necessary in this manual; where no differences are indicated, the information applies to all node types.

Figure 1, shows the components of CS Linux and how they work together.

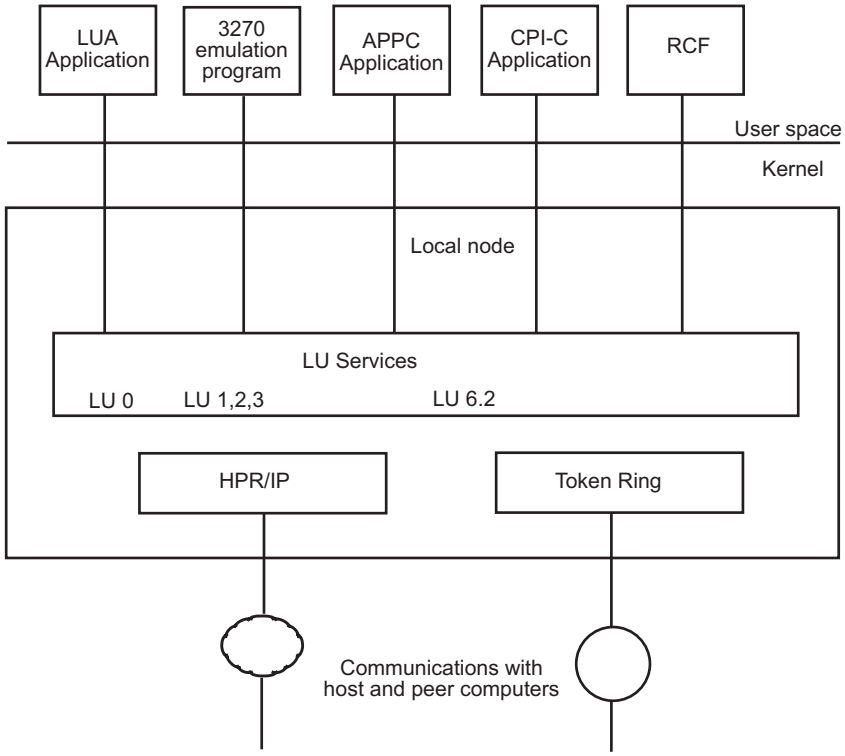

Figure 1. CS Linux Components

The local node, including its associated connectivity resources (DLCs, ports and LSs), is implemented as CS Linux components in the kernel of the Linux system.

The APPC transaction programs, CPI-C applications, LUA applications, and the Remote Command Facility (RCF) are user-space programs. CS Linux supports multiple APPC TPs, CPI-C applications, and LUA applications, running concurrently.

Client/Server Operation

The computers on the CS Linux network are of two types: servers and clients. A server contains a CS Linux node and its associated connectivity components; a client does not contain these connectivity components, but accesses them on the server by means of the network. Servers are Linux computers; clients can be running AIX, Linux, or Windows. (A Linux computer can be either a server or a client, but not both; you cannot install both the server and the client on the same computer.) Servers and clients communicate across the network using Berkeley Software Distribution (BSD) Sockets.

Each CS Linux network, referred to as a domain, is identified by a domain name. This name is specified during the installation of each CS Linux computer (server or client), so that all computers in a single CS Linux network have the same domain name. To install two separate CS Linux domains on the same physical network, you simply use two different domain names to identify the domain in which each computer belongs. A single CS Linux domain can correspond to a TCP/IP subnet, can be part of a TCP/IP subnet (so that there are two or more separate CS Linux domains in the same subnet), or can span multiple subnets.

Each server maintains information about its own node configuration in a node configuration file. You can use the CS Linux administration tools or the NOF API to examine the node's configuration. This can be done either from this server or from any other computer in the domain, as long as the SNA software is running (whether or not the node is started). You can also use the CS Linux administration tools or the NOF API on this server or on any other server to modify the node's configuration or to start or stop resources on the node.

Information about the configuration of domain resources for the complete CS Linux network is held in a domain configuration file. If you have more than one server on the network, CS Linux ensures that this information is consistent across all servers.

Master Server and Backup Servers

If you are using CS Linux with all programs on one computer or on a network that contains only one server, you do not need to read this section.

At any time, one server on the network, known as the master server, holds the master copy of the CS Linux domain configuration file. You can define other servers on the network to be backup servers; the domain configuration file is copied to backup servers (either when they are started or when the master copy is changed) so that all backup servers hold a copy of the latest information.

If the master server fails or if the SNA software on that computer is stopped, a backup server takes over as the master. The domain configuration file on this server is used as the master copy and is copied to other servers as necessary. When the master server is restarted, it receives a copy of the domain configuration from the backup server currently acting as master and then takes over as the master.

In general, define at least one backup server in addition to the master server. Any remaining servers can be defined as additional backup master servers or they can be left as peer servers. A peer server obtains configuration information from the master server as required but cannot act as a backup server.

If at any time the master server and all backup servers are inactive, a node on a peer server can still operate, and you can still change the node's configuration. However, you cannot access the domain configuration file and therefore cannot access the configuration of domain resources (as opposed to node resources). This means that you will not be able to allocate CPI-C conversations using symbolic destination names defined in the configuration file.

There is one situation in which CS Linux cannot maintain a consistent configuration of domain resources across the network; it is your responsibility to maintain the configuration in this case. This situation occurs when the network is split by a network failure into two noncommunicating domains, each containing one or more backup servers. In this situation, there will be an acting master server in each domain, which will hold any changes made to the domain configuration file in that domain but will be unaware of any changes made in the other domain. When the network connection is re-established, the domain configuration file from the original master server (or from the highest backup server available in either of the two domains if the master is inactive at this point) will become the domain configuration file across the network; this will overwrite any changes made to the domain configuration file in the other domain while the network was split. Because of this, do not attempt to make any changes to the domain configuration file in either of the two domains while the network connection is broken. Changes can be made to the configuration of individual nodes.

CS Linux stores information about the master server and backup servers in the file **sna.net**, known as the SNA network data file. The master copy of this file is stored on the master server; any changes made to it are automatically copied to all other servers, in the same way that changes to the domain configuration file are copied to backup servers. You cannot edit the contents of the file directly; instead, CS Linux provides NOF verbs to access the file.

For more information about the SNA network data file, refer to the *IBM Communications Server for Data Center Deployment on Linux Administration Command Reference*.

AIX or Linux Clients

A client computer does not contain any configuration file or the SNA network data file; it holds only the information it needs to access servers on the CS Linux network and relies on a server to provide the necessary configuration information.

The SNA network information required is held in the file **/etc/sna/sna_clnt.net** (AIX) or **/etc/opt/ibm/sna/sna_clnt.net** (Linux). For more information about this file, refer to the *IBM Communications Server for Data Center Deployment on Linux Administration Command Reference*.

On a client, you can use the NOF API to query configuration, initialize or activate sessions, and manage local logging and tracing options. You cannot modify a node's configuration, or start or stop resources on the node.

Windows Clients

The CS Linux Windows Client software can be installed on machines running Microsoft Windows XP, Windows 2003 Server, Windows Vista, Windows Server 2008, Windows 7, or Windows 8. Configuration information required by Windows Clients is managed through the Windows Registry.

For more information about the Windows Registry, and about managing Windows clients, refer to the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

On a client, you can use the NOF API to query configuration, initialize or activate sessions, and manage local logging and tracing options. You cannot modify a node's configuration, or start or stop resources on the node.

NOF Verbs to Manage Specific CS Linux Functions

The following sections list the NOF verbs that are relevant to particular CS Linux functions. For more information about individual verbs, see Chapter 3, "NOF API Verbs," on page 43.

Managing the Target (Node or File) for NOF Verbs

A NOF verb can be issued to a node, to the domain configuration file, or to the SNA network data file. To access the target node or file, use one of the following verbs:

- OPEN_FILE
- CONNECT_NODE

When you issue the verbs shown above to access the target, you are initially restricted to issuing verbs that query the configuration; you cannot issue verbs to modify it. If the NOF application is running on a server (not on a client), you can obtain write access to the target node or file so that you can issue verbs that modify the configuration. Use the following verb:

- SET_PROCESSING_MODE

To register for indications when the target configuration changes, use the following verb:

- REGISTER_INDICATION_SINK

To unregister when indications are no longer required, use the following verb:

- UNREGISTER_INDICATION_SINK

To release the target node or file when you have finished issuing NOF verbs, use one of the following verbs:

- DISCONNECT_NODE, CLOSE_FILE

You can issue OPEN_FILE, CONNECT_NODE, DISCONNECT_NODE, and CLOSE_FILE verbs, and NOF QUERY verbs, from an application running on a client, as well as from an application running on a server. You cannot issue any other NOF verbs from the client.

Getting Started

The first step is to define the CS Linux node that runs on each computer, and its communications links to other computers. To define these components, use the following verbs:

- DEFINE_NODE
- DEFINE_DLC, DEFINE_PORT, DEFINE_LS

After defining these components, activate them to establish the link to the remote system. (DLCs, ports, and LSs can be defined to be "initially active" using the

DEFINE_* verbs described previously, so that they are started automatically when the node is started; in this case, it is not necessary to start them manually.) To activate components, use the following verbs:

- INIT_NODE
- START_DLC, START_PORT, START_LS

The components must be started in the order shown because each component relies on the one before it.

To stop these components when access to the remote system is no longer required, use the following verbs:

- STOP_LS, STOP_PORT, STOP_DLC

To obtain information about the configuration or current status of these components, use the following verbs:

- QUERY_NODE
- QUERY_DLC, QUERY_PORT, QUERY_LS

To obtain information about the usage of an LS or port, use the following verb:

- QUERY_STATISTICS

To delete connectivity components when they are no longer required, use the following verbs:

- DELETE_DLC, DELETE_PORT, DELETE_LS

If you are communicating with many nodes on the same shared-access transport facility (SATF), you can set up a connection network (CN) to represent these nodes, instead of having to define explicit LSs to each node. CNs cannot be used if the local node is a LEN node.

To set up the CN, you first define a DLC and port to access each of the nodes on the SATF.

You then define a CN that includes all these ports; you do not need to define any LSs because a dynamic LS to the CN will be set up as required. To define the CN, or to add ports to an existing CN, use the following verb:

- DEFINE_CN

To obtain information about defined CNs, or about the ports on a CN, use the following verbs:

- QUERY_CN, QUERY_CN_PORT

To delete a CN when it is no longer required, or to remove ports from a CN without deleting the CN, use the following verb:

- DELETE_CN

To stop the node, which deactivates all resources associated with it, use the following verb:

- TERM_NODE

To define default parameters used by the node, or to query the definition of these parameters, use the following verbs:

- DEFINE_DEFAULTS, QUERY_DEFAULTS

To query the options and limits permitted by your CS Linux license for the node, use the following verb:

- QUERY_NODE_LIMITS

3270 Communications

If CS Linux users will be using 3270 emulation to communicate with host systems, you need to define the communications link to the host. For more information, see "Getting Started" on page 6. The definition of the LS to the host must include the name of a local PU to own the LUs required for 3270 emulation and must have the *solicit_sscp_sessions* parameter set to `AP_YES`.

You then need to define LUs that can be used for 3270 emulation. To do this, use the following verbs:

- DEFINE_LU_0_TO_3, DEFINE_LU_0_TO_3_RANGE

To obtain information about the configuration or current status of LUs, use the following verb:

- QUERY_LU_0_TO_3

To obtain information about the PU that owns an LU, use the following verb:

- QUERY_PU

To delete LUs when they are no longer required, use the following verbs:

- DELETE_LU_0_TO_3, DELETE_LU_0_TO_3_RANGE

If you want to provide LU pools (groups of LUs that can be assigned to user sessions as required, rather than having an LU explicitly defined for each user session), use the following verbs to define a pool, to obtain information about the definition, or to delete a pool or remove LUs from it when no longer required:

- DEFINE_LU_POOL, QUERY_LU_POOL, DELETE_LU_POOL

LUA Communications

If applications running on CS Linux will be using LUA to communicate with host programs, you need to define the communications link to the host. For more information, see "Getting Started" on page 6. The definition of the LS to the host must include the name of a local PU to own the LUs, and must have the *solicit_sscp_sessions* parameter set to `AP_YES`.

You then need to define LUs that can be used for LUA. To define the LUs, use the following verbs:

- DEFINE_LU_0_TO_3 to define an individual LU or DEFINE_LU_0_TO_3_RANGE to define multiple LUs with a single verb

To delete LUs when they are no longer required, use the following verbs:

- DELETE_LU_0_TO_3 to delete an individual LU or DELETE_LU_0_TO_3_RANGE to delete multiple LUs with a single verb

To obtain information about the configuration or current status of LUs, use the following verb:

- QUERY_LU_0_TO_3

To obtain information about the PU that owns an LU, use the following verb:

- QUERY_PU

If you want to provide LU pools (groups of LUs that can be assigned to applications as required, rather than having LUs explicitly defined for each application), use the following verbs to define a pool, to obtain information about the definition, or to delete a pool or remove LUs from it when no longer required:

- DEFINE_LU_POOL, QUERY_LU_POOL, DELETE_LU_POOL

If applications running on CS Linux will be using LUA to communicate with applications on downstream computers, you need to define the LUs on the downstream computer and map these to the LUs on the CS Linux node. To define the downstream LUs, use the following verbs:

- DEFINE_DOWNSTREAM_LU, DEFINE_DOWNSTREAM_LU_RANGE, DEFINE_DSPU_TEMPLATE

To obtain information about the configuration or current status of downstream LUs or about the downstream PU that serves them, use the following verbs:

- QUERY_DOWNSTREAM_LU, QUERY_DOWNSTREAM_PU, QUERY_DSPU_TEMPLATE

To delete downstream LUs when they are no longer required, use the following verbs:

- DELETE_DOWNSTREAM_LU, DELETE_DOWNSTREAM_LU_RANGE, DELETE_DSPU_TEMPLATE

APPC Communications

If applications running on CS Linux will be using APPC to communicate with applications running on host or peer computers, you need to define LUs that can be used for APPC.

APPC configuration in an APPN network is much simpler than in a pre-APPN SNA network. Many of the required components, and the interactions between them, can be defined or determined dynamically when sessions are started and do not need to be specified explicitly in the initial configuration.

Each node includes a default APPC local LU (the “control point LU”). An APPC application can use this LU, or you can define additional LUs so that different applications can use different LUs. To define the LUs, use the following verb:

- DEFINE_LOCAL_LU

To obtain information about the configuration or current status of LUs, including the control point LU, use the following verb:

- QUERY_LOCAL_LU

Because APPN can locate a partner LU dynamically when a local application needs to start a session to it, normally you do not need to define partner LUs. However, you may need to define partner LUs if you need to enforce the use of particular APPC features such as conversation security. To define a partner LU, use the following verb:

- DEFINE_PARTNER_LU

To obtain information about the current status of a partner LU or about its definition if it was explicitly defined, use the following verbs:

- QUERY_PARTNER_LU, QUERY_PARTNER_LU_DEFINITION

If the local application communicates with its partner using one of the standard SNA-defined modes, you do not need to define a mode. However, you may want to define additional modes for applications that have particular requirements not covered by the standard modes. To define a mode, use the following verb:

- DEFINE_MODE

To define or query the default mode, which specifies parameters that will be used for any unrecognized mode name, use the following verbs:

- DEFINE_DEFAULTS, QUERY_DEFAULTS

The class of service (COS) used for a mode is normally one of the standard SNA-defined classes of service. However, the node can be configured to support mapping each mode to a specific COS (the *mode_to_cos_map_supp* parameter on the DEFINE_NODE verb). In this case, you may want to define additional COSs for applications that have particular requirements not covered by the standard COSs. To define a COS, use the following verb:

- DEFINE_COS

To specify the default COS to which any unrecognized modes will be mapped, use the following verb:

- DEFINE_MODE

To obtain information about the definition or current usage of a mode, about the COS used by a mode, or about the definition of a COS, use the following verbs:

- QUERY_MODE_DEFINITION, QUERY_MODE, QUERY_MODE_TO_COS_MAPPING
- QUERY_COS, QUERY_COS_NODE_ROW, QUERY_COS_TG_ROW

If the local and partner LUs use session-level security, you need to define the password used to establish a session between the local LU and partner LU. To define the password, check the current definition, or delete the password when it is no longer required, use the following verbs:

- DEFINE_LU_LU_PASSWORD, QUERY_LU_LU_PASSWORD, DELETE_LU_LU_PASSWORD

To delete local LUs, partner LUs, modes, or COSs when they are no longer required, use the following verbs:

- DELETE_LOCAL_LU, DELETE_PARTNER_LU
- DELETE_MODE, DELETE_COS

CS Linux negotiates session limits with the partner LU automatically when sessions are established. If you need to manage session limits between a local LU and its partner LU explicitly, use the following verbs:

- INITIALIZE_SESSION_LIMIT, CHANGE_SESSION_LIMIT, RESET_SESSION_LIMIT

To manage individual sessions and conversations, use the following verbs:

- QUERY_SESSION, QUERY_ISR_SESSION, QUERY_CONVERSATION
- ACTIVATE_SESSION, DEACTIVATE_SESSION, DEACTIVATE_CONV_GROUP

Normally you do not need to define CS Linux invokable TPs if they are operator-started. If a TP is to be automatically started by CS Linux when a remote TP allocates a conversation to it, if it is to be operator-started and a broadcast queued TP (which means that incoming conversation requests can be routed dynamically to the TP wherever it is running), or if it is to be operator-started and requires a specific Receive_Allocate timeout value, you need to specify it in the CS Linux invokable TP data file. For more information about this file, refer to the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

In addition, if a TP (either operator-started or auto-started) needs to be restricted to particular values for conversation security, confirm synchronization, or conversation type (mapped or basic), or if you need to limit the number of instances of the TP that can be running at any time, you need to define the TP. Use the following verb:

- DEFINE_TP

To obtain information about the definition of a TP, about its current usage, or about currently active invokable TPs, use the following verbs:

- QUERY_TP_DEFINITION, QUERY_TP, QUERY_AVAILABLE_TP

To delete a defined TP when it is no longer required, use the following verb:

- DELETE_TP

If the invokable TP requires conversation-level security, you need to define user IDs and passwords that remote TPs can use to access CS Linux TPs. To define user IDs and passwords, check the current definitions, or delete user IDs and passwords when they are no longer required, use the following verbs:

- DEFINE_USERID_PASSWORD, QUERY_USERID_PASSWORD, DELETE_USERID_PASSWORD

To restrict the use of the TP to a specific list of authorized user IDs, check the current list of authorized user IDs, or delete a list of user IDs when it is no longer required, use the following verbs:

- DEFINE_SECURITY_ACCESS_LIST, QUERY_SECURITY_ACCESS_LIST, DELETE_SECURITY_ACCESS_LIST

CPI-C Communications

CPI-C applications use the same resources as APPC applications; the information in "APPC Communications" on page 9, applies to CPI-C as well as to APPC.

In addition, you can set up side information entries for use by CPI-C applications; each entry defines a particular partner application and the information required to access it. The local CPI-C application can then identify its partner application simply by the name of a side information entry, instead of having to specify explicit partner LU and TP names, mode name, and conversation security requirements. To define side information entries, check the current definitions, or delete entries when they are no longer required, use the following verbs:

- DEFINE_CPIC_SIDE_INFO, QUERY_CPIC_SIDE_INFO, DELETE_CPIC_SIDE_INFO

Managing HPR RTP Connections

To define tuning parameters to be used when setting up RTP connections, use the following verb:

- DEFINE_RTP_TUNING

To check the tuning parameters that are currently defined for use when setting up RTP connections, or to check details of currently active RTP connections, use the following verbs:

- QUERY_RTP_TUNING, QUERY_RTP_CONNECTION

Managing SNA Gateway

If the node supports SNA gateway (the *pu_conc_support* parameter on the DEFINE_NODE verb), to enable type 0–3 LUs on downstream computers to communicate with host systems using LUs defined on the CS Linux node, you must first define the following:

- A DLC, port, and LS from CS Linux to the downstream computer. For information about defining these components, see "Getting Started" on page 6. The LS must be defined with the following parameters:

  ```
  solicit_sscp_sessions   =  NO
  dspu_services    =  PU_CONCENTRATION

  dspu_name =  the name of the PU serving the LUs on the downstream computer
  pu_name  =  all zeros
  ```

- One or more type 0–3 LUs on the CS Linux node (and optionally an LU pool containing these LUs) for communications with the host. For information about defining LUs and LU pools, see "3270 Communications" on page 8.

You then define the LUs on the downstream computer and map these to the LUs on the CS Linux node. To define the downstream LUs, use the following verbs:

- DEFINE_DOWNSTREAM_LU, DEFINE_DOWNSTREAM_LU_RANGE

To obtain information about the configuration or current status of downstream LUs or about the downstream PU that serves them, use the following verbs:

- QUERY_DOWNSTREAM_LU, QUERY_DOWNSTREAM_PU

To delete downstream LUs when they are no longer required, use the following verbs:

- DELETE_DOWNSTREAM_LU, DELETE_DOWNSTREAM_LU_RANGE

Managing DLUR

If the node supports DLUR (the *dlur_support* parameter on the DEFINE_NODE verb), and LUs on the CS Linux node will be using DLUR to communicate with host systems, you need to define the PU on the local CS Linux node that owns these LUs. This is not the same as defining a PU for LUs that communicate directly with the host (which is done using the DEFINE_LS verb).

To define the PU, use the following verb:

- DEFINE_INTERNAL_PU

To obtain information about the PU, use the following verb:

- QUERY_PU

To define and manage the LUs associated with this PU, see "3270 Communications" on page 8 or "LUA Communications" on page 8, earlier in this section.

To start the PU (to request an ACTPU from the host) in order to use the LUs or to stop it when applications are no longer using the LUs, use the following verbs:

- START_INTERNAL_PU, STOP_INTERNAL_PU

To delete the PU when it is no longer required, use the following verb:

- DELETE_INTERNAL_PU

If the local node is a network node, and LUs on downstream PUs will be using DLUR to communicate with host systems, you need to define the communications link to the downstream PU, as described in "Getting Started" on page 6. The LS definition must specify that the local node provides DLUR services to the downstream PU.

You do not need to define the downstream PUs; CS Linux will obtain the necessary information dynamically when communications links are established. To obtain information about downstream PUs and LUs currently using DLUR, use the following verbs:

- QUERY_DOWNSTREAM_PU, QUERY_DOWNSTREAM_LU

To set up defaults to simplify DLUR configuration and reduce the information required on other DLUR verbs, use the following verb:

- DEFINE_DLUR_DEFAULTS

To obtain information about PUs and LUs currently using DLUR (either on the local node or on downstream PUs), or about the DLUS nodes they are using, use the following verbs:

- QUERY_DLUR_PU, QUERY_DLUR_LU, QUERY_DLUS

Managing TN Server

If TN3270 users will be using the TN server feature on a CS Linux node to communicate with host systems, you need to define the communications link to the host. For more information, see "Getting Started" on page 6. The definition of the LS to the host must include the name of a local PU to own the 3270 LUs and must have the *solicit_sscp_sessions* parameter set to `AP_YES`.

You then need to define LUs that can be used for 3270 emulation and optionally group these LUs into LU pools. For more information about defining LUs and pools, see "3270 Communications" on page 8.

To define parameters that apply to all TN Server users, use the following verb:

- DEFINE_TN3270_DEFAULTS

If you are using Secure Sockets Layer (SSL) client authentication, and checking clients against a certificate revocation list on an external LDAP server, you need to configure details of how to access this server. In addition, if the client users are permitted to use the TN3270 Express Logon feature, so that their security certificate authorization replaces the standard user ID and password normally used for TN3270 security, you need to configure the host Digital Certificate Access Server (DCAS) used to manage this feature. Use the following verbs:

- DEFINE_TN3270_SSL_LDAP
- DEFINE_TN3270_EXPRESS_LOGON

To define the TN3270 users that can access TN server and assign them to CS Linux 3270 LUs, use the following verb:

- DEFINE_TN3270_ACCESS

To define the association between TN3270 display and printer LUs, so that a TN3270E client can connect to the printer LU that is associated with a display LU without knowing the name of the printer LU, use the following verb:

- DEFINE_TN3270_ASSOCIATION

To obtain information about the configuration of TN Server and TN3270 users, use the following verbs:

- QUERY_TN3270_ACCESS_DEF, QUERY_TN3270_ASSOCIATION, QUERY_TN3270_DEFAULTS, QUERY_TN3270_SSL_LDAP, QUERY_TN3270_EXPRESS_LOGON

To delete TN3270 users so that they can no longer use TN server for 3270 emulation, or to delete LU association information, use the following verbs:

- DELETE_TN3270_ACCESS, DELETE_TN3270_ASSOCIATION

Managing TN Redirector

If Telnet users will be using the TN Redirector feature on a CS Linux node to communicate with host systems, you need to define these users and how they will access the host.

To define the TN3270 users that can access TN Redirector, use the following verb:

- DEFINE_TN_REDIRECT

If you are using Secure Sockets Layer (SSL) client authentication, and checking clients against a certificate revocation list on an external LDAP server, you need to configure details of how to access this server. In addition, if the client users are permitted to use the TN3270 Express Logon feature, so that their security certificate authorization replaces the standard user ID and password normally used for TN3270 security, you need to configure the host Digital Certificate Access Server (DCAS) used to manage this feature. Use the following verbs:

- DEFINE_TN3270_SSL_LDAP

To obtain information about the configuration of TN Redirector and TN Redirector users, use the following verbs:

- QUERY_TN_REDIRECT_DEF, QUERY_TN3270_SSL_LDAP

To delete TN Redirector users so that they can no longer use TN Redirector to access the host, use the following verb:

- DELETE_TN_REDIRECT

Managing SNA Management Services Functions

If applications running on CS Linux will be using the MS API to communicate with remote MS applications, you do not need to define any resources for this explicitly, because the node will locate the appropriate remote applications as required. However, you can define the resources explicitly if you want to specify a particular remote application to use.

To specify a default PU for use by NMVT-level applications (so that they access the NetView® program at a specific host), use the following verb:

- DEFINE_DEFAULT_PU

To specify a focal point application for use by MDS-level applications (instead of enabling the remote focal point application to determine which nodes it manages), use the following verb:

- DEFINE_FOCAL_POINT

To obtain information about the focal point currently in use, or to delete a previously defined focal point, use the following verbs:

- QUERY_FOCAL_POINT, DELETE_FOCAL_POINT

To obtain information about active applications (NMVT-level or MDS-level) using MS functions, use the following verbs:

- QUERY_NMVT_APPLICATION, QUERY_MDS_APPLICATION

To obtain information about outstanding requests from MDS-level applications, or to obtain statistical information about previous requests, use the following verbs:

- QUERY_ACTIVE_TRANSACTION, QUERY_MDS_STATISTICS

Managing Access to the CS Linux System from the Host NetView Program

If you want to enable operators at the host NetView console to issue commands on the CS Linux computer using either the Service Point Command Facility (SPCF) or the UNIX Command Facility (UCF), you need to define the access permissions for these operators.

To define these permissions and enable NetView operators to access SPCF or UCF or both, use the following verb:

- DEFINE_RCF_ACCESS

To check the permissions currently defined, use the following verb:

- QUERY_RCF_ACCESS

To prevent operators from using either SPCF or UCF, use the following verb:

- DELETE_RCF_ACCESS

To remove access to one function but leave the other available, use the following verb:

- DEFINE_RCF_ACCESS

Managing Diagnostics Settings

The CS Linux default setting for log messages is to log problem and exception messages but not audit messages, and to use local logging (messages from each server are written to a file on that server) rather than central logging (messages from all servers are sent to a central log file on the master server). Succinct logging is used (that is, logging of header parameters and message text, but not full details of cause and action for each message). The error log file, used for problem and exception messages, is **/var/opt/ibm/sna/sna.err**; the audit log file, used for audit messages if these are enabled, is **/var/opt/ibm/sna/sna.aud**. Each of these files is backed up and reset when the file size reaches 10 megabytes. The default settings for succinct logging, exception and audit logging, file names, and file sizes can all be overridden using NOF verbs, as described in the following information.

The verbs to manage central logging and global logging options apply to clients as well as to servers. However, other diagnostics settings on Windows clients are controlled by options in the Windows Registry, and not by NOF verbs. For more information, refer to the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

CS Linux also maintains a usage log file **/var/opt/ibm/sna/sna.usage**, which is used to record information about the current and peak usage of CS Linux resources. This file is backed up and reset in the same way as the error and audit log files, and the file name and file size can be specified in the same way.

To specify whether central logging is enabled, use the following verb:

- SET_CENTRAL_LOGGING

To specify whether exception messages or audit messages or both are logged, or to specify whether succinct logging or full logging is to be used, either to establish global default settings for all servers or to override the defaults for a particular server, use the following verbs:

- SET_GLOBAL_LOG_TYPE, SET_LOG_TYPE

To change the file names or directories used for log messages or to change the size at which files are backed up and reset, use the following verb:

- SET_LOG_FILE

To check which server is currently defined as the central logger or to check whether central logging is enabled, use the following verbs:

- QUERY_CENTRAL_LOGGER, QUERY_CENTRAL_LOGGING

To check the types of messages being recorded or to check whether succinct logging or full logging is being used, either globally or on a particular server, use the following verbs:

- QUERY_GLOBAL_LOG_TYPE, QUERY_LOG_TYPE

To check the file, file size, or directory being used for a particular log type, use the following verb:

- QUERY_LOG_FILE

If you want to activate tracing to diagnose problems with connectivity components on a particular CS Linux node or to deactivate it after collecting the required data, use the following verbs:

- ADD_DLC_TRACE, REMOVE_DLC_TRACE

If you want to activate tracing to diagnose problems with other CS Linux kernel components or to deactivate it after collecting the required data, use the following verb:

- SET_TRACE_TYPE

If you want to activate tracing to diagnose problems with communications between clients and servers across the CS Linux LAN or to deactivate it after collecting the required data, use the following verb:

- SET_CS_TRACE

If you want to activate tracing to diagnose problems with the CS Linux TN server feature or to deactivate it after collecting the required data, use the following verbsverb:

- SET_TN_SERVER_TRACE

The default files used for trace data are as follows:

- **/var/opt/ibm/sna/sna1.trc** and **/var/opt/ibm/sna/sna2.trc** for tracing on a particular computer
- **/var/opt/ibm/sna/snacs1.trc** and **/var/opt/ibm/sna/snacs2.trc** for LAN tracing
- **/var/opt/ibm/sna/snatnsv1.trc** and **/var/opt/ibm/sna/snatnsv2.trc** for TN server tracing

If you want to use different files or directories for either of these trace types or to send all tracing of a particular type to one file instead of two files, use the following verb:

- SET_TRACE_FILE

To check the current settings for a particular trace type or to check the files used for a particular trace type, use the following verbs:

- QUERY_DLC_TRACE, QUERY_TRACE_TYPE, QUERY_CS_TRACE, QUERY_TN_SERVER_TRACE, QUERY_TRACE_FILE

Managing Directory Entries

If the local node is a LEN node, you need to set up entries in the local node's directory to identify the adjacent nodes that CS Linux will communicate with and the LUs associated with these nodes. If a particular node contains a range of LUs with similar names, you can set up wildcard entries in the directory to indicate that all LUs in the range are on the specified node.

To define a node and the LUs associated with it, use the following verb:

- DEFINE_ADJACENT_LEN_NODE

To obtain information about a specific node or LU entry in the database (however, this verb cannot be used to return information about wildcard entries), use the following verb:

- QUERY_DIRECTORY_ENTRY

To obtain information about a specific LU entry or wildcard entry in the database, use the following verb:

- QUERY_DIRECTORY_LU

To obtain statistical information about directory entries, use the following verb:

- QUERY_DIRECTORY_STATS

To delete a node and the LUs associated with it or to delete LUs from a node entry, use the following verb:

- DELETE_ADJACENT_LEN_NODE

If the local node is an end node or network node communicating with a LEN node, or if the local node is the network node serving a LEN node, you need to set up directory entries for the LEN node and its LUs, using the verbs described above. For communications with other node types, you do not need to set up

directory entries because the node will locate these resources dynamically as required (and add them to the directory so that they can be used again).

However, you may want to set up entries for particular nodes or LUs so that the local node can communicate with these resources without having to search for them. Because setting up entries for particular nodes or LUs overrides the normal APPN resource location process, you can have problems at this node or at other nodes in the network if the definitions are not correct. Do not define explicit entries for resources at other nodes unless you are sure that the definitions are correct.

To define an individual node, LU, or wildcard entry for a range of LUs, use the following verb:

- DEFINE_DIRECTORY_ENTRY

To delete an individual node, LU, or wildcard entry from the directory, use the following verb:

- DELETE_DIRECTORY_ENTRY

Delete only directory entries that were explicitly defined using the verbs described previously (these entries return an entry type of `HOME` on the QUERY_DIRECTORY_ENTRY verb). Do not use this verb to delete cached entries (entries that have been set up dynamically as a result of network searches).

Querying the Network Topology

To obtain information (on a network node) about adjacent network nodes, use the following verb:

- QUERY_ADJACENT_NN

To obtain information about the TGs to adjacent network nodes, use the following verb:

- QUERY_LOCAL_TOPOLOGY

To obtain information (on a network node) about network nodes and virtual routing nodes (VRNs) in the network, or about the TGs to these nodes, use the following verbs:

- QUERY_NN_TOPOLOGY_NODE, QUERY_NN_TOPOLOGY_TG

To obtain statistical information (on a network node) about the use of entries in the local node's topology database, use the following verb:

- QUERY_NN_TOPOLOGY_STATS

Checking the Communications Path to a Remote LU

To check that a particular target LU can be accessed (that the node owning the LU is active and that there is a communications path to the LU), use the following verb:

- APING

Managing Servers and Clients on the CS Linux LAN

To obtain a list of servers (nodes) on the CS Linux LAN, use the following verb:

- QUERY_NODE_ALL

To obtain detailed information about a particular node, use the following verb:

- QUERY_NODE

To find out which servers are acting as the master configuration file server and backup master servers, use the following verb:

- QUERY_SNA_NET

To add new backup master servers to the list or to remove existing servers from the list so that they can no longer act as master servers, use the following verbs:

- ADD_BACKUP, DELETE_BACKUP

To obtain a list of Remote API Clients (on AIX, Linux or Windows) using a particular server on the CS Linux LAN, use the following verb:

- QUERY_RAPI_CLIENTS

Managing Configuration File Header Information

To add a descriptive comment string to the domain configuration file, use the following verb:

- DEFINE_DOMAIN_CONFIG_FILE

To obtain information about the CS Linux version number for which the domain configuration file was created or about the comment string stored in it, use the following verb:

- QUERY_DOMAIN_CONFIG_FILE

There are no corresponding verbs for the node configuration file because the header information in the node configuration file is for CS Linux internal use only; do not attempt to modify it.

Managing Linux Resource Usage

To set a limit on the amount of kernel memory that CS Linux can use for internal data structures or to specify the maximum amount of memory available for STREAMS buffers, use the following verbs:

- SET_KERNEL_MEMORY_LIMIT, SET_BUFFER_AVAILABILITY

To obtain information about the current limits and usage, use the following verbs:

- QUERY_KERNEL_MEMORY_LIMIT, QUERY_BUFFER_AVAILABILITY

NOF Indications

A NOF application can use the REGISTER_INDICATION_SINK verb to request information about changes to the CS Linux configuration or to the status of its resources. CS Linux then sends an indication message to the application each time a change occurs.

For more details of the indications that an application can request, see Chapter 4, “NOF Indications,” on page 675.

Except for CONFIG_INDICATION, NOF_STATUS_INDICATION, and SNA_NET_INDICATION, each indication is returned when a resource of the specified type changes its status. For example, if the application registers for DLC indications, CS Linux sends a DLC_INDICATION message to the application each time a DLC becomes active or inactive.

An indication returns summary information about the change that has occurred. If necessary, the application can then issue the appropriate QUERY_* verb to obtain more detailed information.

If the local node is short of resources, it can temporarily suppress indications and not send them to applications. When the resource shortage condition clears, and the local node subsequently generates an indication of a type that it has previously suppressed, it then sets a parameter on the indication to inform the application that one or more previous indications of this type have been lost. The application should then issue QUERY_* verbs for the appropriate resource type to determine the current state of resources.

For more information about registering to receive indications, see "REGISTER_INDICATION_SINK" on page 625. For more information about individual indications, see Chapter 4, "NOF Indications," on page 675.

Configuration Indications

An application can register to receive information about changes to the configuration of a particular target (the domain configuration file, a running node, or an inactive node). This enables it to keep track of changes that can be made by other NOF applications or by the administration programs. To do this, the application registers as for other indications, specifying CONFIG_INDICATION as the requested indication type.

No specific VCB structure is associated with this indication type. Instead, when a change to the configuration occurs, CS Linux indicates this change to the application by sending a copy of the completed VCB from the NOF verb that made the change.

For more information about configuration indications, see "CONFIG_INDICATION" on page 675.

SNA Network File Indications

An application can register to receive information about changes to the SNA network file **sna.net** on the master server. This enables the application to keep track of changes to this file that can be made by other NOF applications or by the command-line administration program. To do this, the application registers as for other indications, specifying SNA_NET_INDICATION as the requested indication type.

Two VCB structures are associated with this indication type:

- ADD_BACKUP (indicating that a backup server has been added to the end of the file)
- DELETE_BACKUP (indicating that an unused backup server has been removed from the file)

Registering with a type of SNA_NET_INDICATION will return an ADD_BACKUP indication when a backup server is added or a DELETE_BACKUP indication when a server is deleted; the application does not need to register separately for each of these indications. In each case, the format of the indication is a copy of the completed VCB from the NOF verb that made the change.

For more information about SNA network file indications, see "SNA_NET_INDICATION" on page 730.

NOF Status Indications

CS Linux sends a NOF status indication to a registered NOF application when the application can no longer access its target node or file (because the CS Linux software on the target computer has been stopped or because the communications path to this computer has been lost). If the application is registered to receive indications from the master configuration file, this indication is also returned if another server takes over as master (and therefore the target file is no longer the master configuration file).

The application does not need to register explicitly to receive this indication; CS Linux returns it to any application that has registered for any type of NOF indications on the appropriate target. The indication is returned on the callback routine that the application supplied to the REGISTER_INDICATION_SINK verb (or to the first REGISTER_INDICATION_SINK verb, if the application has issued more than one).

After the application receives an indication that the target has failed, all subsequent verbs using the relevant target handle will be rejected, except for DISCONNECT_NODE or CLOSE_FILE (to free the target handle). In addition, any registrations for indications on this target handle will be lost; in order to continue receiving indications when the target becomes available, the application must connect again to the target and register again for the required indications.

For more information about NOF status indications, see Chapter 4, “NOF Indications,” on page 675.

Chapter 2. Writing NOF Applications

This chapter describes the following:

- Client/Server considerations

UNIX

- AIX or Linux considerations
  - NOF API entry points for Linux
  - Compiling and linking the NOF application

WINDOWS

- Windows considerations
  - NOF API entry points for Windows
  - Compiling and linking the NOF application

- Writing portable applications
- Target (node or file) for NOF verbs, and how they interact with the target
- Ordering and dependencies between NOF verbs
- NOF restrictions based on node configuration
- How to request single or multiple data entries with QUERY_* verbs

Client/Server Considerations

In a client/server system, you can use any NOF verbs in an application running on a server. Applications running on Remote API Clients can use NOF verbs as follows.

- They can use QUERY_* verbs to query configuration or status information.
- They can use verbs to activate sessions or initialize session limits, or to manage logging and Client/Server tracing. The NOF application must run with the userid `root`, or with a userid that is a member of the `sys` group (AIX) or `sna` group (Linux), in order to use these commands.
- They cannot use other verbs to modify the configuration or to start or stop resources. If your NOF application needs to modify the configuration or to start or stop resources, you must write it for Linux and run it on a server.

AIX or Linux Considerations

UNIX

This section describes operating system issues that you need to consider when writing NOF applications for use in the AIX or Linux environment.

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NOF API Entry Points for AIX or Linux

An application accesses the NOF API using the following entry point function calls:

nof Issues a NOF verb synchronously. CS Linux does not return control to the application until verb processing has finished. All NOF verbs except REGISTER_INDICATION_SINK and UNREGISTER_INDICATION_SINK can be issued through this entry point.

An application can use this entry point only if the application can suspend while waiting for CS Linux to completely process a verb.

nof_async
Issues a NOF verb asynchronously. CS Linux returns control to the application immediately, with a returned value indicating whether verb processing is still in progress or has completed. If the returned value indicates that verb processing is still in progress, CS Linux uses an application-supplied callback routine to return the results of the verb processing. In cases when CS Linux is able to completely process the request, the callback routine will not be invoked.

All NOF verbs can be issued through this entry point. The REGISTER_INDICATION_SINK and UNREGISTER_INDICATION_SINK verbs must be issued through this entry point.

An application must use this entry point if either of the following conditions is true:

- The application needs to receive NOF indications.
- The application cannot suspend while waiting for CS Linux to completely process a verb.

nof_async callback routine
When using the asynchronous NOF API entry point, the application must supply a pointer to a callback routine. CS Linux uses this callback routine both for completion of a verb and also for returning NOF data and status indications.

The `nof` and `nof_async` entry points are defined in the NOF header file **nof_c.h**. Parameter types such as `AP_UINT32`, used in these entry points and in the NOF VCBs, are defined in the common header file **values_c.h**, which is included by the NOF header file **nof_c.h**. Both of these files are stored in **/usr/include/sna** (AIX) or **/opt/ibm/sna/include** (Linux).

Synchronous Entry Point: nof

An application uses the `nof` entry point to issue a NOF verb synchronously. CS Linux does not return control to the application until verb processing has finished.

Function Call:

```
void nof (
        AP_UINT32      target_handle,
        void *         nofvcb
        );
```

Supplied Parameters: An application supplies the following parameters when it uses the `nof` entry point:

target_handle
An identifier that the application uses to identify the target CS Linux node or file. This parameter is supplied in one of the following ways:

- For the following verbs, this parameter is not supplied; set it to 0 (zero). If the verb completes successfully, CS Linux returns the target handle as one of the VCB parameters. The application then uses the target handle for subsequent verbs.
  - CONNECT_NODE (to access a running node, or to access the node on a server where the CS Linux software is started but the node is not yet started)
  - OPEN_FILE (to access the domain configuration fileor the SNA network data file)
- For the following verbs, the application supplies a null value:
  - QUERY_NODE_ALL (to obtain a list of running nodes)
  - QUERY_CENTRAL_LOGGER
- For all other NOF verbs, the application supplies the value that was returned on the CONNECT_NODE or OPEN_FILE verb.

nofvcb Pointer to a Verb Control Block (VCB) that contains the parameters for the verb being issued. The VCB structure for each verb is described in Chapter 3, "NOF API Verbs," on page 43. These structures are defined in the NOF API header file **/usr/include/sna/nof_c.h** (AIX) or **/opt/ibm/sna/include/nof_c.h** (Linux).

Note: The NOF VCBs contain many parameters marked as "reserved"; some of these are used internally by the CS Linux software, and others are not used in this version but may be used in future versions. Your application must not attempt to access any of these reserved parameters; instead, it must set the entire contents of the VCB to zero to ensure that all of these parameters are zero, before it sets other parameters that are used by the verb. This ensures that CS Linux will not misinterpret any of its internally-used parameters, and also that your application will continue to work with future CS Linux versions in which these parameters may be used to provide new functions.

To set the VCB contents to zero, use `memset`:

```
memset(nofvcb, 0, sizeof(nofvcb));
```

Returned Values: The `nof` entry point does not have a return value. When the call returns, the application should examine the return code in the VCB to determine whether the verb completed successfully and to determine parameters it needs for further verbs. In particular, when the CONNECT_NODE or OPEN_FILE verb completes successfully, the VCB contains the *target_handle* that the application should use when issuing subsequent verbs.

Using the Synchronous Entry Point: Only one synchronous verb can be outstanding at any time for each target handle. A synchronous verb fails with the primary return code `AP_STATE_CHECK` and secondary return code `AP_SYNC_PENDING` if another synchronous verb for the same target handle is in progress.

Asynchronous Entry Point: nof_async

An application uses `nof_async` to issue a NOF verb asynchronously. The application also supplies a pointer to a callback routine. CS Linux returns control to the application immediately with a returned value that indicates whether verb processing is still in progress or has completed. In most cases, verb processing is still in progress when control returns to the application. In these cases, CS Linux

uses the application-supplied callback routine to return the results of the verb processing at a later time. In some cases, verb processing is complete when CS Linux returns control to the application, so CS Linux does not use the application's callback routine.

Function Call:

```
AP_UINT16  nof_async(
                     AP_UINT32      target_handle,
                     void *         nofvcb,
                     NOF_CALLBACK   (*comp_proc),
                     AP_CORR        corr
                    );

typedef void (*NOF_CALLBACK) (
                              AP_UINT32      target_handle,
                              void *         nofvcb,
                              AP_CORR        corr
                              AP_UINT32      indic_length
                              );

typedef union ap_corr  {
                         void *         corr_p;
                         AP_UINT32      corr_l;
                         AP_INT32       corr_i;
                       } AP_CORR;
```

For more information about the parameters in the NOF_CALLBACK structure, see "The Callback Routine Specified on the nof_async Entry Point" on page 28.

Supplied Parameters: An application supplies the following parameters when it uses the nof_async entry point:

target_handle

This parameter is supplied in one of the following ways:

- For the following verbs, this parameter is not used; set it to 0 (zero). If the verb completes successfully, CS Linux returns the target handle as one of the VCB parameters. The application then uses the target handle for subsequent verbs.
  - CONNECT_NODE (to access a running node, or to access the node on a server where the CS Linux software is started but the node is not yet started)
  - OPEN_FILE (to access the domain configuration fileor the SNA network data file)
- For the following verbs, the application supplies a null value:
  - QUERY_NODE_ALL (to obtain a list of running nodes)
  - QUERY_CENTRAL_LOGGER
- For all other NOF verbs, the application supplies the value that was returned on the CONNECT_NODE or OPEN_FILE verb.

nofvcb Pointer to a Verb Control Block (VCB) that contains the parameters for the verb being issued. The VCB structure for each verb is described in Chapter 3, "NOF API Verbs," on page 43. These structures are defined in the NOF API header file **/usr/include/sna/nof_c.h** (AIX) or **/opt/ibm/sna/include/nof_c.h** (Linux).

Note: The NOF VCBs contain many parameters marked as "reserved"; some of these are used internally by the CS Linux software, and others are not used in this version but may be used in future

versions. Your application must not attempt to access any of these reserved parameters; instead, it must set the entire contents of the VCB to zero to ensure that all of these parameters are zero, before it sets other parameters that are used by the verb. This ensures that CS Linux will not misinterpret any of its internally-used parameters, and also that your application will continue to work with future CS Linux versions in which these parameters may be used to provide new functions.

To set the VCB contents to zero, use `memset`:

memset(nofvcb, 0, sizeof(nofvcb));

comp_proc
The callback routine that CS Linux will call when the verb completes. For more information about the requirements for a callback routine, see "The Callback Routine Specified on the nof_async Entry Point" on page 28.

corr An optional correlator for use by the application. This parameter is defined as a C union so that the application can specify any of three different parameter types: pointer, 32–bit integer, or 16–bit integer.

CS Linux does not use this value, but passes it as a parameter to the callback routine when the verb completes. This value enables the application to correlate the returned information with its other processing.

Returned Values: The asynchronous entry point returns one of the following values:

AP_COMPLETED
The verb has already completed. The application can examine the parameters in the VCB to determine whether the verb completed successfully. CS Linux does not call the supplied callback routine for this verb.

AP_IN_PROGRESS
The verb has not yet completed. The application can continue with other processing, including issuing other NOF verbs, provided that they do not depend on the completion of the current verb. However, the application should not attempt to examine or modify the parameters in the VCB supplied to this verb.

CS Linux calls the supplied callback routine to indicate when the verb processing completes. The application can then examine the VCB parameters.

Using the Asynchronous Entry Point: When using the asynchronous entry point, note the following:

- If an application specifies a null pointer in the *comp_proc* parameter, the verb will complete synchronously (as though the application issued the verb using the synchronous entry point).
- If the call to `nof_async` is made from within an application callback, specifying a null pointer in the *comp_proc* parameter is not permitted. In such cases, CS Linux rejects the verb with a primary return code value of `AP_PARAMETER_CHECK` and a secondary return code value of `AP_SYNC_NOT_ALLOWED`.
- The application must not attempt to use or modify any parameters in the VCB until the callback routine has been called.

- Multiple verbs do not necessarily complete in the order in which they were issued. In particular, if an application issues an asynchronous verb followed by a synchronous verb, the completion of the synchronous verb does not guarantee that the asynchronous verb has already completed.

The Callback Routine Specified on the nof_async Entry Point

When using the asynchronous NOF API entry point, the application must supply a pointer to a callback routine. CS Linux uses this callback routine both for completion of a verb and also for returning NOF indications. (The REGISTER_INDICATION_SINK verb is also issued as an asynchronous verb that specifies a callback routine; the callback is called each time the indication is received. For other NOF verbs, an indication is received when the verb completes.) The application must examine the *opcode* parameter in the VCB to determine which event is contained in the callback routine.

This section describes how CS Linux uses the callback routine and the functions that the callback routine must perform.

Callback Function:

```
NOF_CALLBACK (*comp_proc);
typedef void (*NOF_CALLBACK) (
                               AP_UINT32      target_handle,
                               void *         nofvcb,
                               AP_CORR        corr
                               AP_UINT32      indic_length
                              );
typedef union ap_corr  {
                         void *         corr_p;
                         AP_UINT32      corr_l;
                         AP_INT32       corr_i;
                       } AP_CORR;
```

Supplied Parameters: CS Linux calls the callback routine with the following parameters:

target_handle
: For NOF indications, CS Linux passes the target handle that was supplied with the REGISTER_INDICATION_SINK verb. For completion of verbs, this parameter is undefined.

nofvcb One of the following:

- For NOF indications, a pointer to a VCB supplied by CS Linux.
- For completion of verbs, a pointer to the VCB supplied by the application. The VCB now includes the returned parameters set by CS Linux.

corr The correlator value supplied by the application. This value enables the application to correlate the returned information with its other processing.

The callback routine need not use all of these parameters (except as described in "Using the Callback Routine for Indications"). The callback routine can perform all the necessary processing on the returned parameters, or it can simply set a variable to inform the NOF application that the verb has completed.

Returned Values: The callback function does not return any values.

Using the Callback Routine for Indications: Although the application allocates the VCBs for NOF verbs, CS Linux allocates the VCBs for indications. Therefore, the application has access to the VCB information only from within the callback

routine; the VCB pointer that CS Linux supplies to the callback routine is not valid outside the callback routine. The application must either complete all the required processing from within the callback routine, or make a copy of any VCB data that it needs to use outside this routine.

Scope of Target Handle

Each application that needs to use NOF must issue the CONNECT_NODE verb to obtain its own handle. No two NOF applications can use the same NOF target handle.

In particular, if the application that issued CONNECT_NODE later forks to create a child process, the child process cannot issue any NOF verbs that use the target handle obtained by the parent process. However, the child process can issue another CONNECT_NODE to obtain its own target handle.

Compiling and Linking the NOF Application

AIX Applications

To compile and link 32–bit applications, use the following options:

-bimport:/usr/lib/sna/nof_r.exp -I /usr/include/sna

To compile and link 64–bit applications, use the following options:

-bimport:/usr/lib/sna/nof_r64_5.exp -I /usr/include/sna

Linux Applications

Before compiling and linking a NOF application, specify the directory where shared libraries are stored, so that the application can find them at run time. To do this, set the environment variable `LD_RUN_PATH` to **/opt/ibm/sna/lib**, or to **/opt/ibm/sna/lib64** if you are compiling a 64–bit application.

To compile and link 32–bit applications, use the following options:

-I /opt/ibm/sna/include -L /opt/ibm/sna/lib -lnof -lsna_r -lpthread -lpLiS

To compile and link 64–bit applications, use the following options:

-I /opt/ibm/sna/include -L /opt/ibm/sna/lib64 -lnof -lsna_r -lpthread -lpLiS

The option `-lpLiS` is required only if you will be running the application on a CS Linux server; you do not need to use it if you are building the application on an IBM Remote API Client and it will run only on the client. As an alternative to using this option, you can set the the environment variable `LD_PRELOAD` to **/usr/lib/libpLiS.so** before compiling and linking the application.

Windows Considerations

WINDOWS

This section describes operating system issues that you need to consider when writing NOF applications for use on Windows clients.

Note that applications running on Remote API Clients on Windows can use NOF QUERY_* verbs to query configuration or status information, but cannot use other verbs to modify the configuration or to start or stop resources. If your NOF application needs to modify the configuration or to start or stop resources, you must write it for Linux and run it on a server.

NOF API Entry Points for Windows

A Windows NOF application accesses the NOF API using the following entry point function calls:

nof Issues a NOF verb synchronously. The Remote API does not return control to the application until verb processing has finished.

An application can use this entry point only if the application can suspend while waiting for the Remote API to completely process a verb.

nof_async
Issues a NOF verb asynchronously. The Remote API returns control to the application immediately, with a returned value indicating whether verb processing is still in progress or has completed. If the returned value indicates that verb processing is still in progress, it will later complete asynchronously; the Remote API indicates the completion by signaling an event handle supplied by the application. In cases when the Remote API is able to completely process the request, the event handle will not be signaled.

An application must use this entry point if it cannot suspend while waiting for the Remote API to completely process a verb.

The `nof` and `nof_async` entry points are defined in the NOF header file **winnof.h**; this file is installed in the subdirectory in the subdirectory **\sdk** for 32–bit applications, or **\sdk64** for 64–bit applications, within the directory where you installed the Windows Client software. Parameter types such as `AP_UINT32`, used in these entry points and in the NOF VCBs, are defined in the common header file **values_c.h**, which is installed in the same directory and is included by the NOF header file **winnof.h**.

Synchronous Entry Point: nof

An application uses the `nof` entry point to issue a NOF verb synchronously. The Remote API does not return control to the application until verb processing has finished.

Function Call:

```
void WINAPI nof (
                 AP_UINT32      target_handle,
                 void *         nofvcb
                );
```

Supplied Parameters: An application supplies the following parameters when it uses the `nof` entry point:

target_handle
An identifier that the application uses to identify the target CS Linux node or file. This parameter is supplied in one of the following ways:

- For the following verbs, this parameter is not supplied; set it to 0 (zero). If the verb completes successfully, the Remote API returns the target handle as one of the VCB parameters. The application then uses the target handle for subsequent verbs.
  - CONNECT_NODE (to access a running node, or to access the node on a server where the CS Linux software is started but the node is not yet started)
  - OPEN_FILE (to access the domain configuration file or the SNA network data file)
- For the following verbs, the application supplies a null value:
  - QUERY_NODE_ALL (to obtain a list of running nodes)
  - QUERY_CENTRAL_LOGGER
- For all other NOF verbs, the application supplies the value that was returned on the CONNECT_NODE or OPEN_FILE verb.

nofvcb Pointer to a Verb Control Block (VCB) that contains the parameters for the verb being issued. The VCB structure for each verb is described in Chapter 3, "NOF API Verbs," on page 43. These structures are defined in the NOF API header file **nof_c.h**.

Note: The NOF VCBs contain many parameters marked as "reserved"; some of these are used internally by the CS Linux software, and others are not used in this version but may be used in future versions. Your application must not attempt to access any of these reserved parameters; instead, it must set the entire contents of the VCB to zero to ensure that all of these parameters are zero, before it sets other parameters that are used by the verb. This ensures that CS Linux will not misinterpret any of its internally-used parameters, and also that your application will continue to work with future CS Linux versions in which these parameters may be used to provide new functions.

To set the VCB contents to zero, use memset:

```
memset(nofvcb, 0, sizeof(nofvcb));
```

Returned Values: The nof entry point does not have a return value. When the call returns, the application should examine the return code in the VCB to determine whether the verb completed successfully and to determine parameters it needs for further verbs. In particular, when the CONNECT_NODE or OPEN_FILE verb completes successfully, the VCB contains the *target_handle* that the application should use when issuing subsequent verbs.

Using the Synchronous Entry Point: Only one synchronous verb can be outstanding at any time for each target handle. A synchronous verb fails with the primary return code AP_STATE_CHECK and secondary return code AP_SYNC_PENDING if another synchronous verb for the same target handle is in progress.

Asynchronous Entry Point: nof_async

An application uses nof_async to issue a NOF verb asynchronously. The application also supplies a pointer to a callback routine. The Remote API returns control to the application immediately with a returned value that indicates whether verb processing is still in progress or has completed. In most cases, verb processing is still in progress when control returns to the application. In these cases, the Remote API uses the application-supplied callback routine to return the results of

the verb processing at a later time. In some cases, verb processing is complete when the Remote API returns control to the application, so the Remote API does not use the application's callback routine.

Function Call:

```
AP_UINT16 WINAPI nof_async(
                           AP_UINT32      target_handle,
                           void *         nofvcb,
                           NOF_CALLBACK   (*comp_proc),
                           AP_CORR        corr
                          );

typedef void (*NOF_CALLBACK) (
                              AP_UINT32      target_handle,
                              void *         nofvcb,
                              AP_CORR        corr
                              AP_UINT32      indic_length
                              );

typedef union ap_corr  {
                         void *         corr_p;
                         AP_UINT32      corr_l;
                         AP_INT32       corr_i;
                       } AP_CORR;
```

For more information about the parameters in the NOF_CALLBACK structure, see "The Callback Routine Specified on the nof_async Entry Point" on page 34.

Supplied Parameters: An application supplies the following parameters when it uses the nof_async entry point:

target_handle

This parameter is supplied in one of the following ways:

- For the following verbs, this parameter is not used; set it to 0 (zero). If the verb completes successfully, the Remote API returns the target handle as one of the VCB parameters. The application then uses the target handle for subsequent verbs.
  - CONNECT_NODE (to access a running node, or to access the node on a server where the CS Linux software is started but the node is not yet started)
  - OPEN_FILE (to access the domain configuration file or the SNA network data file)
- For the following verbs, the application supplies a null value:
  - QUERY_NODE_ALL (to obtain a list of running nodes)
  - QUERY_CENTRAL_LOGGER
- For all other NOF verbs, the application supplies the value that was returned on the CONNECT_NODE or OPEN_FILE verb.

nofvcb Pointer to a Verb Control Block (VCB) that contains the parameters for the verb being issued. The VCB structure for each verb is described in Chapter 3, "NOF API Verbs," on page 43. These structures are defined in the NOF API header file **nof_c.h**.

Note: The NOF VCBs contain many parameters marked as "reserved"; some of these are used internally by the CS Linux software, and others are not used in this version but may be used in future versions. Your application must not attempt to access any of these reserved parameters; instead, it must set the entire contents of the

VCB to zero to ensure that all of these parameters are zero, before it sets other parameters that are used by the verb. This ensures that CS Linux will not misinterpret any of its internally-used parameters, and also that your application will continue to work with future CS Linux versions in which these parameters may be used to provide new functions.

To set the VCB contents to zero, use `memset`:

memset(nofvcb, 0, sizeof(nofvcb));

comp_proc
The callback routine that the Remote API will call when the verb completes. For more information about the requirements for a callback routine, see "The Callback Routine Specified on the nof_async Entry Point" on page 34.

corr An optional correlator for use by the application. This parameter is defined as a C union so that the application can specify any of three different parameter types: pointer, 32–bit integer, or 16–bit integer.

The Remote API does not use this value, but passes it as a parameter to the callback routine when the verb completes. This value enables the application to correlate the returned information with its other processing.

Returned Values: The asynchronous entry point returns one of the following values:

AP_COMPLETED
The verb has already completed. The application can examine the parameters in the VCB to determine whether the verb completed successfully. The Remote API does not call the supplied callback routine for this verb.

AP_IN_PROGRESS
The verb has not yet completed. The application can continue with other processing, including issuing other NOF verbs, provided that they do not depend on the completion of the current verb. However, the application should not attempt to examine or modify the parameters in the VCB supplied to this verb.

The Remote API calls the supplied callback routine to indicate when the verb processing completes. The application can then examine the VCB parameters.

Using the Asynchronous Entry Point: When using the asynchronous entry point, note the following:

- If an application specifies a null pointer in the *comp_proc* parameter, the verb will complete synchronously (as though the application issued the verb using the synchronous entry point).
- If the call to `nof_async` is made from within an application callback, specifying a null pointer in the *comp_proc* parameter is not permitted. In such cases, the Remote API rejects the verb with a primary return code value of `AP_PARAMETER_CHECK` and a secondary return code value of `AP_SYNC_NOT_ALLOWED`.
- The application must not attempt to use or modify any parameters in the VCB until the callback routine has been called.
- Multiple verbs do not necessarily complete in the order in which they were issued. In particular, if an application issues an asynchronous verb followed by a

synchronous verb, the completion of the synchronous verb does not guarantee that the asynchronous verb has already completed.

The Callback Routine Specified on the nof_async Entry Point

When using the asynchronous NOF API entry point, the application must supply a pointer to a callback routine. The Remote API uses this callback routine to indicate verb completion. This section describes how the Remote API uses the callback routine and the functions that the callback routine must perform.

Callback Function:

```
NOF_CALLBACK (*comp_proc);
typedef void (*NOF_CALLBACK) (
                              AP_UINT32      target_handle,
                              void *         nofvcb,
                              AP_CORR        corr
                              AP_UINT32      indic_length
                             );
typedef union ap_corr  {
                         void *         corr_p;
                         AP_UINT32      corr_l;
                         AP_INT32       corr_i;
                       } AP_CORR;
```

Supplied Parameters: The Remote API calls the callback routine with the following parameters:

target_handle
: This parameter is undefined.

nofvcb
: A a pointer to the VCB supplied by the application. The VCB now includes the returned parameters set by the Remote API.

corr
: The correlator value supplied by the application. This value enables the application to correlate the returned information with its other processing.

The callback routine need not use all of these parameters. It can perform all the necessary processing on the returned parameters, or it can simply set a variable to inform the NOF application that the verb has completed.

Returned Values: The callback function does not return any values.

Scope of Target Handle

Each application that needs to use NOF must issue the CONNECT_NODE verb to obtain its own handle. No two NOF applications can use the same NOF target handle.

Compiling and Linking the NOF Application

This section provides information about compiling and linking NOF applications on Windows.

Compiler Options for Structure Packing

The VCB structures for NOF verbs are not packed. Do not use compiler options that change this packing method.

DWORD parameters are on DWORD boundaries, *WORD* parameters are on WORD boundaries, and *BYTE* parameters are on BYTE boundaries.

Header Files

The NOF header file to be included in Windows NOF applications is named **nof_c.h**. This file is installed in the subdirectory **\sdk** for 32–bit applications, or **\sdk64** for 64–bit applications, within the directory where you installed the Remote API Client on Windows software.

Load-Time Linking

To link the application to NOF at load time, link the TP to the API library file **\sdk\winnof32.lib** for 32–bit applications, or **\sdk64\winnof32.lib** for 64–bit applications.

Run-Time Linking

To link the application to NOF at run-time, include the following calls in the TP:

- `LoadLibrary` to load the NOF dynamic link library **winnof32.dll**
- `GetProcAddress` to specify each of the NOF entry points required (`nof` and/or `nof_async`)
- `FreeLibrary` when the library is no longer required

Writing Portable Applications

The following guidelines are provided for writing CS Linux NOF applications so that they will be portable to other environments:

- Include the NOF header file without any path name prefix. This enables the application to be used in an environment with a different file system. Use include options on the compiler to locate the file (see "Compiling and Linking the NOF Application" on page 29 or "Compiling and Linking the NOF Application" on page 34).
- Use the symbolic constant names for parameter values and return codes, not the numeric values shown in the header file; this ensures that the correct value will be used regardless of the way these values are stored in memory.
- Include a check for return codes other than those applicable to your current operating system (for example using a "default" case in a switch statement), and provide appropriate diagnostics.
- Ensure that any parameters shown as reserved are set to `0` (zero).

Target For NOF Verbs

A NOF verb can be directed to any of the following targets:

- A running node (to manage the node's resources)
- The node on a server where the CS Linux software is running but where the node has not been started (to start the node, to query the node's stored configuration, or to modify the configuration so that the changes take effect when the node is restarted)
- The domain configuration file (to manage domain resources)
- The **sna.net** file (to manage the CS Linux servers that can act as backup masters if the master server is not available)

The target for a particular NOF verb is identified by the *target_handle* parameter used on the NOF call. An application acquires a target handle using different NOF verbs depending on the target, as follows:

Running node or node on running server
The application issues CONNECT_NODE, specifying the name of the required node, with a null target handle; CS Linux returns a target handle for this node as one of the VCB parameters for CONNECT_NODE.

Domain configuration file
The application issues OPEN_FILE with a null target handle; CS Linux returns a target handle for the file as one of the VCB parameters for OPEN_FILE.

sna.net file
The application issues OPEN_FILE with a null target handle; CS Linux returns a target handle for the file as one of the VCB parameters for OPEN_FILE.

Some NOF verbs can be issued only to particular target types:

- DEFINE_NODE cannot be issued to a running node; it must be issued to a server where the node is not running.
- Verbs associated with node resources, such as DEFINE_LOCAL_LU, must be issued to a node.
- START_* and STOP_* verbs, to start and stop node resources, must be issued to a running node.
- Verbs associated with domain resources must be issued to the domain configuration file.
- Different QUERY_* verbs return information about the definition of a resource, on its current status, or on both definition and status. Status information can only be obtained from a running node. Verbs that return only status information cannot be issued to an inactive node, and verbs that return both definition and status will return only definition information when issued to an inactive node. For example, QUERY_PARTNER_LU_DEFINITION can be issued either to an inactive node (to determine the stored configuration) or to a running node (to determine the current definition). However, QUERY_PARTNER_LU (which returns information about the LU's current sessions) can be issued only to a running node. QUERY_LS (which returns both the definition of the LS and its current status) can be issued either to an inactive node or to a running node, but status information is not returned if you issue it to an inactive node. The description of each QUERY_* verb in Chapter 3, "NOF API Verbs," on page 43 includes information about the valid target types for the verb.
- Verbs associated with managing backup master servers (ADD_BACKUP, DELETE_BACKUP, QUERY_SNA_NET, and REGISTER_INDICATION_SINK or UNREGISTER_INDICATION_SINK for SNA network file indications) must be issued to the **sna.net** file.

Processing Modes

Each target handle used by an application has an associated processing mode that can be modified with the NOF verb SET_PROCESSING_MODE. The mode controls file locking and access permissions for the application.

For a NOF application running on a client, read-only mode is the only mode available. Only QUERY_* verbs are enabled in this mode. All other verbs, which modify the configuration or status of a resource, will be rejected. This enables the application to check the configuration or status of a resource but not to change it.

For a NOF application running on a server, the following modes are available:

AP_MODE_READ_ONLY
Only QUERY_* verbs are enabled in this mode. All other verbs, which modify the configuration or status of a resource, will be rejected.

This is the default mode when the target handle is first assigned; it enables the application to check the configuration or status of a resource but not to change it.

AP_MODE_READ_WRITE
All NOF verbs are enabled in this mode, including those that change a resource's configuration or status.

AP_MODE_COMMIT
This mode is only available if the target handle identifies the domain configuration file (not when issuing verbs to a node). It obtains a lock on the file so that only this application can access it; this file lock ensures that the file will not be modified by any other process during a sequence of verbs issued by this application. The file lock also ensures that no changes are made to the file until the complete sequence of verbs has been issued (until the application changes from `AP_MODE_COMMIT` mode to one of the other modes).

Because this mode prevents any other program from accessing the file, it should be used only for as long as necessary. The application should immediately issue all the verbs that it requires to modify the file and then change to one of the other modes.

If the file lock cannot be obtained (for example, because another program is currently modifying the file), the SET_PROCESSING_MODE verb will fail.

Note: To obtain read/write or commit access to the file, your NOF application must be running with a user ID that is a member of the SNA administrators group `sna` (or running as `root`). If the user ID is not a member of this group or `root`, the only valid processing mode is `AP_MODE_READ_ONLY`.

Ordering and Dependencies between NOF Verbs

The main restriction on the order of NOF verbs is that the first reference to a particular resource must be in a DEFINE_* verb for that resource. This leads to the following dependencies:

- When creating a new node configuration file, the first verb issued must be DEFINE_NODE.
- A DLC must be defined before any port that refers to it.
- A port must be defined before any LS or CN that refers to it.
- A COS must be defined before any mode that refers to it.
- A PU name must be defined (as part of an LS definition) before a dependent LU that refers to this PU.
- An LU must be defined before an LU pool that includes it.
- A downstream PU name (as part of an LS definition) and a host LU must be defined before a downstream LU that refers to them.
- A resource must be defined before a START_* verb refers to it, and must be started before a STOP_* verb refers to it.

In addition, when modifying a running node, using a DEFINE_* verb a second time (to modify the previous definition) is not always valid. For some of these

verbs, a second definition is never valid (the resource must be deleted and then defined again); for others, a second definition is valid only if the resource is currently inactive. The descriptions of individual DEFINE_* verbs in Chapter 3, "NOF API Verbs," on page 43 provide information about whether a second definition is valid. When modifying the domain configuration file, a second DEFINE_* verb can always be used to modify a previous definition.

When creating a new node configuration file, the first verb issued must be DEFINE_NODE. This must be followed by DEFINE_* and SET_* verbs for all the resources associated with the node.

In the domain configuration file, there is no restriction on the ordering of domain resource records.

NOF Restrictions Based on Node Configuration

The DEFINE_NODE verb includes parameters that define the range of functions supported by a node. Several NOF verbs relate to optional functions that a node can or can not support; these verbs are valid only when issued to a node that supports the relevant functions.

This section summarizes the optional functions that affect which NOF verbs can be used. For more information about these functions, see "DEFINE_NODE" on page 163.

APPN End Node and LEN Node Restrictions

The CS Linux local node can be an APPN network node, an APPN branch network node, an APPN end node, or a LEN node.

The following NOF verbs are only valid at a network node, branch network node, or end node; the primary return code `AP_FUNCTION_NOT_SUPPORTED` is returned if you attempt to issue them at a LEN node.

- DEFINE_CN
- DELETE_CN
- QUERY_CN
- QUERY_CN_PORT

The following NOF verbs are only valid at a network node or branch network node; the primary return code `AP_FUNCTION_NOT_SUPPORTED` is returned if you attempt to issue them at an end node or LEN node.

- QUERY_ADJACENT_NN
- QUERY_ISR_SESSION
- QUERY_NN_TOPOLOGY_NODE
- QUERY_NN_TOPOLOGY_STATS
- QUERY_NN_TOPOLOGY_TG
- REGISTER_INDICATION_SINK for any of the following indications:
  - ISR_INDICATION
  - NN_TOPOLOGY_NODE_INDICATION
  - NN_TOPOLOGY_TG_INDICATION

Multiple Domain Support (MDS) Restrictions

The local node can be run with or without Multiple Domain Support (MDS). The following NOF verbs are only valid at a node running with MDS; the primary return code AP_FUNCTION_NOT_SUPPORTED is returned if you attempt to issue them at a node without MDS.

- QUERY_ACTIVE_TRANSACTION
- QUERY_MDS_APPLICATION
- QUERY_MDS_STATISTICS

SNA Gateway and DLUR Restrictions

The local node can be run with or without support for SNA gateway or DLUR or both.

The following NOF verbs are valid only if the node is running with SNA gateway enabled; the primary return code AP_FUNCTION_NOT_SUPPORTED is returned if you attempt to issue them at a node without SNA gateway.

- DEFINE_DOWNSTREAM_LU, DEFINE_DOWNSTREAM_LU_RANGE
- DELETE_DOWNSTREAM_LU, DELETE_DOWNSTREAM_LU_RANGE

The following NOF verbs are valid only if the node is running with DLUR enabled; the primary return code AP_FUNCTION_NOT_SUPPORTED is returned if you attempt to issue them at a node without DLUR.

- DEFINE_DLUR_DEFAULTS
- DEFINE_INTERNAL_PU, DELETE_INTERNAL_PU
- START_INTERNAL_PU, STOP_INTERNAL_PU
- QUERY_DLUR_LU, QUERY_DLUR_PU, QUERY_DLUS

The following NOF verbs are valid only if the node is running with SNA gateway or DLUR or both enabled; the primary return code AP_FUNCTION_NOT_SUPPORTED is returned if you attempt to issue them at a node without either of these two functions.

- QUERY_DOWNSTREAM_LU, QUERY_DOWNSTREAM_PU

List Options For QUERY_* Verbs

A NOF application can obtain information about a particular CS Linux resource by issuing a QUERY_* verb for the appropriate resource type. For example, it can obtain information about the configuration of an LS by issuing QUERY_LS. These verbs can either return information about a specific resource (for example, the configuration of a particular LS) or about many resources of the same type (for example, a summary of all configured LSs), depending on the options used. In addition, some QUERY_* verbs have the option of returning either summary or detailed information about the specified resources. This section explains how to use these options.

Obtaining Information about a Single Resource or Multiple Resources

You can think of the information returned by QUERY_* verbs as being stored in the form of a list, ordered according to the name of the resource. For example, the information returned by QUERY_LS is in order of LS name. The normal order of the list is as follows:

- By name length (shortest name first)
- By ASCII lexicographical ordering for names of the same length

Where the list ordering differs from this (for example, where the list is ordered by a numeric value), this difference is indicated in the individual verb descriptions in Chapter 3, "NOF API Verbs," on page 43.

This means that an application can obtain information about multiple resources by requesting the complete list or a specified part of it. The following parameters on a QUERY_* verb determine which entries from the list are returned:

buf_size
: Size of the data buffer that the application supplies to receive the returned information.

num_entries
: Maximum number of resources for which information should be returned. The application can specify 1 to request a specific entry rather than a range, a number greater than 1 to request a range, or 0 (zero) to request as many entries as possible.

list_options
: The position in the list of the first entry required:
  - First entry in the list
  - Entries starting from a specific named entry
  - Entries starting from the next entry after a specific named entry. (The name specified gives the starting position according to the list ordering and need not exist in the list; for example, if the list contains entries `NODEA`, `NODEB`, `NODED`, `NODEF`, and the application requests entries starting from the first entry after `NODEC`, the first entry returned is `NODED`.)

In addition, if the *list_options* parameter does not request starting from the first entry, the name of a specific entry in the list is used to indicate the starting position for the required entries.

The number of entries returned is the smallest of the following values:

- The *num_entries* parameter, if this is nonzero
- The maximum number of entries that the supplied data buffer can hold
- The number of entries between the specified starting position and the end of the list

In addition, the verb returns information about the total number of entries available and the size of the buffer that would be required to return all the entries at once. If the application has not yet received all the information it requires, it can then issue further verbs to obtain the remaining information.

These options enable the application to manage the information it receives, as follows:

- To obtain a specific entry, it sets the index value to the name of that entry, *list_options* to indicate "start from the named entry", *buf_size* to at least the size of a single entry, and *num_entries* to 1.
- To obtain a complete list a few entries at a time, it first sets *list_options* to indicate "start from beginning of list", and uses either *buf_size* or *num_entries* to limit the amount of information returned. If the returned values indicate that there is more information available, it then issues another verb with *list_options*

indicating "start from the following entry" and sets the index value to the name of the last entry received; this second verb then returns the next section of the list. The application repeats this process until it has received all the required entries.

Obtaining Summary or Detailed Information

Some QUERY_* verbs provide the option of returning either summary or detailed information about the specified resources. For example, QUERY_LOCAL_LU can return just the LU name and LU alias (summary information) or can also return additional information such as the LU address and session limit (detailed information). The description of each QUERY_* verb in Chapter 3, "NOF API Verbs," on page 43 indicates whether the verb includes the option of returning summary or detailed information.

For the verbs that provide this option, the *list_options* parameter is used to indicate whether summary or detailed information is required, as well as the starting position within the list. To specify these options, you combine two values using a logical `OR` operation (one value to specify the starting position in the list and one value to specify whether summary or detailed information is required) and set the *list_options* parameter to the combination of these two values. For verbs that do not provide this option, you simply set *list_options* to a single value to indicate the starting position in the list.

Chapter 3. NOF API Verbs

This chapter provides the following information for each NOF API verb:

- Description of the verb's purpose and usage
- Whether the verb can be issued to an active node, an inactive node, the domain configuration file, or the SNA network data file (unless otherwise stated, verbs may be issued either to an active node or to an inactive node)
- Verb control block (VCB) structure, as defined in the NOF API header file **nof_c.h**
- Parameters supplied to the verb by the application
- Parameters returned to the application
- Error return codes for unsuccessful execution

Most parameters supplied to and returned by the NOF interface are hexadecimal values. To simplify coding, these values are represented by meaningful symbolic constants defined in the header file **values_c.h**, which is included by the NOF header file **nof_c.h**. For example, the *opcode* parameter of the ACTIVATE_SESSION verb is the hexadecimal value represented by the symbolic constant `AP_ACTIVATE_SESSION`. The file **values_c.h** also includes definitions of parameter types such as `AP_UINT16` that are used in the NOF VCBs.

It is important that you use the symbolic constant and not the hexadecimal value when setting values for supplied parameters, or when testing values of returned parameters. This is because different Linux systems store these values differently in memory, so the value shown may not be in the format recognized by your system.

The error return codes described in this chapter are specific to each verb. Additional return codes, which are common to all NOF API verbs, are described in Appendix B, “Common Return Codes,” on page 743.

NOF API indications, which the application can accept by registering using the REGISTER_INDICATION_SINK verb, are described separately in Chapter 4, “NOF Indications,” on page 675.

Note: The NOF VCBs contain many parameters marked as “reserved”; some of these are used internally by the CS Linux software, and others are not used in this version but may be used in future versions. Your application must not attempt to access any of these reserved parameters; instead, it must set the entire contents of the VCB to zero to ensure that all of these parameters are zero, before it sets other parameters that are used by the verb. This ensures that CS Linux will not misinterpret any of its internally-used parameters, and also that your application will continue to work with future CS Linux versions in which these parameters may be used to provide new functions.

To set the VCB contents to zero, use `memset`:

memset(nofvcb, 0, sizeof(nofvcb));

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ACTIVATE_SESSION

The ACTIVATE_SESSION verb requests CS Linux to activate a session between the local LU and a specified partner LU, using a specified mode. You must issue an INITIALIZE_SESSION_LIMIT verb before issuing an ACTIVATE_SESSION verb, unless *cnos_permitted* is set to AP_YES.

This verb must be issued to a running node.

This verb can be issued from a NOF application running on a client. If it runs on an AIX or Linux client, the NOF application must run with the userid root, or with a userid that is a member of the sys group (AIX) or sna group (Linux).

VCB Structure

```
typedef struct activate_session
{
      AP_UINT16        opcode;           /* verb operation code             */
      unsigned char    reserv2;          /* reserved                        */
      unsigned char    format;           /* reserved                        */
      AP_UINT16        primary_rc;       /* primary return code             */
      AP_UINT32        secondary_rc;     /* secondary return code           */
      unsigned char    lu_name[8];       /* local LU name                   */
      unsigned char    lu_alias[8];      /* local LU alias                  */
      unsigned char    plu_alias[8];     /* partner LU alias                */
      unsigned char    mode_name[8];     /* mode name                       */
      unsigned char    fqplu_name[17];   /* fully qualified partner LU name */
      unsigned char    polarity;         /* requested session polarity      */
      unsigned char    session_id[8];    /* session ID                      */
      unsigned char    cnos_permitted;   /* is implicit CNOS permitted?     */
      unsigned char    reserv4[15];      /* reserved                        */
} ACTIVATE_SESSION;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_ACTIVATE_SESSION

lu_name

LU name of the local LU, as defined to CS Linux. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 bytes. To indicate that the LU is defined by its LU alias instead of its LU name, set this parameter to 8 binary zeros.

lu_alias

LU alias of the local LU, as defined to CS Linux. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes. This parameter is used only if *lu_name* is set to zeros.

If both the LU name and the LU alias are set to all zeros, the verb is forwarded to the LU associated with the CP (the default LU).

plu_alias

LU alias of the partner LU. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes. To indicate that the partner LU is defined by its fully qualified LU name instead of its LU alias, set this parameter to 8 binary zeros.

mode_name

Name of the mode to be used by the LUs. This is an 8-byte alphanumeric

type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 bytes.

fqplu_name
Fully qualified LU name for the partner LU, as defined to CS Linux. This parameter is used only if the *plu_alias* field is set to zeros; it is ignored if *plu_alias* is specified.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

polarity
The polarity for the session. Possible values are:

```
AP_POL_EITHER
AP_POL_FIRST_SPEAKER
AP_POL_BIDDER
```

If AP_POL_EITHER is set, ACTIVATE_SESSION activates a first speaker session if available, otherwise a bidder session is activated. If AP_POL_FIRST_SPEAKER or AP_POL_BIDDER is set, ACTIVATE_SESSION only succeeds if a session of the requested polarity is available.

cnos_permitted
Indicates that CNOS processing is permitted. Possible values are:

AP_YES CNOS processing is permitted.

AP_NO CNOS processing is not permitted.

If the activation of a new session is not possible because the session limits for the specified mode are reset, and this parameter is set to AP_YES, implicit CNOS processing will initialize the session limits. Execution of this command is suspended while CNOS processing is active.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Possible values are:

AP_AS_NEGOTIATED
The session was activated successfully; the session limit defined for the mode was negotiated during the activation process.

AP_AS_SPECIFIED
The session was activated successfully; the session limit was not changed.

session_id
The 8-byte identifier of the activated session.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_EXCEEDS_MAX_ALLOWED
The session cannot be activated, because this would exceed the current session limit for this LU-LU-mode combination.

AP_INVALID_LU_ALIAS
The *lu_alias* parameter did not match any defined local LU alias.

AP_INVALID_LU_NAME
The *lu_name* parameter did not match any defined local LU name.

AP_INVALID_PLU_NAME
The *fqplu_name* parameter did not match any defined partner LU name, or the *plu_alias* parameter did not match any defined partner LU name.

AP_INVALID_CNOS_PERMITTED
The value specified in the *cnos_permitted* parameter was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Activation Failure

If the verb does not execute because of other errors, CS Linux returns one of the following parameters.

primary_rc
Possible values are:

AP_ACTIVATION_FAIL_NO_RETRY
The session could not be activated because of a condition that requires action (such as a configuration mismatch or a session protocol error). Check the CS Linux log file for information about the error condition, and correct it before retrying this verb.

AP_ACTIVATION_FAIL_RETRY
The session could not be activated because of a temporary condition (such as a link failure). Retry the verb, preferably after a timeout to allow the condition to clear. Check the CS Linux log file for information about the error condition.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

ADD_BACKUP

An application uses this verb to add a server to the list of backup master servers in the **sna.net** file, so that this server can act as the master configuration file server if the current master becomes inactive. The new server is added to the end of the list, so that it will only become the master if all the other servers listed in the file are inactive.

This verb must be issued to the **sna.net** file.

VCB Structure

```
typedef struct add_backup
{
      AP_UINT16        opcode;             /* verb operation code           */
      unsigned char    reserv2;            /* reserved                      */
      unsigned char    format;             /* reserved                      */
      AP_UINT16        primary_rc;         /* primary return code           */
      AP_UINT32        secondary_rc;       /* secondary return code         */
      unsigned char    backup_name[128];   /* name of backup server to add  */
      unsigned char    reserv3[4];         /* reserved                      */
} ADD_BACKUP;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_ADD_BACKUP

backup_name
The name of the server being added to the list of backup servers.

If the server name includes a **.** (period) character, CS Linux assumes that it is a fully-qualified name; otherwise it performs a DNS lookup to determine the server name.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: State Check

If the verb does not execute because of a state check, CS Linux returns the following parameters:

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_DUPLICATE_RECORD
The server name specified is already listed in the file.

AP_INVALID_TARGET
The target handle on the NOF API call specified a configuration file or a node. This verb must be issued to the **sna.net** file.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

ADD_DLC_TRACE

This verb specifies tracing on SNA messages sent on a DLC. It can be used to activate tracing on a particular DLC, port, LS, or HPR RTP connection, or on a particular session on a specified LS, and to specify which types of messages are to be traced. It can also be used to activate tracing on all DLCs, ports, link stations, and HPR RTP connections. For more information about how to use CS Linux tracing, see the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

If multiple ADD_DLC_TRACE verbs relating to the same resource are issued, a message will be traced if it matches any of the verbs currently active. For example:

- If you issue a verb to trace all messages for a port and its LSs, and then issue a second verb to trace only messages with a specified LFSID for one of the LSs owned by the port, all messages for the LS will continue to be traced (because they match the first verb). If you then use REMOVE_DLC_TRACE to remove tracing for the port, messages on the LS with the specified LFSID will continue to be traced (because they match the second verb which is still active), but other messages on this LS will not be traced.
- If you issue a verb to trace XID messages on all resources, and then issue a second verb to trace SC and DFC messages on a particular LS, all three message types will be traced for this LS.

If you are tracing an SDLC line and would like more detailed trace information, you can get this by using internal tracing on SDLC as well as line tracing. The additional detail is formatted as part of the output for line tracing, so that you will see all of the SDLC tracing in one file. For more information, see "SET_TRACE_TYPE" on page 653.

Note: The SET_TRACE_TYPE verb includes an option to truncate each entry in trace files to a specified length. This option applies to DLC tracing as well as to the kernel component tracing specified by SET_TRACE_TYPE.

VCB Structure

```
typedef struct add_dlc_trace
{
      AP_UINT16           opcode;             /* verb operation code         */
      unsigned char       reserv2;            /* reserved                    */
      unsigned char       format;             /* reserved                    */
      AP_UINT16           primary_rc;         /* primary return code         */
      AP_UINT32           secondary_rc;       /* secondary return code       */
      DLC_TRACE_FILTER    filter;             /* resource to be traced       */
} ADD_DLC_TRACE;

typedef struct dlc_trace_filter
{
      unsigned char       resource_type;      /* type of resource            */
      unsigned char       resource_name[8];   /* name of resource            */
      SNA_LFSID           lfsid;              /* session identifier          */
      unsigned char       message_type;       /* type of messages            */
} DLC_TRACE_FILTER;

typedef struct sna_lfsid
{
      union
      {
         AP_UINT16        session_id;
         struct
         {
```

```
          unsigned char  sidh;
          unsigned char  sidl;
        } s;
      } uu;
      AP_UINT16          odai;
} SNA_LFSID;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_ADD_DLC_TRACE

filter.resource_type
Specifies the resource to be traced, and optionally the specific message types to be traced for this resource. Possible values are:

AP_ALL_RESOURCES
Set up tracing options for all DLCs, ports, link stations, and HPR RTP connections.

AP_DLC Set up tracing options for the DLC named in *resource_name*, and for all ports and LSs that use this DLC.

AP_PORT
Set up tracing options for the port named in *resource_name*, and for all LSs that use this port.

AP_LS Set up tracing options for the LS named in *resource_name*.

AP_RTP_RESOURCE_TYPE
Specify tracing options for the RTP connection named in *resource_name*.

AP_PORT_DEFINED_LS
Set up tracing options for the port named in *resource_name*, and for all defined LSs (but not implicit LSs) that use this port.

AP_PORT_IMPLICIT_LS
Set up tracing options for the port named in *resource_name*, and for all implicit LSs (but not defined LSs) that use this port.

filter.resource_name
The name of the DLC, port, LS, or RTP connection for which tracing is being activated. This parameter is reserved if *resource_type* is set to AP_ALL_RESOURCES.

If *resource_type* is set to AP_RTP_RESOURCE_TYPE, you can specify the name of a particular RTP connection (this name begins with the @ character), or you can set this parameter to all zeros to indicate that all RTP traffic is to be traced.

filter.lfsid
The Local Form Session Identifier for a session on the specified LS. This is only valid for *resource_type* AP_LS, and indicates that only messages on this session are to be traced. The structure contains the following three values, which are returned in the SESSION_STATS section of a QUERY_SESSION verb:

filter.lfsid.uu.s.sidh
Session ID high byte.

filter.lfsid.uu.s.sidl
Session ID low byte.

filter.lfsid.odai
Origin Destination Assignor Indicator.

filter.message_type
The type of messages to trace for the specified resource or session. Set this parameter to AP_TRACE_ALL to trace all messages, or specify one or more of the following values (combined using a logical OR):

AP_TRACE_XID
XID messages

AP_TRACE_SC
Session Control RUs

AP_TRACE_DFC
Data Flow Control RUs

AP_TRACE_FMD
FMD messages

AP_TRACE_SEGS
Non-BBIU segments that do not contain an RH

AP_TRACE_CTL
Messages other then MUs and XIDs

AP_TRACE_NLP
Trace Network-Layer Protocol messages

AP_TRACE_NC
Trace Network Control messages

For tracing on an RTP connection, the values AP_TRACE_XID, AP_TRACE_NLP, and AP_TRACE_CTL are ignored. At least one of the other values listed must be specified for RTP tracing.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_RESOURCE_TYPE
The *resource_type* parameter specified a value that was not valid.

AP_INVALID_MESSAGE_TYPE
The *message_type* parameter specified a value that was not valid.

INVALID_RTP_CONNECTION
The *resource_name* parameter does not match any RTP connection.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

APING

APING is the APPN version of the “ping” utility; it allows a management application to check the communications path from a local LU to a remote LU in the network.

CS Linux APING is implemented using an internally-defined APPC TP. This TP sends data to the partner LU, and optionally receives data from the partner LU. If the TP completes successfully, the APING verb returns information about the time taken to allocate a conversation to the partner LU and to send and receive data.

The application must supply a VCB that is large enough to include a partner TP verification string of the requested size as well as the basic APING VCB structure; the returned data includes this string appended to the end of the basic structure.

This verb is intended for checking the path to an LU on a remote node. Using APING to check communications with a partner LU on the local node will impact the performance of other programs on the local computer, and is not recommended.

This verb must be issued to a running node.

VCB Structure

```
typedef struct aping
{
     AP_UINT16         opcode;            /* verb operation code             */
     unsigned char     reserv2;           /* reserved                        */
     unsigned char     format;            /* reserved                        */
     AP_UINT16         primary_rc;        /* primary return code             */
     AP_UINT32         secondary_rc;      /* secondary return code           */
     unsigned char     lu_name[8];        /* local LU name                   */
     unsigned char     lu_alias[8];       /* local LU alias                  */
     AP_UINT32         sense_data;        /* sense data                      */
     unsigned char     plu_alias[8];      /* partner LU alias                */
     unsigned char     mode_name[8];      /* mode name                       */
     unsigned char     tp_name[64];       /* destination TP name             */
     unsigned char     security;          /* security level                  */
     unsigned char     reserv3a[3];       /* reserved                        */
     unsigned char     pwd[10];           /* password                        */
     unsigned char     user_id[10];       /* user ID                         */
     AP_UINT16         dlen;              /* length of data to send          */
     AP_UINT16         consec;            /* number of consecutive sends     */
     unsigned char     fqplu_name[17];    /* fully qualified partner LU name */
     unsigned char     echo;              /* data echo flag                  */
     AP_UINT16         iterations;        /* number of iterations            */
     AP_UINT32         alloc_time;        /* time taken for ALLOCATE         */
     AP_UINT32         min_time;          /* minimum send/receive time       */
     AP_UINT32         avg_time;          /* average send/receive time       */
     AP_UINT32         max_time;          /* maximum send/receive time       */
     AP_UINT16         partner_ver_len;   /* size of string to receive       */
} APING;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_APING

lu_name
LU name of the local LU. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters. To indicate that the LU is identified by its LU alias instead of its LU name, set this parameter to 8 binary zeros and specify the LU alias in the following parameter.

lu_alias
LU alias of the local LU. This parameter is used only if the *lu_name* field is set to 8 binary zeros, and is ignored otherwise. The alias is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. To use the default LU (the LU associated with the CP), set both the *lu_name* and *lu_alias* parameters to 8 binary zeros.

plu_alias
Partner LU alias. This should be the alias of an LU on a remote node; you are not recommended to use APING with a partner LU on the local node.

The alias is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. To indicate that the LU is identified by its fully qualified name instead of its alias, set this parameter to 8 binary zeros and specify the LU name in the *fqplu_name* parameter.

mode_name
Name of the mode used by the LU pair. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with spaces if the name is shorter than 8 characters.

tp_name
Name of the invoked TP (generally set to APINGD). This is a 64-byte string, padded on the right with spaces.

security
Specifies whether conversation security information is required to start the TP. Possible values are:

AP_NONE
No security information is required.

AP_SAME
Security information may be verified by the TP that invoked this TP on behalf of a third TP.

AP_PGM A user ID and password are required to start the TP.

AP_PGM_STRONG
A password and user ID are required to start the TP, but the password must not be sent in clear text. If password substitution is not supported on the session, the **aping** fails. Otherwise, the password is sent encrypted.

pwd Password required to access the partner TP; this parameter is required only if the security parameter is set to AP_PGM. This is a 10-byte type-AE EBCDIC character string, padded on the right with EBCDIC spaces if the password is shorter than 10 bytes.

user_id User ID required to access the partner TP; this parameter is required only

if the security parameter is set to AP_SAME or AP_PGM. This is a 10-byte type-AE EBCDIC character string, padded on the right with EBCDIC spaces if the user ID is shorter than 10 bytes.

dlen Length of the data string to be sent to the partner LU. (The NOF API application does not need to provide a data string; the APING TP simply sends a string of zeros of the specified length.)

consec Number of consecutive data strings sent to the partner LU during each iteration. The APING TP sends this number of data strings, each containing the number of bytes specified by the *dlen* parameter. It then requests either data or a confirmation message from the partner TP, depending on the setting of the *echo* parameter.

fqplu_name
Fully qualified network name for the partner LU. This parameter is used only if the *plu_alias* field is set to 8 binary zeros, and is ignored otherwise. This should be the name of an LU on a remote node; you are not recommended to use APING with a partner LU on the local node.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

echo Specifies whether the APING TP requests data from the partner LU after sending data to it. Possible values are:

AP_YES After sending the specified number of data strings, APING waits to receive data from the partner LU.

AP_NO After sending the specified number of data strings, APING requests confirmation from the partner LU, but does not receive data.

iterations
Number of times that the APING TP should perform the sequence of sending data to the partner LU and requesting either data or confirmation.

partner_ver_len
Maximum length of the partner TP verification data string which can be received by the NOF API application. The application must supply a VCB large enough to include this string as well as the basic APING VCB structure, because the string will be appended to the returned VCB.

Returned Parameters: Successful Execution

If the verb executes successfully, APING returns the following parameters:

primary_rc
AP_OK

alloc_time
The time in milliseconds to allocate a conversation to the partner (the time taken for the MC_ALLOCATE verb issued by the APING TP to complete).

min_time
The minimum time in milliseconds required for a data-sending iteration (the shortest measured time for a single iteration of sending data and receiving either data or confirmation). If iterations was set to zero, this parameter is not used.

avg_time
The average time in milliseconds required for a data-sending iteration (the

average time for a single iteration of sending data and receiving either data or confirmation). If iterations was set to zero, this parameter is not used.

max_time
The maximum time in milliseconds required for a data-sending iteration (the longest measured time for a single iteration of sending data and receiving either data or confirmation). If iterations was set to zero, this parameter is not used.

partner_ver_len
Length of verification string returned by the partner TP.

In addition to these returned parameters, the verification string returned by the partner TP is appended to the end of the APING VCB. The length of this string is given by *partner_ver_len*. If *partner_ver_len* is zero, then this string is not returned.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_ALIAS
The *lu_alias* parameter did not match any defined LU alias.

AP_INVALID_LU_NAME
The *lu_name* parameter did not match any defined LU name.

AP_BAD_SECURITY
The *security* parameter was not set to a valid value.

AP_UNKNOWN_PARTNER_MODE
The value specified for *plu_alias*, *fqplu_name*, or *mode_name* did not match any defined partner LU or mode.

AP_BAD_PARTNER_LU_ALIAS
The value specified for *plu_alias* did not match any defined partner LU.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Allocation Failure

If the verb does not execute because CS Linux cannot allocate the APPC conversation, CS Linux returns the following parameters:

primary_rc
AP_ALLOCATION_ERROR

secondary_rc
Possible values are:

AP_ALLOCATION_FAILURE_NO_RETRY
The conversation cannot be allocated because of a permanent condition, such as a configuration error or session protocol error.

Check the *sense_data* parameter and the error log file for more information. Do not attempt to retry the APING verb until the error has been corrected.

AP_ALLOCATION_FAILURE_RETRY
The conversation could not be allocated because of a temporary condition, such as a link failure. Check the error log file for more information. Retry the APING verb, preferably after a timeout to allow the condition to clear.

AP_SECURITY_NOT_VALID
The user ID or password specified was not accepted by the partner LU.

AP_TP_NAME_NOT_RECOGNIZED
The partner LU does not recognize the specified TP name.

AP_TRANS_PGM_NOT_AVAIL_NO_RETRY
The remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition is permanent. The reason for the error may be logged on the remote node. Do not retry the APING verb until the cause of the error has been corrected.

AP_TRANS_PGM_NOT_AVAIL_RETRY
The remote LU rejected the allocation request because it was unable to start the requested partner TP. The condition may be temporary, such as a timeout. The reason for the error may be logged on the remote node. Retry the APING verb, preferably after a timeout to allow the condition to clear.

sense_data
If the *secondary_rc* parameter is AP_ALLOCATION_FAILURE_NO_RETRY, this parameter contains the SNA sense data associated with the error. For all other *secondary_rc* values, this parameter is reserved.

Returned Parameters: Conversation Failure

If the verb does not execute because the APPC conversation with the partner TP failed, CS Linux returns the following parameters:

primary_rc

AP_CONV_FAILURE_NO_RETRY
The conversation was terminated because of a permanent condition, such as a session protocol error. Check the error log file to determine the cause of the error. Do not retry the APING verb until the error has been corrected.

primary_rc

AP_CONV_FAILURE_RETRY
The conversation was terminated because of a temporary error. Retry the APING verb. If the problem occurs again, check the error log file to determine the cause of the error.

primary_rc

AP_DEALLOC_ABEND
The partner TP deallocated the conversation because of an error condition. The reason for the error may be logged on the remote node.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

CHANGE_SESSION_LIMIT

The CHANGE_SESSION_LIMIT verb requests CS Linux to change the session limits for a particular LU-LU-mode combination. Sessions may be activated or deactivated as a result of processing this verb.

This verb must be issued to a running node.

VCB Structure

```
typedef struct change_session_limit
{
   AP_UINT16       opcode;                 /* verb operation code          */
   unsigned char   reserv2;                /* reserved                     */
   unsigned char   format;                 /* reserved                     */
   AP_UINT16       primary_rc;             /* primary return code          */
   AP_UINT32       secondary_rc;           /* secondary return code        */
   unsigned char   lu_name[8];             /* local LU name                */
   unsigned char   lu_alias[8];            /* local LU alias               */
   unsigned char   plu_alias[8];           /* partner LU alias             */
   unsigned char   fqplu_name[17];         /* fully qualified partner      */
                                           /*  LU name                     */
   unsigned char   reserv3;                /* reserved                     */
   unsigned char   mode_name[8];           /* mode name                    */
   unsigned char   reserv3a;               /* reserved                     */
   unsigned char   set_negotiable;         /* set max negotiable limit?    */
   AP_UINT16       plu_mode_session_limit; /* session limit                */
   AP_UINT16       min_conwinners_source;  /* minimum source contention    */
                                           /*  winner sessions             */
   AP_UINT16       min_conwinners_target;  /* minimum target contention    */
                                           /*  winner sessions             */
   AP_UINT16       auto_act;               /* auto activation limit        */
   unsigned char   responsible;            /* who is responsible for       */
                                           /*  deactivating                */
   unsigned char   reserv4[3];             /* reserved                     */
   AP_UINT32       sense_data;             /* sense data                   */
} CHANGE_SESSION_LIMIT;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_CHANGE_SESSION_LIMIT

lu_name

LU name of the local LU, as defined to CS Linux. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 bytes. To indicate that the LU is defined by its LU alias instead of its LU name, set this parameter to 8 binary zeros.

lu_alias

LU alias of the local LU, as defined to CS Linux. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes. It is used only if *lu_name* is set to zeros.

To indicate the LU associated with the CP (the default LU), set both *lu_name* and *lu_alias* to 8 binary zeros.

plu_alias
LU alias of the partner LU.

This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes. To indicate that the partner LU is defined by its fully qualified LU name instead of its LU alias, set this parameter to 8 binary zeros.

fqplu_name
Fully qualified LU name for the partner LU, as defined to CS Linux. This parameter is used only if the *plu_alias* field is set to zeros; it is ignored if *plu_alias* is specified.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

mode_name
Name of the mode to be used by the LUs.

This is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 bytes.

set_negotiable
Specifies whether the maximum negotiable session limit for this mode should be modified. Possible values are:

AP_YES Use the value specified by *plu_mode_session_limit* as the maximum negotiable session limit for this LU-LU-mode combination.

AP_NO Leave the maximum negotiable session limit as the value specified for the mode.

plu_mode_session_limit
Requested total session limit for this LU-LU-mode combination: the maximum number of parallel sessions permitted between these two LUs using this mode. Specify a value in the range 1–32,767 (which must not exceed the session limit specified for the local LU on the DEFINE_LOCAL_LU verb). This value may be negotiated with the partner LU.

min_conwinners_source
Minimum number of sessions using this mode for which the local LU is the contention winner. Specify a value in the range 0–32,767. The sum of the *min_conwinners_source* and *min_conwinners_target* parameters must not exceed the *plu_mode_session_limit* parameter.

min_conwinners_target
Minimum number of sessions using this mode for which the partner LU is the contention winner. Specify a value in the range 0–32,767. The sum of the *min_conwinners_source* and *min_conwinners_target* parameters must not exceed the *plu_mode_session_limit* parameter.

auto_act
Number of sessions to automatically activate after the session limit is changed. Specify a value in the range 0–32,767 (which must not exceed the *plu_mode_session_limit* parameter or the session limit specified for the local LU on the DEFINE_LOCAL_LU verb). The actual number of automatically activated sessions is the minimum of this value and the negotiated minimum number of contention winner sessions for the local LU. When

sessions are deactivated normally (specifying AP_DEACT_NORMAL) below this limit, new sessions are activated up to this limit.

responsible
Indicates whether the local or partner LU is responsible for deactivating sessions after the session limit is changed. Possible values are:

AP_SOURCE
The local LU is responsible.

AP_TARGET
The partner LU is responsible.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Possible values are:

AP_AS_NEGOTIATED
The session limits were changed, but one or more values were negotiated by the partner LU.

AP_AS_SPECIFIED
The session limits were changed as requested, without being negotiated by the partner LU.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_EXCEEDS_MAX_ALLOWED
The *plu_mode_session_limit*, *min_conwinners_source*, *min_conwinners_target*, or *auto_act* parameter was set to a value outside the valid range.

AP_CANT_CHANGE_TO_ZERO
The *plu_mode_session_limit* parameter cannot be set to zero using this verb; use RESET_SESSION_LIMIT instead.

AP_INVALID_LU_ALIAS
The *lu_alias* parameter did not match any defined local LU alias.

AP_INVALID_LU_NAME
The *lu_name* parameter did not match any defined local LU name.

AP_INVALID_MODE_NAME
The *mode_name* parameter did not match any defined mode name.

AP_INVALID_PLU_NAME
The *fqplu_name* parameter did not match any defined partner LU name.

AP_INVALID_RESPONSIBLE
The *responsible* parameter was not set to a valid value.

AP_INVALID_SET_NEGOTIABLE
The *set_negotiable* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_MODE_RESET
No sessions are currently active for this LU-LU-mode combination. Use INITIALIZE_SESSION_LIMIT instead of CHANGE_SESSION_LIMIT to specify the limits.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Session Allocation Error

If the verb does not execute because of a session allocation error, CS Linux returns the following parameters:

primary_rc
AP_ALLOCATION_ERROR

secondary_rc

AP_ALLOCATION_FAILURE_NO_RETRY
A session could not be allocated because of a condition that requires corrective action. Check the *sense_data* parameter and any logged messages to determine the reason for the failure, and take any action required. Do not attempt to retry the verb until the condition has been corrected.

sense_data
The SNA sense data associated with the allocation failure.

Returned Parameters: CNOS Processing Errors

If the verb does not execute because of an error, CS Linux returns the following parameters.

primary_rc

AP_CONV_FAILURE_NO_RETRY
The session limits could not be changed because of a condition that requires action (such as a configuration mismatch or a session protocol error). Check the CS Linux log file for information about the error condition, and correct it before retrying this verb.

primary_rc
AP_CNOS_PARTNER_LU_REJECT

secondary_rc

AP_CNOS_COMMAND_RACE_REJECT
The verb failed because the specified mode was being accessed by another administration program (or internally by the CS Linux software) for session activation or deactivation, or for session limit processing. The application should retry the verb, preferably after a timeout to allow the race condition to be cleared.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

CLOSE_FILE

An application uses this verb to release its handle to the domain configuration file, or to the **sna.net** file, when it has finished issuing NOF verbs to the file. The file which the application wishes to close is identified by the *target_handle* parameter on the call.

The application should always issue CLOSE_FILE for any open file handles before it exits. After the verb completes successfully, the target handle identifying the file is no longer valid.

This verb must be issued to the domain configuration fileor to the **sna.net** file.

VCB Structure

```
 typedef struct close_file
{
       AP_UINT16           opcode;           /* verb operation code         */
       unsigned char       reserv2           /* reserved                    */
       unsigned char       format;           /* reserved                    */
       AP_UINT16           primary_rc;       /* primary return code         */
       AP_UINT32           secondary_rc;     /* secondary return code       */
 } CLOSE_FILE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_CLOSE_FILE

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: State Check

If the verb does not execute because of a state check, CS Linux returns the following parameters:

primary_rc
AP_STATE_CHECK

secondary_rc

AP_VERB_IN_PROGRESS
The specified file cannot be released because a previous verb issued for this target handle is still outstanding. All verbs for the target file must be completed before attempting to close the file.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

CONNECT_NODE

An application uses this verb in order to establish communications with a CS Linux node (active or inactive). The verb returns a target handle identifying the node, which the application can then use on other NOF verbs to indicate the target for the verb.

VCB Structure

```
typedef struct connect_node
{
      AP_UINT16         opcode;           /* verb operation code            */
      unsigned char     reserv2;          /* reserved                       */
      unsigned char     format;           /* reserved                       */
      AP_UINT16         primary_rc;       /* primary return code            */
      AP_UINT32         secondary_rc;     /* secondary return code          */
      unsigned char     node_type;        /* which node to connect to       */
      unsigned char     node_name[128];   /* name of Node                   */
      AP_UINT32         target_handle;    /* handle for subsequent verbs    */
      unsigned char     node_status;      /* node status                    */
      unsigned char     reserv3[12];      /* reserved                       */
} CONNECT_NODE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_CONNECT_NODE

node_type
To connect to a particular node in order to manage the node's configuration, set this parameter to AP_SPECIFIED_NODE.

To connect to the node currently acting as the central logger, set this parameter to AP_CENTRAL_LOGGER. This value is required if the application will be issuing the following verbs:

- SET_CENTRAL_LOGGING, QUERY_CENTRAL_LOGGING
- SET_GLOBAL_LOG_TYPE, QUERY_GLOBAL_LOG_TYPE
- SET_LOG_FILE, QUERY_LOG_FILE (if central logging is in use)

node_name
Name of the CS Linux node to connect to. This parameter is reserved if *node_type* is set to AP_CENTRAL_LOGGER.

If the node name includes a . (period) character, CS Linux assumes that it is a fully-qualified name; otherwise it performs a DNS lookup to determine the node name.

If CS Linux is running with all components on a single computer, you can set this parameter to all binary zeros; there is no need to specify the node name. Otherwise, setting this parameter to all binary zeros indicates the default local node (on the same CS Linux server as the application).

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

target_handle
Returned value for use on subsequent verbs.

node_status
Specifies the status of the node. Possible values are:

AP_NDE_STARTING
The node is in the process of being activated.

AP_NDE_STARTED
The node is active.

AP_NDE_STOPPING
The node is in the process of being deactivated.

AP_NDE_STOPPED
The node is not active.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_NODE_NAME
The value that was specified for the *node_name* parameter was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters:

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_CONNECTION_NOT_MADE
An error occurred in connecting to the node.

AP_INVALID_VERSION
The application could not connect to the node, because there was a version mismatch between the CS Linux software on the computer where the application is running and the computer where the target node is defined. If you are in the process of upgrading the network, so that different computers are running different levels of the CS Linux software, nodes running on the back-level software can be managed only by applications running on the back-level software.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEACTIVATE_CONV_GROUP

The DEACTIVATE_CONV_GROUP verb requests the deactivation of the session corresponding to the specified conversation group. Although this verb is part of the NOF API, it is primarily intended for use by application programmers writing TPs that use the APPC API. The conversation group identifier is returned by the APPC verbs [MC_]ALLOCATE, [MC_]GET_ATTRIBUTES, and RECEIVE_ALLOCATE.

This verb must be issued to a running node.

VCB Structure

```
typedef struct deactivate_conv_group
{
      AP_UINT16        opcode;          /* verb operation code              */
      unsigned char    reserv2;         /* reserved                         */
      unsigned char    format;          /* reserved                         */
      AP_UINT16        primary_rc;      /* primary return code              */
      AP_UINT32        secondary_rc;    /* secondary return code            */
      unsigned char    lu_name[8];      /* local LU name                    */
      unsigned char    lu_alias[8];     /* local LU alias                   */
      AP_UINT32        conv_group_id;   /* conversation group identifier    */
      unsigned char    type;            /* deactivation type                */
      unsigned char    reserv3[3];      /* reserved                         */
      AP_UINT32        sense_data;      /* deactivation sense data          */
} DEACTIVATE_CONV_GROUP;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEACTIVATE_CONV_GROUP

lu_name
LU name of the local LU, as defined to CS Linux. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 bytes. To indicate that the LU is defined by its LU alias instead of its LU name, set this parameter to 8 binary zeros.

lu_alias
LU alias of the local LU, as defined to CS Linux. This is an 8-byte ASCII

string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes. It is used only if *lu_name* is set to zeros.

To indicate the LU associated with the CP (the default LU), set both *lu_name* and *lu_alias* to 8 binary zeros.

conv_group_id
Conversation group identifier for the session to be deactivated.

type Type of deactivation. Possible values are:

AP_DEACT_CLEANUP
Deactivate the session immediately, without waiting for sessions to end.

AP_DEACT_NORMAL
Do not deactivate the session until all conversations using the session have ended.

sense_data
If type is set to AP_DEACT_CLEANUP, this parameter specifies the sense data to be used when deactivating the session. Otherwise this parameter is not used.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_DEACT_CG_INVALID_CGID
The *conv_group_id* parameter did not match any valid conversation group ID.

AP_INVALID_CLEANUP_TYPE
The *type* parameter was not set to a valid value.

AP_INVALID_LU_ALIAS
The *lu_alias* parameter did not match any defined LU alias.

AP_INVALID_LU_NAME
The *lu_name* parameter did not match any defined LU name.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEACTIVATE_LU_0_TO_3

The DEACTIVATE_LU_0_TO_3 verb requests CS Linux to deactivate the session for a particular LU for use with 3270 emulation or LUA (an LU of type 0, 1, 2, or 3). CS Linux deactivates the session by sending a TERM_SELF message to the host for the PLU-SLU session.

This verb must be issued to a running node.

VCB Structure

```
typedef struct deactivate_lu_0_to_3
{
  AP_UINT16      opcode;                 /* verb operation code          */
  unsigned char  reserv2;
  unsigned char  format;
  AP_UINT16      primary_rc;             /* primary return code          */
  AP_UINT32      secondary_rc;           /* secondary return code        */
  unsigned char  lu_name[8];             /* LU Name                      */
} DEACTIVATE_LU_0_TO_3;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEACTIVATE_LU_0_TO_3

lu_name
LU name of the LU, as defined to CS Linux. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 bytes.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters. This return code can also indicate that there was no active session for the specified LU (implying that the session has already been deactivated).

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
The *lu_name* parameter did not match any defined LU name.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEACTIVATE_SESSION

The DEACTIVATE_SESSION verb requests CS Linux to deactivate a particular session, or all sessions on a particular mode.

This verb must be issued to a running node.

VCB Structure

```
typedef struct deactivate_session
{
      AP_UINT16         opcode;           /* verb operation code           */
      unsigned char     reserv2;          /* reserved                      */
      unsigned char     format;           /* reserved                      */
      AP_UINT16         primary_rc;       /* primary return code           */
      AP_UINT32         secondary_rc;     /* secondary return code         */
      unsigned char     lu_name[8];       /* local LU name                 */
      unsigned char     lu_alias[8];      /* local LU alias                */
      unsigned char     session_id[8];    /* session identifier            */
      unsigned char     plu_alias[8];     /* partner LU alias              */
      unsigned char     mode_name[8];     /* mode name                     */
      unsigned char     type;             /* deactivation type             */
      unsigned char     reserv3[3];       /* reserved                      */
      AP_UINT32         sense_data;       /* deactivation sense data       */
      unsigned char     fqplu_name[17];   /* fully qualified partner       */
                                          /*  LU name                      */
      unsigned char     reserv4[20];      /* reserved                      */
} DEACTIVATE_SESSION;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEACTIVATE_SESSION

lu_name

LU name of the local LU, as defined to CS Linux. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 bytes. To indicate that the LU is defined by its LU alias instead of its LU name, set this parameter to 8 binary zeros.

lu_alias

LU alias of the local LU, as defined to CS Linux. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes. It is used only if *lu_name* is set to zeros.

To indicate the LU associated with the CP (the default LU), set both *lu_name* and *lu_alias* to 8 binary zeros.

session_id

8-byte identifier of the session to deactivate. If this field is set to 8 binary zeros, CS Linux deactivates all sessions for the partner LU and mode.

plu_alias

LU alias of the partner LU.

This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes. To indicate that the partner LU is defined by its fully qualified LU name instead of its LU alias, set this parameter to 8 binary zeros.

mode_name

Name of the mode to be used by the LUs.

This is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 bytes.

type Type of deactivation. Possible values are:

AP_DEACT_CLEANUP
Deactivate the session immediately, without waiting for sessions to end.

AP_DEACT_NORMAL
Do not deactivate the session until all conversations using the session have ended.

sense_data
If type is set to AP_DEACT_CLEANUP, this parameter specifies the sense data to be used when deactivating the session. Otherwise this parameter is not used.

fqplu_name
Fully qualified LU name for the partner LU, as defined to CS Linux. This parameter is used only if the *plu_alias* field is set to zeros; it is ignored if *plu_alias* is specified.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters. This return code can also indicate that the session ID did not match the session ID of an active session (implying that the session has already been deactivated).

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_CLEANUP_TYPE
The *type* parameter was not set to a valid value.

AP_INVALID_LU_ALIAS
The *lu_alias* parameter did not match any defined LU alias.

AP_INVALID_LU_NAME
The *lu_name* parameter did not match any defined LU name.

AP_INVALID_MODE_NAME
The *mode_name* parameter did not match any defined mode name.

AP_INVALID_PLU_NAME
The *fqplu_name* parameter did not match any defined partner LU name.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_ADJACENT_LEN_NODE

DEFINE_ADJACENT_LEN_NODE adds entries to the node directory database for an adjacent LEN node and its associated LUs, or adds additional LU entries for a previously-defined LEN node.

This verb is equivalent to a series of DEFINE_DIRECTORY_ENTRY verbs for the LEN node and its associated LUs; it provides a fast method of defining the LEN node's configuration with a single verb. To query the directory entries created by this verb, use QUERY_DIRECTORY_ENTRY.

If this verb is issued to the network node acting as the server for the LEN node, the LEN node's resources are added to the network node's directory database. This means that the network node will respond to network searches for these resources, so that they are accessible to the entire network. If the verb is issued to an end node, the LEN node's resources are accessible only to that end node.

VCB Structure

```
typedef struct define_adjacent_len_node
{
      AP_UINT16         opcode;             /* verb operation code          */
      unsigned char     reserv2;            /* reserved                     */
      unsigned char     format;             /* reserved                     */
      AP_UINT16         primary_rc;         /* primary return code          */
      AP_UINT32         secondary_rc;       /* secondary return code        */
      unsigned char     cp_name[17];        /* CP name                      */
      unsigned char     description[32];    /* resource description         */
      unsigned char     reserv1[16];        /* reserved                     */
      unsigned char     num_of_lus;         /* number of LUs                */
      unsigned char     wildcard_lus;       /* wildcard LUs                 */
      unsigned char     reserv3[8];         /* reserved                     */
      unsigned char     lu_names[10][8];    /* LU names                     */
} DEFINE_ADJACENT_LEN_NODE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_ADJACENT_LEN_NODE

cp_name

The fully qualified name of the CP in the adjacent LEN node. This should match the name the LEN node sends on its XIDs (if it supports them), and the adjacent CP name specified on the DEFINE_LS for the link to the LEN node.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

description

A null-terminated text string (0–31 characters followed by a null character) describing the adjacent LEN node. This string is for information only; it is

stored in the configuration and returned on the QUERY_DIRECTORY_ENTRY verb, but CS Linux does not make any other use of it.

num_of_lus
The number of LUs to be defined, in the range `0–10`. To define an adjacent node with more than 10 LUs, use multiple DEFINE_ADJACENT_LEN_NODE verbs for the same CP name.

wildcard_lus
Indicates whether the specified LU names are wildcard entries or explicit LU names. Possible values are:

AP_YES The specified LU names are wildcard entries.

AP_NO The specified LU names are explicit entries.

lu_names
The names of the LUs being defined on the LEN node. Each name is an 8-byte type-A EBCDIC character string, right-padded with EBCDIC spaces, corresponding to the second part of the fully qualified LU name (the first part of the fully qualified name is defined by the *cp_name* parameter above).

To define the LU associated with the LEN node's control point (the CP LU or default LU), specify the node's fully qualified CP name in the *cp_name* parameter, and include the "network name" part of this name (the 8 characters after the EBCDIC dot) as one of the LU names.

You can specify a wildcard LU name to match multiple LU names, by specifying only the initial characters of the name. For example, the wildcard LU name "LU" will match "LUNAME" or "LU01" (but will not match "NAMELU"). However, all the LU names specified on a single verb must be of the same type (wildcard or explicit), as defined by the *wildcard_lus* parameter. To add both types of LU names for the same LEN node, use multiple DEFINE_ADJACENT_LEN_NODE verbs.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
`AP_PARAMETER_CHECK`

secondary_rc
Possible values are:

AP_INVALID_CP_NAME
The *cp_name* parameter contained a character that was not valid.

AP_INVALID_LU_NAME
One or more of the specified LU names contained a character that was not valid.

AP_INVALID_NUM_LUS
The *num_of_lus* parameter was not in the valid range.

AP_INVALID_WILDCARD_NAME
The *wildcard_lus* parameter was set to AP_YES, but one or more of the specified LU names was already defined on a different parent node.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_INVALID_CP_NAME
The specified CP name is already defined in a directory entry, and is not a LEN node.

AP_INVALID_LU_NAME
One or more of the specified LU names was already defined on a different parent node.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_CN

DEFINE_CN defines a Connection Network (otherwise known as a Virtual Routing Node or VRN). The verb provides the network qualified name of the connection network along with its Transmission Group (TG) characteristics. Also provided is a list of the names of the local ports that can access this connection network.

DEFINE_CN can be used to redefine an existing Connection Network. In particular, new ports can be added to the list of ports which access the connection network by issuing another DEFINE_CN. (Ports can be removed in the same way by issuing the DELETE_CN verb).

This verb is valid only at a network node or an end node, and not at a LEN node.

VCB Structure

```
typedef struct define_cn
{
      AP_UINT16          opcode;              /* verb operation code         */
      unsigned char      reserv2;             /* reserved                    */
      unsigned char      format;              /* reserved                    */
      AP_UINT16          primary_rc;          /* primary return code         */
      AP_UINT32          secondary_rc;        /* secondary return code       */
      unsigned char      fqcn_name[17];       /* name of connection network  */
      CN_DEF_DATA        def_data;            /* CN defined data             */
      unsigned char      port_name[8][8];     /* port names                  */
} DEFINE_CN;

typedef struct cn_def_data
{
      unsigned char      description[32];     /* resource description        */
```

```
      unsigned char      reserve0[16];       /* reserved                   */
      unsigned char      num_ports;          /* number of ports on CN      */
      unsigned char      cn_type;            /* reserved                   */
      unsigned char      reserve1[15];       /* reserved                   */
      TG_DEFINED_CHARS   tg_chars;           /* TG characteristics         */
} CN_DEF_DATA;

typedef struct tg_defined_chars
{
      unsigned char      effect_cap;         /* effective capacity         */
      unsigned char      reserve1[5];        /* reserved                   */
      unsigned char      connect_cost;       /* connection cost            */
      unsigned char      byte_cost;          /* byte cost                  */
      unsigned char      reserve2;           /* reserved                   */
      unsigned char      security;           /* security                   */
      unsigned char      prop_delay;         /* propagation delay          */
      unsigned char      modem_class;        /* reserved                   */
      unsigned char      user_def_parm_1;    /* user-defined parameter 1   */
      unsigned char      user_def_parm_2;    /* user-defined parameter 2   */
      unsigned char      user_def_parm_3;    /* user-defined parameter 3   */
} TG_DEFINED_CHARS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_CN

fqcn_name
: Fully qualified name of the connection network. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

def_data.description
: A null-terminated text string (0–31 characters followed by a null character) describing the connection network. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_CN verb, but CS Linux does not make any other use of it.

def_data.num_ports
: Number of ports included on this verb; each DEFINE_CN verb can specify up to 8 ports. To define a CN with more than 8 ports, issue multiple DEFINE_CN verbs for the same CN name; the maximum total number of ports on a CN is 239.

def_data.tg_chars.effect_cap
: Actual bits per second rate (line speed). The value is encoded as a 1-byte floating point number, represented by the formula 0.1 mmm * 2^{eeeee} where the bit representation of the byte is b'eeeeemmm'. Each unit of effective capacity is equal to 300 bits per second.

def_data.tg_chars.connect_cost
: Cost per connect time. Valid values are integer values in the range 0–255, where 0 is the lowest cost per connect time and 255 is the highest.

def_data.tg_chars.byte_cost
: Cost per byte. Valid values are integer values in the range 0–255, where 0 is the lowest cost per byte and 255 is the highest.

def_data.tg_chars.security
: Security level of the network. Possible values are:

  AP_SEC_NONSECURE
  : No security.

AP_SEC_PUBLIC_SWITCHED_NETWORK
Data is transmitted over a public switched network.

AP_SEC_UNDERGROUND_CABLE
Data is transmitted over secure underground cable.

AP_SEC_SECURE_CONDUIT
Data is transmitted over a line in a secure conduit that is not guarded.

AP_SEC_GUARDED_CONDUIT
Data is transmitted over a line in a conduit that is protected against physical tapping.

AP_SEC_ENCRYPTED
Data is encrypted before transmission over the line.

AP_SEC_GUARDED_RADIATION
Data is transmitted over a line that is protected against physical and radiation tapping.

def_data.tg_chars.prop_delay
Propagation delay: the time that a signal takes to travel the length of the link. Specify one of the following values, according to the type of link:

AP_PROP_DELAY_MINIMUM
Minimum propagation delay.

AP_PROP_DELAY_LAN
Delay is less than 480 microseconds (typical for a LAN).

AP_PROP_DELAY_TELEPHONE
Delay is in the range 480–49,512 microseconds (typical for a telephone network).

AP_PROP_DELAY_PKT_SWITCHED_NET
Delay is in the range 49,512–245,760 microseconds (typical for a packet-switched network).

AP_PROP_DELAY_SATELLITE
Delay is greater than 245,760 microseconds (typical for a satellite link).

AP_PROP_DELAY_MAXIMUM
Maximum propagation delay.

def_data.tg_chars.user_def_parm_1 **through** *def_data.tg_chars.user_def_parm_3*
User-defined parameters, which you can use to include other TG characteristics not covered by the above parameters. Each of these parameters must be set to a value in the range `0`–`255`.

port_name
Array of up to eight port names defined on the connection network. Each port name is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes, and must already have been defined by a DEFINE_PORT verb. The port type must be a network type that supports connection networks (Ethernet, Token Ring, Enterprise Extender). Additional ports may be defined on the Connection Network by issuing another DEFINE_CN specifying the new port names.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameter:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_DEF_LINK_INVALID_SECURITY
The *security* parameter was not set to one of the valid values.

AP_EXCEEDS_MAX_ALLOWED
Adding the specified number of ports would exceed the maximum total number of ports on a CN.

AP_INVALID_CN_NAME
The *fqcn_name* parameter contained a character that was not valid or was not in the correct format.

AP_INVALID_NUM_PORTS_SPECIFIED
The *num_ports* parameter was not set to a valid value.

AP_INVALID_PORT_NAME
One or more of the port names specified did not match the name of a defined port.

AP_INVALID_PORT_TYPE
One or more of the specified ports cannot be on a CN because its DLC type is a point-to-point type (such as SDLC) rather than a network type.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters:

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_PORT_ACTIVE
The specified port cannot be modified because it is currently active.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node is a LEN node, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node is a LEN node. This verb is valid only at a network node or an end node.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_COS

DEFINE_COS adds a class of service definition or modifies a previously defined COS. The definition specifies TG "rows" and node "rows", which associate a range of node and TG characteristics with weights used for route calculation. The lower the weight the more favorable the route.

VCB Structure

The DEFINE_COS verb contains a variable number of `cos_tg_row` and `cos_node_row` structures; the number of each is specified by the *num_of_node_rows* and *num_of_tg_rows* parameters. The TG rows are included at the end of the main DEFINE_COS structure, in ascending order of weight; they are followed by the node rows, again in ascending order of weight.

```
typedef struct define_cos
{
   AP_UINT16          opcode;                 /* verb operation code        */
   unsigned char      reserv2;                /* reserved                   */
   unsigned char      format;                 /* reserved                   */
   AP_UINT16          primary_rc;             /* primary return code        */
   AP_UINT32          secondary_rc;           /* secondary return code      */
   unsigned char      cos_name[8];            /* class of service name      */
   unsigned char      description[32];        /* resource description       */
   unsigned char      reserv1[16];            /* reserved                   */
   unsigned char      transmission_priority;  /* transmission priority      */
   unsigned char      reserv3[9];             /* reserved                   */
   unsigned char      num_of_node_rows;       /* number of node rows        */
   unsigned char      num_of_tg_rows;         /* number of TG rows          */
} DEFINE_COS;

typedef struct cos_tg_row
{
   TG_DEFINED_CHARS   minimum;                /* minimum                    */
   TG_DEFINED_CHARS   maximum;                /* maximum                    */
   unsigned char      weight;                 /* weight                     */
   unsigned char      reserv1;                /* reserved                   */
} COS_TG_ROW;

typedef struct tg_defined_chars
{
   unsigned char      effect_cap;             /* effective capacity         */
   unsigned char      reserve1[5];            /* reserved                   */
   unsigned char      connect_cost;           /* cost per connect time      */
   unsigned char      byte_cost;              /* cost per byte              */
   unsigned char      reserve2;               /* reserved                   */
   unsigned char      security;               /* security                   */
   unsigned char      prop_delay;             /* propagation delay          */
   unsigned char      modem_class;            /* reserved                   */
   unsigned char      user_def_parm_1;        /* user defined parameter 1   */
   unsigned char      user_def_parm_2;        /* user defined parameter 2   */
   unsigned char      user_def_parm_3;        /* user defined parameter 3   */
} TG_DEFINED_CHARS;

typedef struct cos_node_row
{
   COS_NODE_STATUS     minimum;               /* minimum                    */
```

```
   COS_NODE_STATUS     maximum;              /* maximum                    */
   unsigned char       weight;               /* weight                     */
   unsigned char       reserv1;              /* reserved                   */
} COS_NODE_ROW;

typedef struct cos_node_status
{
   unsigned char       rar;                  /* route additional resistance*/
   unsigned char       status;               /* node status                */
   unsigned char       reserv1[2];           /* reserved                   */
} COS_NODE_STATUS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_COS

cos_name
: Class of service name. This is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

description
: A null-terminated text string (0–31 characters followed by a null character) describing the COS. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_COS verb, but CS Linux does not make any other use of it.

transmission_priority
: Transmission priority. Possible values are:

  AP_LOW

  AP_MEDIUM

  AP_HIGH

  AP_NETWORK

num_of_node_rows
: Number of node rows which follow the DEFINE_COS VCB (after the TG rows). The maximum is 8.

num_of_tg_rows
: Number of TG rows which follow the DEFINE_COS VCB. The maximum is 8.

  Each TG row contains a set of minimum TG characteristics, a set of maximum TG characteristics, and a weight. When computing the weights for a TG, its characteristics are checked against the minimum and maximum characteristics defined for each TG row. The TG is then assigned the weight of the first TG row which bounds all the TG's characteristics within the limits specified. If the TG characteristics do not satisfy any of the listed TG rows, the TG is considered unsuitable for this COS, and is assigned an infinite weight. The TG rows must be concatenated in ascending order of weight.

cos_tg_row.minimum.effect_cap
: Minimum limit for actual bits per second rate (line speed). The value is encoded as a 1-byte floating point number, represented by the formula 0.1 mmm * 2 ^{eeeee} where the bit representation of the byte is b'eeeeemmm'. Each unit of effective capacity is equal to 300 bits per second.

cos_tg_row.minimum.connect_cost
Minimum limit for cost per connect time. Valid values are integer values in the range `0`–`255`, where `0` is the lowest cost per connect time and `255` is the highest.

cos_tg_row.minimum.byte_cost
Minimum limit for cost per byte. Valid values are integer values in the range `0`–`255`, where `0` is the lowest cost per byte and `255` is the highest.

cos_tg_row.minimum.security
Minimum level of security. Possible values are:

AP_SEC_NONSECURE
No security.

AP_SEC_PUBLIC_SWITCHED_NETWORK
Data is transmitted over a public switched network.

AP_SEC_UNDERGROUND_CABLE
Data is transmitted over secure underground cable.

AP_SEC_SECURE_CONDUIT
Data is transmitted over a line in a secure conduit that is not guarded.

AP_SEC_GUARDED_CONDUIT
Data is transmitted over a line in a conduit that is protected against physical tapping.

AP_SEC_ENCRYPTED
Data is encrypted before transmission over the line.

AP_SEC_GUARDED_RADIATION
Data is transmitted over a line that is protected against physical and radiation tapping.

cos_tg_row.minimum.prop_delay
Minimum limits for propagation delay: the time that a signal takes to travel the length of the link. Specify one of the following values, according to the type of link:

AP_PROP_DELAY_MINIMUM
Minimum propagation delay.

AP_PROP_DELAY_LAN
Delay is less than 480 microseconds (typical for a LAN).

AP_PROP_DELAY_TELEPHONE
Delay is in the range 480–49,512 microseconds (typical for a telephone network).

AP_PROP_DELAY_PKT_SWITCHED_NET
Delay is in the range 49,512–245,760 microseconds (typical for a packet-switched network).

AP_PROP_DELAY_SATELLITE
Delay is greater than 245,760 microseconds (typical for a satellite link).

AP_PROP_DELAY_MAXIMUM
Maximum propagation delay.

cos_tg_row.minimum.user_def_parm_1 **through** *cos_tg_row.user_def_parm_3*
Minimum values for user-defined parameters, which you can use to

include other TG characteristics not covered by the above parameters. Each of these parameters must be set to a value in the range 0–255.

cos_tg_row.maximum.effect_cap
Maximum limit for actual bits per second rate (line speed). The value is encoded as a 1-byte floating point number, represented by the formula 0.1 mmm * 2 ^{eeeee} where the bit representation of the byte is b'eeeeemmm'. Each unit of effective capacity is equal to 300 bits per second.

cos_tg_row.maximum.connect_cost
Maximum limit for cost per connect time. Valid values are integer values in the range 0–255, where 0 is the lowest cost per connect time and 255 is the highest.

cos_tg_row.maximum.byte_cost
Maximum limit for cost per byte. Valid values are integer values in the range 0–255, where 0 is the lowest cost per byte and 255 is the highest.

cos_tg_row.maximum.security
Maximum level of security. Possible values are:

AP_SEC_NONSECURE
No security.

AP_SEC_PUBLIC_SWITCHED_NETWORK
Data is transmitted over a public switched network.

AP_SEC_UNDERGROUND_CABLE
Data is transmitted over secure underground cable.

AP_SEC_SECURE_CONDUIT
Data is transmitted over a line in a secure conduit that is not guarded.

AP_SEC_GUARDED_CONDUIT
Data is transmitted over a line in a conduit that is protected against physical tapping.

AP_SEC_ENCRYPTED
Data is encrypted before transmission over the line.

AP_SEC_GUARDED_RADIATION
Data is transmitted over a line that is protected against physical and radiation tapping.

cos_tg_row.maximum.prop_delay
Maximum limits for propagation delay: the time that a signal takes to travel the length of the link. Specify one of the following values, according to the type of link:

AP_PROP_DELAY_MINIMUM
Minimum propagation delay.

AP_PROP_DELAY_LAN
Delay is less than 480 microseconds (typical for a LAN).

AP_PROP_DELAY_TELEPHONE
Delay is in the range 480–49,512 microseconds (typical for a telephone network).

AP_PROP_DELAY_PKT_SWITCHED_NET
Delay is in the range 49,512–245,760 microseconds (typical for a packet-switched network).

AP_PROP_DELAY_SATELLITE
Delay is greater than 245,760 microseconds (typical for a satellite link).

AP_PROP_DELAY_MAXIMUM
Maximum propagation delay.

cos_tg_row.maximum.user_def_parm_1 **through** *cos_tg_row.maximum.user_def_parm_3*
Maximum values for user-defined parameters, which you can use to include other TG characteristics not covered by the above parameters. Each of these parameters must be set to a value in the range 0–255.

cos_tg_row.weight
Weight associated with this TG row.

Each node row contains a set of minimum node characteristics, a set of maximum node characteristics, and a weight. When computing the weights for a node, its characteristics are checked against the minimum and maximum characteristics defined for each node row. The node is then assigned the weight of the first node row which bounds all the node's characteristics within the limits specified. If the node characteristics do not satisfy any of the listed node rows, the node is considered unsuitable for this COS, and is assigned an infinite weight. The node rows must be listed in ascending order of weight.

cos_node_row.minimum.rar
Route additional resistance minimum. Values must be in the range 0–255.

cos_node_row.minimum.status
Specifies the minimum congestion status of the node. Possible values are:

AP_UNCONGESTED
The number of ISR sessions is below the *isr_sessions_upper_threshold* value in the node's configuration.

AP_CONGESTED
The number of ISR sessions exceeds the threshold value.

cos_node_row.maximum.rar
Route additional resistance maximum. Values must be in the range 0–255.

cos_node_row.maximum.status
Specifies the maximum congestion status of the node. Possible values are:

AP_UNCONGESTED
The number of ISR sessions is below the *isr_sessions_upper_threshold* value in the node's configuration.

AP_CONGESTED
The number of ISR sessions exceeds the threshold value.

cos_node_row.weight
Weight associated with this node row.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_COS_NAME
The *cos_name* parameter contained a character that was not valid.

AP_INVALID_NUMBER_OF_NODE_ROWS
The *num_of_node_rows* parameter was not in the valid range.

AP_INVALID_NUMBER_OF_TG_ROWS
The *num_of_tg_rows* parameter was not in the valid range.

AP_NODE_ROW_WGT_LESS_THAN_LAST
The node rows were not listed in ascending order of weight.

AP_TG_ROW_WGT_LESS_THAN_LAST
The TG rows were not listed in ascending order of weight.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_COS_TABLE_FULL
You cannot define a new COS because this would exceed the maximum number of COS definitions permitted for the node (specified by the *cos_cache_size* parameter on DEFINE_NODE).

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_CPIC_SIDE_INFO

This verb adds or replaces a side information entry. A CPI-C side information entry associates a set of conversation characteristics with a symbolic destination name. If there is already a side information entry with the same symbolic destination name as the one supplied with this verb, it is overwritten with the data supplied to this call.

Note the difference between this verb and the CPI-C function Set_CPIC_Side_Information. This verb modifies the domain configuration file, so

that it affects all CS Linux CPI-C applications. The CPI-C function modifies the application's own copy in memory of the side information table, and does not affect any other CPI-C applications.

This verb must be issued to the domain configuration file.

VCB Structure

```
typedef struct define_cpic_side_info
{
   AP_UINT16               opcode;             /* verb operation code       */
   unsigned char           reserv2;            /* reserved                  */
   unsigned char           format;             /* reserved                  */
   AP_UINT16               primary_rc;         /* primary return code       */
   AP_UINT32               secondary_rc;       /* secondary return code     */
   unsigned char           reserv2a[8];        /* reserved                  */
   unsigned char           sym_dest_name[8];   /* Symbolic destination name */
   CPIC_SIDE_INFO_DEF_DATA def_data;
} DEFINE_CPIC_SIDE_INFO;

typedef struct cpic_side_info_def_data
{
   unsigned char    description[32];             /* resource description    */
   unsigned char    reserv1[16];                 /* reserved                */
   CPIC_SIDE_INFO   side_info;                   /* CPIC side info          */
   unsigned char    user_data[24];               /* reserved                */

} CPIC_SIDE_INFO_DEF_DATA;

typedef struct cpic_side_info
{
   unsigned char    partner_lu_name[17];         /* Fully qualified         */
                                                 /*  partner LU name        */
   unsigned char    reserved[3];                 /* Reserved                */
   AP_UINT32        tp_name_type;                /* TP name type            */
   unsigned char    tp_name[64];                 /* TP name                 */
   unsigned char    mode_name[8];                /* Mode name               */
   AP_UINT32        conversation_security_type;  /* Conversation security   */
                                                 /*  type                   */
   unsigned char    security_user_id[10];        /* User ID                 */
   unsigned char    security_password[10];       /* Password                */
   unsigned char    lu_alias[8];                 /* LU alias                */
} CPIC_SIDE_INFO;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_CPIC_SIDE_INFO

sym_dest_name
Symbolic destination name which identifies the side information entry. This is an 8-byte ASCII string, padded on the right with spaces if necessary. The name can contain any displayable character.

def_data.description
A null-terminated text string (0–31 characters followed by a null character) describing the side information entry. This string is for information only; it is stored in the configuration file and returned on the QUERY_CPIC_SIDE_INFO verb, but CS Linux does not make any other use of it.

def_data.side_info.partner_lu_name
Fully qualified name of the partner LU. The name is a 17-byte EBCDIC

string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

def_data.side_info.tp_name_type
The type of the target TP (the valid characters for a TP name are determined by the TP type). Possible values are:

XC_APPLICATION_TP
Application TP. All characters in the TP name must be valid ASCII characters.

XC_SNA_SERVICE_TP
Service TP. The TP name must be specified as an 8–character ASCII string representing the hexadecimal digits of a 4-character name. For example, if the hexadecimal representation of the name is 0x21F0F0F8, set the *def_data.side_info.tp_name* parameter to the 8–character string "21F0F0F8".

The first character (represented by two bytes) must be a hexadecimal value in the range `0x0–0x3F`, excluding `0x0E` and `0x0F`; the remaining characters (each represented by two bytes) must be valid EBCDIC characters.

def_data.side_info.tp_name
TP name of the target TP. This is a 64-byte ASCII character string, padded on the right with ASCII spaces.

def_data.side_info.mode_name
Name of the mode used to access the target TP. This is an 8-byte ASCII character string, padded on the right with spaces.

def_data.side_info.conversation_security_type
Specifies whether the target TP uses conversation security. Possible values are:

XC_SECURITY_NONE
The target TP does not use conversation security.

XC_SECURITY_PROGRAM
The target TP uses conversation security. The *security_user_id* and *security_password* parameters specified below will be used to access the target TP.

XC_SECURITY_PROGRAM_STRONG
As for `XC_SECURITY_PROGRAM`, except that the local node must not send the password across the network in clear text format. This value can be used only if the remote system supports password substitution.

XC_SECURITY_SAME
The target TP uses conversation security, and can accept an "already verified" indicator from the local TP. (This indicates that the local TP was itself invoked by another TP, and has verified the security user ID and password supplied by this TP.) The *security_user_id* parameter specified below will be used to access the target TP; no password is required.

def_data.side_info.security_user_id
User ID used to access the partner TP. This parameter is not required if the *conversation_security_type* parameter is set to `XC_SECURITY_NONE`.

def_data.side_info.security_password
Password used to access the partner TP. This parameter is required only if the *conversation_security_type* parameter is set to XC_SECURITY_PROGRAM or XC_SECURITY_PROGRAM_STRONG.

def_data.side_info.lu_alias
The alias of the local LU used to communicate with the target TP. This alias is a character string using any locally displayable characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_SYM_DEST_NAME
The *sym_dest_name* parameter contained a character that was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_DEFAULT_PU

DEFINE_DEFAULT_PU specifies which PU is the default for handling CS Linux management services data. Only one default PU for each node can be defined at any time; a second DEFINE_DEFAULT_PU verb for a different PU name overrides the previous definition.

DEFINE_DEFAULT_PU enables the user to define, redefine, or modify any field of a default PU. This verb also enables the user to delete the default PU, by specifying a null PU name.

If an application issues the MS API verb TRANSFER_MS_DATA without specifying a PU name, then the data is routed to the default PU defined for the local node, and sent on this PU's session with the host SSCP. For more information about TRANSFER_MS_DATA, see the *IBM Communications Server for Data Center Deployment on AIX or Linux MS Programmer's Guide*.

VCB Structure

```
typedef struct define_default_pu
{
      AP_UINT16           opcode;              /* verb operation code       */
      unsigned char       reserv2;             /* reserved                  */
```

```
      unsigned char       format;              /* reserved                 */
      AP_UINT16           primary_rc;          /* primary return code      */
      AP_UINT32           secondary_rc;        /* secondary return code    */
      unsigned char       pu_name[8];          /* PU name                  */
      unsigned char       description[32];      /* resource description     */
      unsigned char       reserv1[16];         /* reserved                 */
      unsigned char       reserv3[16];         /* reserved                 */
} DEFINE_DEFAULT_PU;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_DEFAULT_PU

pu_name

Name of the default PU; this must be a PU name defined by a previous DEFINE_LS verb. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if necessary.

To delete the default PU, specify all zeros.

description

A null-terminated text string (0–31 characters followed by a null character) describing the PU. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_DEFAULT_PU verb, but CS Linux does not make any other use of it.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc

AP_OK

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_DEFAULTS

DEFINE_DEFAULTS specifies default parameters used by the node.

VCB Structure

```
typedef struct define_defaults
{
      AP_UINT16           opcode;              /* verb operation code      */
      unsigned char       reserv2;             /* reserved                 */
      unsigned char       format;              /* reserved                 */
      AP_UINT16           primary_rc;          /* primary return code      */
      AP_UINT32           secondary_rc;        /* secondary return code    */
      DEFAULT_CHARS       default_chars;       /* default parameters       */
} DEFINE_DEFAULTS;

typedef struct default_chars
{
      unsigned char       description[32];     /* resource description     */
      unsigned char       reserv2[16];         /* reserved                 */
      unsigned char       mode_name[8];        /* default mode name        */
      unsigned char       implicit_plu_forbidden; /* disallow implicit PLUs? */
      unsigned char       specific_security_codes;/* generic security sense  */
```

```
                                                  /* codes?                  */
     AP_UINT16           limited_timeout;    /* timeout for limited sessions*/
     unsigned char       reserv[244];        /* reserved                    */
} DEFAULT_CHARS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_DEFAULTS

default_chars.description
A null-terminated text string (0–31 characters followed by a null character) describing the default parameters. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_DEFAULTS verb, but CS Linux does not make any other use of it.

default_chars.mode_name
Name of the default mode. If an application specifies an unrecognized mode name when attempting to start a session, the parameters from this mode will be used as a default definition for the unrecognized mode.

This must be either a mode defined by a previous DEFINE_MODE verb or one of the SNA-defined modes listed in "Purpose of the NOF API" on page 1. The name is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if necessary.

default_chars.implicit_plu_forbidden
Specifies whether CS Linux puts implicit definitions in place for unknown partner LUs. Possible values are:

AP_YES CS Linux does not put implicit definitions in place for unknown partner LUs. All partner LUs must be defined explicitly.

AP_NO CS Linux puts implicit definitions in place for unknown partner LUs.

default_chars.specific_security_codes
Specifies whether CS Linux uses specific sense codes on a security authentication or authorization failure. Specific sense codes are only returned to those partner LUs which have reported support for them on the session. Possible values are:

AP_YES CS Linux uses specific sense codes.

AP_NO CS Linux does not use specific sense codes.

default_chars.limited_timeout
Specifies the timeout after which free limited-resource conwinner sessions are deactivated. Specify a value in the range 0–65,535 seconds.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_MODE_NAME
The *mode_name* parameter did not match any defined mode name.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_DIRECTORY_ENTRY

DEFINE_DIRECTORY_ENTRY defines a new entry in the node directory database. This verb cannot be used to modify existing entries. The verb provides a network qualified resource name along with a resource type (network node, end node, LU or Wildcard).

When defining an adjacent node and its LUs, you are recommended to use DEFINE_ADJACENT_LEN_NODE instead of DEFINE_DIRECTORY_ENTRY. This allows you to define the node and its LUs with a single verb. (DEFINE_DIRECTORY_ENTRY defines only a single entry, so you need to use multiple verbs to define entries for the adjacent node and for its LUs.)

Because the database is hierarchical, each entry includes the name of the parent resource; for an LU the parent resource is the owning Control Point, and for an end node or LEN node it is the network node server. However, when DEFINE_DIRECTORY_ENTRY is used on an end node or LEN node to define an adjacent LEN node resource with which it communicates directly, the entry does not include a parent resource name.

You can specify a "wildcard" LU name to match multiple LU names, by specifying only the initial characters of the name. For example, the wildcard LU name APPN.LU will match APPN.LUNAME or APPN.LU01 (but will not match APPN.NAMELU).

VCB Structure

```
typedef struct define_directory_entry
{
   AP_UINT16        opcode;              /* verb operation code              */
   unsigned char    reserv2;             /* reserved                         */
   unsigned char    format;              /* reserved                         */
   AP_UINT16        primary_rc;          /* primary return code              */
   AP_UINT32        secondary_rc;        /* secondary return code            */
   unsigned char    resource_name[17];   /* network qualified resource name  */
   unsigned char    reserv1a;            /* reserved                         */
   AP_UINT16        resource_type;       /* resource type                    */
   unsigned char    description[32];     /* resource description             */
   unsigned char    reserv3[16];         /* reserved                         */
   unsigned char    parent_name[17];     /* fully qualified parent name      */
   unsigned char    reserv1b;            /* reserved                         */
   AP_UINT16        parent_type;         /* parent's resource type           */
   unsigned char    reserv4[8];          /* reserved                         */
} DEFINE_DIRECTORY_ENTRY;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_DIRECTORY_ENTRY

resource_name
Fully qualified name of the resource being registered. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

resource_type
Specifies the type of the resource being defined. Possible values are:

AP_ENCP_RESOURCE
End node or LEN node

AP_NNCP_RESOURCE
Network node

AP_LU_RESOURCE
LU

AP_WILDCARD_LU_RESOURCE
Wildcard LU name.

For an LU or wildcard LU, the directory entry for the parent resource (the owning CP) must already be defined.

description
A null-terminated text string (0–31 characters followed by a null character) describing the directory entry. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_DIRECTORY_ENTRY and QUERY_DIRECTORY_LU verbs, but CS Linux does not make any other use of it.

parent_name
Fully qualified name of the parent resource; for an LU the parent resource is the owning Control Point, and for an end node or LEN node it is the network node server. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

This parameter should be set to all binary zeros in the following cases:

- When registering a network node CP
- When the verb is being issued to an end node or LEN node to define an adjacent LEN node CP with which the local node communicates directly.

parent_type
Specifies the parent type of the resource being defined. Possible values are:

AP_ENCP_RESOURCE
End node (for an LU resource owned by an end node)

AP_NNCP_RESOURCE
Network node (for an LU resource owned by a network node, or for an EN or LEN resource).

Set this parameter to zero when no parent resource name is supplied.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_FQ_OWNING_CP_NAME
The *parent_name* parameter did not match the name of a defined resource.

AP_INVALID_LU_NAME
The *resource_name* parameter contained a character that was not valid or was not in the correct format.

AP_INVALID_RESOURCE_TYPE
The *resource_type* parameter was not set to a valid value.

AP_INVALID_WILDCARD_NAME
The *resource_type* parameter was set to AP_WILDCARD_LU_RESOURCE, but the *resource_name* parameter did not contain a valid wildcard entry.

AP_DUPLICATE
The *resource_name* parameter contained a wildcard entry that has already been defined.

AP_INVALID_RESOURCE_NAME
The *resource_name* parameter specified a node name that clashed with the name of the node to which the verb was issued.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_DLC

DEFINE_DLC defines a new DLC. It can also be used to modify the DLC-specific parameters of an existing DLC, if the DLC is not currently active, but other parameters (such as DLC type, negotiable link support and the valid port types) cannot be modified.

VCB Structure

```
typedef struct define_dlc
{
   AP_UINT16       opcode;             /* verb operation code             */
   unsigned char   reserv2;            /* reserved                        */
   unsigned char   format;             /* reserved                        */
   AP_UINT16       primary_rc;         /* primary return code             */
```

```
   AP_UINT32       secondary_rc;         /* secondary return code           */
   unsigned char   dlc_name[8];          /* name of DLC                     */
   DLC_DEF_DATA    def_data;             /* DLC defined data                */
} DEFINE_DLC;

typedef struct dlc_def_data
{
   unsigned char   description[32];      /* resource description            */
   unsigned char   initially_active;     /* is the DLC initially active?    */
   unsigned char   reserv1[15];          /* reserved                        */
   unsigned char   dlc_type;             /* DLC type                        */
   unsigned char   neg_ls_supp;          /* negotiable link station support */
   unsigned char   port_types;           /* port types supported by DLC type */
   unsigned char   hpr_only;             /* only support HPR?               */
   unsigned char   reserv3;              /* reserved                        */
   unsigned char   retry_flags;          /* reserved                        */
   AP_UINT16       max_activation_attempts; /* reserved                     */
   AP_UINT16       activation_delay_timer;  /* reserved                     */
   unsigned char   reserv4[4];              /* reserved                     */
   AP_UINT16       dlc_spec_data_len;       /* Length of DLC specific data  */
} DLC_DEF_DATA;
```

DLC-specific data for multipath channel (MPC), CS Linux for System z only:

```
typedef struct chnl_dlc_spec_data
{
   V0_MUX_INFO     mux_info;             /* streams information             */
   AP_UINT16       mu_credit;            /* reserved                        */
   unsigned char   stats_support;        /* reserved                        */
   unsigned char   reserve1[31];         /* pad and future expansion        */
} CHNL_DLC_SPEC_DATA;
```

DLC-specific data for Enterprise Extender (HPR/IP):

```
typedef struct ipdlc_dlc_spec_data
{
    V0_MUX_INFO   mux_info;          /* streams information                */
    AP_UINT16     udp_port[5];       /* UDP port numbers for traffic       */
                                     /*  priorities LLC, Network, High,    */
                                     /*  Medium, Low                       */
    unsigned char ip_precedence[5];  /* IP precedence 0-7 for traffic      */
                                     /*  priorities                        */
    unsigned char no_dns_lookup;     /* are all remote hosts specified by  */
                                     /*  numeric IP address?               */
} IPDLC_DLC_SPEC_DATA;
```

DLC-specific data for SDLC:

```
typedef struct sdl_spec_data
{
   V0_MUX_INFO       mux_info;        /* Streams config info              */
   AP_UINT16         mu_credit;       /* amount of credit to allow PC to send*/
   unsigned char     stats_support;   /* activate statistics gathering?   */
   unsigned char     reserve1;        /* reserved                         */
   AP_UINT16         sdh_parms_len;   /* Length of HMOD stub create_parms */
   SDH_CREATE_PARMS  sdh_parms;       /* HMOD stub create_parms structure */
} SDL_SPEC_DATA;
typedef struct sdh_create_parms
{
   AP_UINT16         length;          /* Length of HMOD stub create_parms */
   AP_UINT16         num_ports;       /* max number of ports DLC can support */
   AP_UINT32         creators_pid;    /* process ID of DLC                */
   V0_MUX_INFO       mux_info;        /* reserved                         */
} SDH_CREATE_PARMS;
```

DLC-specific data for QLLC:

```
typedef struct vql_dlc_spec_data
{
   V0_MUX_INFO       mux_info;        /* streams config info               */
} VQL_DLC_SPEC_DATA;
```

DLC-specific data for Token Ring, Ethernet:

```
typedef struct vmc_dlc_cfg
{
   V0_MUX_INFO       mux_info;              /* Streams config info         */
   AP_UINT16         lan_type;              /* type of LAN                 */
   AP_UINT16         min_rcv_dsf;           /* reserved                    */
} VMC_DLC_CFG;
```

For all DLC types:

```
typedef struct v0_mux_info
{
   AP_UINT16         dlc_type;              /* DLC implementation type     */
   unsigned char     need_vrfy_fixup;       /* reserved                    */
   unsigned char     num_mux_ids;           /* reserved                    */
   AP_UINT32         card_type;             /* type of adapter card        */
   AP_UINT32         adapter_number;        /* DLC adapter number          */
   AP_UINT32         oem_data_length;       /* reserved                    */
   AP_INT32          mux_ids[5];            /* reserved                    */
} V0_MUX_INFO;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_DLC

dlc_name
Name of the DLC. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes.

def_data.description
A null-terminated text string (0–31 characters followed by a null character) describing the DLC. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_DLC verb, but CS Linux does not make any other use of it.

def_data.initially_active
Specifies whether this DLC is automatically started when the node is started. Possible values are:

AP_YES The DLC is automatically started when the node is started.

AP_NO The DLC is automatically started only if a port or LS that uses it is defined to be initially active; otherwise it must be started manually.

def_data.dlc_type
Type of the DLC. You cannot change this parameter for an existing DLC; this parameter can be specified only when creating a new DLC. Possible values are:

AP_SDLC
SDLC

AP_X25 QLLC

AP_TR Token Ring

AP_ETHERNET
Ethernet

AP_MPC Multipath Channel (MPC), CS Linux for System z only

AP_IP Enterprise Extender (HPR/IP)

def_data.neg_ls_supp
Specifies whether the DLC supports negotiable link stations. You cannot change this parameter for an existing DLC; this parameter can be specified only when creating a new DLC. If *dlc_type* is set to AP_QLLC, this must be set to AP_YES. If *dlc_type* is set to AP_MPC, this must be set to AP_YES.

Possible values are:

AP_YES Link stations using this DLC may be negotiable.

AP_NO Link stations using this DLC must be defined as either primary or secondary; negotiable link stations are not supported.

def_data.port_types
If *dlc_type* is set to AP_TR / AP_ETHERNET / AP_IP, set this parameter to AP_PORT_SATF. If *dlc_type* is set to AP_MPC, set this parameter to AP_PORT_SWITCHED. For all other DLC types, this parameter is reserved.

def_data.hpr_only
Specifies whether the DLC supports only HPR traffic. If *dlc_type* is set to AP_IP, this must be set to AP_YES. If *dlc_type* is set to AP_MPC, this must be set to AP_NO.Possible values are:

AP_YES This DLC is used for Enterprise Extender links, and supports only HPR traffic.

AP_NO This DLC is used for link types other than Enterprise Extender and supports non-HPR traffic; it may also support HPR traffic.

def_data.dlc_spec_data_len
Length, in bytes, of data specific to the type of the DLC. The DLC-specific data structures should be included at the end of the basic VCB structure.

DLC-specific data for Enterprise Extender (HPR/IP):

ipdlc_dlc_spec_data.mux_info.dlc_type
Type of the DLC. Set this to AP_IP.

ipdlc_dlc_spec_data.mux_info.card_type
Type of the adapter card. Set this to AP_CARD_IP.

ipdlc_dlc_spec_data.mux_info.adapter_number
Reserved (set this parameter to zero).

ipdlc_dlc_spec_data.udp_port
Array of five UDP port numbers used by the DLC for different traffic priorities. These are normally set to 12000—12004.

udp_port[0]
UDP port used for LLC commands.

udp_port[1]
UDP port used for network priority traffic.

udp_port[2]
UDP port used for high priority traffic.

udp_port[3]
UDP port used for medium priority traffic.

udp_port[4]
UDP port used for low priority traffic.

ipdlc_dlc_spec_data.ip_precedence
Array of five IP precedence values used by the DLC for different traffic priorities. Each entry in this array is a value in the range 0 (minimum)—7 (maximum).

ip_precedence[0]
IP precedence used for LLC commands. This is normally set to 6.

ip_precedence[1]
IP precedence used for network priority traffic. This is normally set to 6.

ip_precedence[2]
IP precedence used for high priority traffic. This is normally set to 4.

ip_precedence[3]
IP precedence used for medium priority traffic. This is normally set to 2.

ip_precedence[4]
IP precedence used for low priority traffic. This is normally set to 1.

ipdlc_dlc_spec_data.no_dns_lookup
Specifies whether remote host IP addresses require lookup at a Domain Name Server. Possible values are:

AP_YES Do not attempt to look up the hostname from the remote IP address when receiving an incoming IP connection.

Use this option when the remote IP address cannot be resolved. In this case, the incoming connection can be matched to a configured LS only if the LS is configured to use an explicit IP address (either IPv4 or IPv6) rather than a hostname.

AP_NO The remote host IP address on link stations defined for this DLC can be specified as a numeric address (either IPv4 or IPv6), as a name (such as newbox.this.co.uk), or as an alias (such as newbox). The node performs a Domain Name Server lookup to determine the remote host name on all incoming calls where necessary.

DLC-specific data for MPC, CS Linux for System z only:

chnl_dlc_spec_data.mux_info.dlc_type
Type of the DLC. Set this to AP_IMPL_MPC_GDLC.

chnl_dlc_spec_data.mux_info.card_type
Type of the adapter card. Set this to AP_CARD_IBM_ESCON.

chnl_dlc_spec_data.mux_info.adapter_number
This parameter is reserved (set it to zero).

DLC-specific data for SDLC:

sdl_spec_data.mux_info.dlc_type
Type of the DLC. Set this to AP_IMPL_SDLC_SL

sdl_spec_data.mux_info.card_type
Type of the adapter card.

Possible values are:
```
AP_CARD_IBM_SDLC
AP_CARD_IBM_MPCA
AP_CARD_IBM_MPAA
AP_CARD_DCA_ISCA
```

sdl_spec_data.mux_info.adapter_number
Adapter number used by the DLC. If the server contains more than one SDLC adapter card, specify `0` (zero) for the first card, `1` for the second card, and so on. Otherwise, set this parameter to `0` (zero).

sdl_spec_data.mu_credit
Specifies the credit value for sending DLC_MUs to the link component. Set this parameter to `4`.

sdl_spec_data.stats_support
Specifies whether the DLC collects link statistics information. Possible values are:

AP_YES The DLC collects link statistics information, which can be examined using QUERY_STATISTICS.

AP_NO The DLC does not collect link statistics information.

sdl_spec_data.sdh_parms_len
Length, in bytes, of the `sdh_parms` structure. Set this to `sizeof(SDH_CREATE_PARMS)`.

sdl_spec_data.sdh_parms.length
Length, in bytes, of the `sdh_parms` structure. Set this to `sizeof(SDH_CREATE_PARMS)`.

sdl_spec_data.sdh_parms.num_ports
The maximum number of ports that this DLC will need to support at a time.

sdl_spec_data.sdh_parms.creators_pid
This parameter is reserved (set it to zero).

DLC-specific data for QLLC:

vql_dlc_spec_data.mux_info.dlc_type
Type of the DLC. Set this to `AP_IMPL_NLI_QLLC`.

vql_dlc_spec_data.mux_info.card_type
Type of the adapter card. Set this to `AP_CARD_QLLC_NLI`.

vql_dlc_spec_data.mux_info.adapter_number
Adapter number used by the DLC. If the server contains more than one X.25 adapter card, specify zero for the first card, `1` for the second, and so on. Otherwise, set this parameter to zero.

DLC-specific data for Token Ring, Ethernet:

vmc_dlc_cfg.mux_info.dlc_type
Type of the DLC. Possible values are:

AP_IMPL_TR_SNAP_LLC2
Token Ring

AP_IMPL_ETHER_SNAP_LLC2
Ethernet

vmc_dlc_cfg.mux_info.card_type
Type of the adapter card.

Possible values are:

AP_CARD_TOKEN_RING_LLI
Token Ring

AP_CARD_ETHERNET_LLI
Ethernet

vmc_dlc_cfg.mux_info.adapter_number
Adapter number used by the DLC.

If the server contains more than one adapter card for this DLC type, specify zero for the first card, 1 for the second, and so on. Otherwise, set this parameter to zero.

vmc_dlc_cfg.lan_type
The type of network accessed by the DLC. Possible values are:

LLC_DIX
DIX

LLC2_802_3
802.3

LLC2_802_3_DIX
Not determined (either 802.3 or DIX). CS Linux will detect the correct type (one of the two values above) when the adjacent station first responds to a frame in one of these formats.

LLC2_TOKEN_RING
Token Ring

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_DLC_NAME
The supplied *dlc_name* parameter contained a character that was not valid.

AP_INVALID_DLC_TYPE
The supplied *dlc_type* parameter was not one of the allowed values.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_DLC_ACTIVE
The specified DLC cannot be modified because it is currently active.

AP_INVALID_DLC_TYPE
You cannot change the DLC type, negotiable link support, or supported port types for an existing DLC. They can be specified only when creating a new DLC.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_DLUR_DEFAULTS

DEFINE_DLUR_DEFAULTS defines a default Dependent LU server (DLUS) and a backup default DLUS; if a default DLUS or backup default DLUS is already defined, the verb overrides the existing definition. The default DLUS name is used by DLUR when it initiates SSCP-PU activation for PUs that do not have an explicitly specified associated DLUS. (To define a PU and its associated DLUS, use DEFINE_INTERNAL_PU for a local PU, or DEFINE_LS for a downstream PU.)

The verb can also be used to revoke a default DLUS or backup default DLUS, so that none is defined.

VCB Structure

```
typedef struct define_dlur_defaults
{
  AP_UINT16       opcode;                 /* verb operation code          */
  unsigned char   reserv2;                /* reserved                     */
  unsigned char   format;                 /* reserved                     */
  AP_UINT16       primary_rc;             /* primary return code          */
  AP_UINT32       secondary_rc;           /* secondary return code        */
  unsigned char   description[32];        /* resource description         */
  unsigned char   reserv1[16];            /* reserved                     */
  unsigned char   dlus_name[17];          /* DLUS name                    */
  unsigned char   bkup_dlus_name[17];     /* Backup DLUS name             */
  unsigned char   reserv3;                /* reserved                     */
  unsigned char   dlus_retry_timeout;     /* retry timeout                */
  unsigned char   dlus_retry_limit;       /* retry limit                  */
  unsigned char   prefer_active_dlus;     /* reserved                     */
  unsigned char   persistent_pipe_support; /* reserved                    */
  unsigned char   reserv4[14];            /* reserved                     */
} DEFINE_DLUR_DEFAULTS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_DLUR_DEFAULTS

description
A null-terminated text string (0–31 characters followed by a null character) describing the DLUR defaults. This string is for information only; it is stored in the node's configuration file, but CS Linux does not make any other use of it.

dlus_name
Name of DLUS node which will serve as the default. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

To revoke the current default DLUS, so that no default DLUS is defined, set this parameter to 17 binary zeros.

bkup_dlus_name
Name of DLUS node which will serve as the backup default. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

To revoke the current backup default DLUS, so that no backup default DLUS is defined, set this parameter to 17 binary zeros.

dlus_retry_timeout
Reactivation timer for contacting a DLUS. If CS Linux fails to contact the DLUS, this parameter specifies the time in seconds between retries. Specify a value in the range 0x0001–0xFFFF.

dlus_retry_limit
Retry count for contacting a DLUS. This parameter is used to specify the number of times CS Linux should retry if it fails to contact the DLUS on the first attempt.

Specify a value in the range 0x0001–0xFFFE, or 0xFFFF to indicate that CS Linux should retry indefinitely until it contacts the DLUS.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_DLUS_NAME
The supplied *dlus_name* parameter contained a character that was not valid or was not in the correct format.

AP_INVALID_BKUP_DLUS_NAME
The supplied *dlus_name* parameter contained a character that was not valid or was not in the correct format.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node's configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support DLUR; this is defined by the *dlur_support* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_DOMAIN_CONFIG_FILE

DEFINE_DOMAIN_CONFIG_FILE specifies a comment string to be included in the header of the domain configuration file, or modifies an existing comment string.

There is no equivalent verb for a node configuration file, because the header for this file does not contain a comment string; use the description parameter in the DEFINE_NODE verb to include comment information in a node configuration file.

This verb must be issued to the domain configuration file.

VCB Structure

```
typedef struct define_domain_config_file
{
   AP_UINT16            opcode;                 /* verb operation code       */
   unsigned char        reserv2;                /* reserved                  */
   unsigned char        format;                 /* reserved                  */
   AP_UINT16            primary_rc;             /* primary return code       */
   AP_UINT32            secondary_rc;           /* secondary return code     */
   unsigned char        reserv3[8];             /* Reserved                  */
   CONFIG_FILE_HEADER   hdr;                    /* defined data              */
} DEFINE_DOMAIN_CONFIG_FILE;

typedef struct config_file_header
{
   AP_UINT16            major_version;          /* reserved                  */
   AP_UINT16            minor_version;          /* reserved                  */
   AP_UINT16            update_release;         /* reserved                  */
   AP_UINT32            revision_level;         /* reserved                  */
   unsigned char        comment[100];           /* optional comment string   */
   unsigned char        updating;               /* reserved                  */
} CONFIG_FILE_HEADER;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_DOMAIN_CONFIG_FILE

hdr.comment
An optional comment string to store information about the file. This is an ASCII string of 0–99 characters, followed by a null character. This parameter is for information only; CS Linux returns it on the QUERY_DOMAIN_CONFIG_FILE verb, but does not make any other use of it.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_DOWNSTREAM_LU

DEFINE_DOWNSTREAM_LU defines a new downstream LU, and maps it to an upstream host LU or LU pool (defined using DEFINE_LU_0_TO_3 or DEFINE_LU_POOL). This allows the downstream LU to access the host computer using the SNA gateway feature of CS Linux. This verb cannot be used to modify an existing downstream LU.

This verb can also be used to activate a downstream LU that is already defined (for example, because the downstream workstation has just been activated). To do this, reissue the DEFINE_DOWNSTREAM_LU verb for that LU. Note that all parameters must be the same as in the original definition, because you cannot modify the definition.

DEFINE_DOWNSTREAM_LU can also be used to define the downstream LU used by an application that communicates with a CS Linux Primary RUI application. For more information about Primary RUI, see IBM Communications Server for Data Center Deployment on AIX or Linux LUA Programmer's Guide.

VCB Structure

```
typedef struct define_downstream_lu
{
    AP_UINT16               opcode;           /* verb operation code       */
    unsigned char           reserv2;          /* reserved                  */
    unsigned char           format;           /* reserved                  */
    AP_UINT16               primary_rc;       /* primary return code       */
    AP_UINT32               secondary_rc;     /* secondary return code     */
    unsigned char           dslu_name[8];     /* Downstream LU name        */
    DOWNSTREAM_LU_DEF_DATA  def_data;         /* Defined data              */
} DEFINE_DOWNSTREAM_LU;

typedef struct downstream_lu_def_data
    unsigned char           description[32];  /* resource description      */
    unsigned char           reserv1[16];      /* reserved                  */
    unsigned char           nau_address;      /* downstream LU nau address */
    unsigned char           dspu_name[8];     /* Downstream PU name        */
    unsigned char           host_lu_name[8];  /* Host LU or Pool name      */
    unsigned char           allow_timeout;    /* Allow timeout of host LU? */
    unsigned char           delayed_logon;    /* Allow delayed logon to    */
                                              /*  host LU                  */
    unsigned char           reserv2[6];       /* reserved                  */
} DOWNSTREAM_LU_DEF_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_DOWNSTREAM_LU

dslu_name
Name of the downstream LU that is being defined. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

def_data.description
A null-terminated text string (0–31 characters followed by a null character) describing the downstream LU. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_DOWNSTREAM_LU verb, but CS Linux does not make any other use of it.

def_data.nau_address
Network accessible unit address of the downstream LU. This must be in the range 1–255.

def_data.dspu_name
Name of the downstream PU associated with this LU (as specified on the DEFINE_LS). This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

def_data.host_lu_name
Name of the host LU or host LU pool that the downstream LU will be mapped onto. This is an 8-byte type-A EBCDIC string, padded on the right with EBCDIC spaces.

For SNA gateway, the host LU cannot be a dependent LU type 6.2. However, if the downstream LU is LU type 6.2, you can configure the host LU as an LU type 0–3 and specify that the model type for the host LU is unknown.

If the downstream LU is used to communicate with a CS Linux Primary RUI application instead of a host, set this field to the string #PRIRUI# in EBCDIC.

def_data.allow_timeout
Specifies whether to allow the session between the downstream LU and the upstream LU to timeout if the session is left inactive for the timeout period specified on the upstream LU definition. Possible values are:

AP_YES Allow the session this downstream LU has with the upstream LU to timeout.

AP_NO Do not allow the session this downstream LU has with the upstream LU to timeout.

This field is ignored if the downstream LU is used to communicate with a CS Linux Primary RUI application instead of a host.

def_data.delayed_logon
Specifies whether to use delayed logon with this downstream LU (the upstream LU is not activated until the user requests it). Possible values are:

AP_YES Use delayed logon with this downstream LU; the upstream LU is not activated until the user requests it.

AP_NO Do not use delayed logon with this downstream LU.

This field is ignored if the downstream LU is used to communicate with a CS Linux Primary RUI application instead of a host.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_DNST_LU_NAME
The supplied *dslu_name* parameter contained a character that was not valid.

AP_INVALID_NAU_ADDRESS
The supplied NAU address was not in the valid range.

AP_INVALID_ALLOW_TIMEOUT
The supplied *allow_timeout* parameter value was not valid.

AP_INVALID_DELAYED_LOGON
The supplied *delayed_logon* parameter value was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_INVALID_PU_NAME
The specified *dspu_name* parameter was not valid.

AP_PU_NOT_DEFINED
The specified *dspu_name* parameter did not match any defined PU name.

AP_INVALID_PU_TYPE
The PU specified by the *dspu_name* parameter is not a downstream PU that supports SNA gateway.

AP_LU_ALREADY_DEFINED
An LU with the specified name has already been defined, and cannot be modified using this verb.

AP_DSLU_ACTIVE
The LU is already active.

AP_LU_NAU_ADDR_ALREADY_DEFD
An LU with the specified NAU address has already been defined.

AP_INVALID_HOST_LU_NAME
The specified host LU name was not valid.

AP_LU_NAME_POOL_NAME_CLASH
The specified LU name clashes with the name of an existing LU pool.

AP_PU_NOT_ACTIVE
The PU specified by the *dspu_name* parameter is not currently active.

AP_LU_ALREADY_ACTIVATING
An LU with the name specified by the *dslu_name* parameter is currently activating.

AP_LU_DEACTIVATING
An LU with the name specified by the *dslu_name* parameter is currently deactivating.

AP_LU_ALREADY_ACTIVE
An LU with the name specified by the *dslu_name* parameter is already active.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node's configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support SNA gateway; this is defined by the *pu_conc_support* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_DOWNSTREAM_LU_RANGE

DEFINE_DOWNSTREAM_LU_RANGE defines a new range of downstream LUs, and maps them to an upstream host LU or LU pool (defined using DEFINE_LU_0_TO_3 or DEFINE_LU_POOL). This allows the downstream LUs to access the host computer using the SNA gateway feature of CS Linux. This verb cannot be used to modify existing downstream LUs.

The supplied parameters to this verb include a base name for the new LUs and the range of NAU addresses. The new LU names are generated by combining the base name with the NAU addresses. For example, a base name of LUNME combined with a NAU range of 11 to 14 would define the LUs LUNME011, LUNME012, LUNME013 and LUNME014.

DEFINE_DOWNSTREAM_LU_RANGE can also be used to define downstream LUs used by applications that communicate with a CS Linux Primary RUI application. For more information about Primary RUI, see IBM Communications Server for Data Center Deployment on AIX or Linux LUA Programmer's Guide.

VCB Structure

```
typedef struct define_downstream_lu_range
{
    AP_UINT16         opcode;              /* verb operation code           */
    unsigned char     reserv2;             /* reserved                      */
    unsigned char     format;              /* reserved                      */
    AP_UINT16         primary_rc;          /* primary return code           */
    AP_UINT32         secondary_rc;        /* secondary return code         */
    unsigned char     dslu_base_name[5];   /* Downstream LU base name       */
    unsigned char     reserv3;             /* reserved                      */
    unsigned char     description[32];     /* resource description          */
    unsigned char     reserv1[16];         /* reserved                      */
    unsigned char     min_nau;             /* Minimum NAU address in range  */
    unsigned char     max_nau;             /* Maximum NAU address in range  */
    unsigned char     dspu_name[8];        /* Downstream PU name            */
    unsigned char     host_lu_name[8];     /* Host LU or Pool name          */
    unsigned char     allow_timeout;       /* Allow timeout of host LU?     */
    unsigned char     delayed_logon;       /* Allow delayed logon to host LU */
    unsigned char     reserv4[6];          /* reserved                      */
} DEFINE_DOWNSTREAM_LU_RANGE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_DOWNSTREAM_LU_RANGE

dslu_base_name
: Base name for the names of the new LUs. This is a 5-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the base name is less than 5 characters. CS Linux generates the LU name for each LU by appending the 3-digit decimal value of the NAU address to this name.

description
: A null-terminated text string (0–31 characters followed by a null character) describing the downstream LUs (the same string is used for each LU in the range). This string is for information only; it is stored in the node's configuration file and returned on the QUERY_DOWNSTREAM_LU verb, but CS Linux does not make any other use of it.

min_nau
: NAU address of the first LU, in the range 1–255.

max_nau
: NAU address of the last LU, in the range 1–255.

dspu_name
: Name of the downstream PU (as specified on the DEFINE_LS verb) which the downstream LUs in this range will use. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if necessary.

host_lu_name
: Name of host LU or host LU pool that the downstream LUs in the given range will be mapped to. This is an 8-byte type-A EBCDIC string, padded on the right with EBCDIC spaces if necessary.

If the downstream LUs are used to communicate with a CS Linux Primary RUI application instead of a host, set this field to the string #PRIRUI# in EBCDIC.

allow_timeout
Specifies whether to allow the sessions this range of downstream LUs have with the upstream LU to timeout if the session is left inactive for the timeout period specified on the upstream LU definition. Possible values are:

AP_YES Allow the sessions this range of downstream LUs have with the upstream LU to timeout.

AP_NO Do not allow the session this range of downstream LUs have with the upstream LU to timeout.

This field is ignored if the downstream LUs are used to communicate with a CS Linux Primary RUI application instead of a host.

delayed_logon
Specifies whether to use delayed logon with this range of downstream LUs (the upstream LU is not activated until the user requests it). Possible values are:

AP_YES Use delayed logon with this range of downstream LUs; the upstream LU is not activated until the user requests it.

AP_NO Do not use delayed logon with this range of downstream LUs.

This field is ignored if the downstream LUs are used to communicate with a CS Linux Primary RUI application instead of a host.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_DNST_LU_NAME
The supplied *dslu_base_name* parameter contained a character that was not valid.

AP_INVALID_NAU_ADDRESS
One or more of the supplied NAU addresses was not in the valid range.

AP_INVALID_ALLOW_TIMEOUT
The supplied *allow_timeout* parameter value was not valid.

AP_INVALID_DELAYED_LOGON
The supplied *delayed_logon* parameter value was not valid.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_INVALID_PU_NAME
The specified *dspu_name* parameter was not valid.

AP_PU_NOT_DEFINED
The specified *dspu_name* parameter did not match any defined PU name.

AP_INVALID_PU_TYPE
The PU specified by the *dspu_name* parameter is not a downstream PU that supports SNA gateway.

AP_LU_ALREADY_DEFINED
An LU has already been defined with a name that matches one of the names in the range. The existing LU cannot be modified using this verb.

AP_DSLU_ACTIVE
An LU with a name that matches one of the names in the range is already active. The existing LU cannot be modified using this verb.

AP_LU_NAU_ADDR_ALREADY_DEFD
An LU has already been defined with an NAU address that matches one of the addresses in the range.

AP_INVALID_HOST_LU_NAME
The specified host LU name was not valid.

AP_LU_NAME_POOL_NAME_CLASH
One of the LU names in the range clashes with the name of an existing LU pool.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node's configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support SNA gateway; this is defined by the *pu_conc_support* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_DSPU_TEMPLATE

The DEFINE_DSPU_TEMPLATE verb defines a template for downstream LUs that use the CS Linux SNA gateway feature. This template is used to define downstream LUs on a group of downstream workstations when a workstation connects over an implicit link (a link not previously defined).

DEFINE_DSPU_TEMPLATE can also be used to define downstream LUs that support applications communicating with a Primary RUI application on the CS Linux node. For more information about Primary RUI, see IBM Communications Server for Data Center Deployment on AIX or Linux LUA Programmer's Guide.

VCB Structure

```
typedef struct define_dspu_template
{
   AP_UINT16               opcode;            /* verb operation code        */
   unsigned char           reserv3;           /* reserved                   */
   unsigned char           format;            /* reserved                   */
   AP_UINT16               primary_rc;        /* primary return code        */
   AP_UINT32               secondary_rc;      /* secondary return code      */
   unsigned char           template_name[8];  /* Name of template           */
   unsigned char           description[32];   /* resource description       */
   unsigned char           reserv2[16];       /* reserved                   */
   unsigned char           modify_template;   /* Modify existing template?  */
   unsigned char           reserv1[11];       /* reserved                   */
   AP_UINT16               max_instance;      /* Max active template        */
                                              /* instances                  */
   AP_UINT16               num_of_dslu_templates;/* number of DSLU templates*/
} DEFINE_DSPU_TEMPLATE;

typedef struct dslu_template
{
   unsigned char           min_nau;           /* Minimum NAU address in range*/
   unsigned char           max_nau;           /* Maximum NAU address in range*/
   unsigned char           allow_timeout;     /* Allow timeout of host LU?   */
   unsigned char           delayed_logon;     /* Allow delayed logon to host */
                                              /*  LU                         */
   unsigned char           reserv1[8];        /* reserved                    */
   unsigned char           host_lu[8];        /* Host LU or Pool name        */
} DSLU_TEMPLATE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_DSPU_TEMPLATE

template_name
The name of the template for downstream LUs that are present on a group of downstream workstations.

description
Resource description that is returned on the QUERY_DSPU_TEMPLATE verb.

modify_template
Specifies whether this verb should add additional DSLU templates to an existing DSPU template or should replace an existing DSPU template. Possible values are:

AP_MODIFY_DSPU_TEMPLATE
If the named DSPU template does not exist, then it is created. If

the named DSPU template does exist, then appended DSLU templates are added to the existing DSPU template.

AP_REPLACE_DSPU_TEMPLATE
A new template is created, overwriting any existing definition.

max_instance
The maximum number of instances of the template that can be active concurrently. When the limit is reached, no new instances are created. Specify a value in the range 0–65,535, where 0 (zero) indicates no limit.

num_of_dslu_templates
The number of downstream LU (DSLU) templates being defined by this verb.

The subrecord dslu_template contains the following parameters:

min_nau
NAU address of the first downstream PU, in the range 1–255.

max_nau
NAU address of the last downstream PU, in the range 1–255.

allow_timeout
Specifies whether to timeout host LUs used by the downstream LU if the session is left inactive for the timeout period specified on the host LU definition. Possible values are:

AP_YES CS Linux is allowed to timeout host LUs used by this downstream LU.

AP_NO CS Linux is not allowed to timeout host LUs used by this downstream LU.

This field is ignored if the downstream LUs are used to communicate with a CS Linux Primary RUI application instead of a host.

delayed_logon
Specifies whether to delay connecting the downstream LU to the host LU until the first data is received from the downstream LU. Possible values are:

AP_YES CS Linux delays connecting the downstream LU to the host LU. A simulated logon screen is sent to the downstream LU.

AP_NO CS Linux does not delay connecting the downstream LU to the host LU.

This field is ignored if the downstream LUs are used to communicate with a CS Linux Primary RUI application instead of a host.

host_lu Name of the host LU or host LU pool that the downstream LU uses. This name is an 8-byte type-A character string.

If the downstream LUs are used to communicate with a CS Linux Primary RUI application instead of a host, set this field to the string #PRIRUI# in EBCDIC.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_TEMPLATE_NAME
The name specified for the *template_name* parameter was not valid.

AP_INVALID_NAU_ADDRESS
The *min_nau* or *max_nau* parameter was not valid.

AP_INVALID_NAU_RANGE
The address specified on the *min_nau* or *max_nau* parameters was not in the valid range.

AP_CLASHING_NAU_RANGE
The range of addresses specified by the *min_nau* parameter through the *max_nau* parameter in a `dslu_template` subrecord clashes with a range specified by another `dslu_template` subrecord in the template named by the *template_name* parameter.

AP_INVALID_NUM_DSPU_TEMPLATES
The value specified for the *num_of_dslu_templates* parameter was not in the valid range.

AP_INVALID_ALLOW_TIMEOUT
The value specified for the *allow_timeout* parameter was not valid.

AP_INVALID_DELAYED_LOGON
The value specified for the *delayed_logon* parameter was not valid.

AP_INVALID_MODIFY_TEMPLATE
The value specified for the *modify_template* parameter was not valid.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with `AP_PARAMETER_CHECK`, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_INVALID_HOST_LU_NAME
The specified *host_lu_name* parameter value was not valid.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with `AP_STATE_CHECK`, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node's configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support SNA gateway; this is defined by the *pu_conc_support* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743, lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_FOCAL_POINT

The DEFINE_FOCAL_POINT verb specifies the focal point for a particular Management Services category. When a new focal point is specified, CS Linux attempts to establish an implicit primary focal point relationship with the specified focal point by sending an MS_CAPABILITIES request.

VCB Structure

```
typedef struct define_focal_point
{
   AP_UINT16        opcode;             /* verb operation code             */
   unsigned char    reserv2;            /* reserved                        */
   unsigned char    format;             /* reserved                        */
   AP_UINT16        primary_rc;         /* primary return code             */
   AP_UINT32        secondary_rc;       /* secondary return code           */
   unsigned char    reserved;           /* reserved                        */
   unsigned char    ms_category[8];     /* management services category    */
   unsigned char    fp_fqcp_name[17];   /* Fully qualified focal           */
                                        /*  point cp name                  */
   unsigned char    ms_appl_name[8];    /* Focal point application name    */
   unsigned char    description[32];    /* resource description            */
   unsigned char    reserv1[16];        /* reserved                        */
   unsigned char    backup;             /* is focal point a backup         */
   unsigned char    reserv3[16];        /* reserved                        */
} DEFINE_FOCAL_POINT;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_FOCAL_POINT

ms_category
Management Services category. This may be either one of the category names specified in the MS Discipline-Specific Application Programs table of *Systems Network Architecture: Management Services Reference* (see the Bibliography), padded with EBCDIC spaces (0x40), or a user-defined category. A user-defined category name is an 8-byte type-1134 EBCDIC string, padded with EBCDIC spaces (0x40) if necessary.

fp_fqcp_name
Fully qualified control point name of the focal point. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

ms_appl_name
Focal point application name. This is normally an EBCDIC string, using type-1134 characters; alternatively, it can be one of the MS Discipline-Specific Application Programs specified in *Systems Network Architecture: Management Services Reference* (see the Bibliography). The string must be 8 characters long; pad on the right with EBCDIC space characters (`0x40`) if necessary.

description
A null-terminated text string (0–31 characters followed by a null character) describing the focal point. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_FOCAL_POINT verb, but CS Linux does not make any other use of it.

backup Indicates whether the specified application is the main focal point for this category, or a backup focal point. Possible values are:

AP_YES Backup focal point (used only if the main focal point is not available).

AP_NO Main focal point.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc

AP_OK The focal point was defined as requested.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
`AP_PARAMETER_CHECK`

secondary_rc
Possible values are:

AP_INVALID_CATEGORY_NAME
The supplied category name contained a character that was not valid.

AP_INVALID_FP_NAME
The fully qualified name or the application name was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with `AP_PARAMETER_CHECK`, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support MS network management functions; this is defined by the *mds_supported* parameter on the DEFINE_NODE verb.

Returned Parameters: Replaced

If the verb does not execute successfully because it is followed by another verb specifying a different focal point, CS Linux returns the following parameters.

primary_rc

AP_REPLACED
Another DEFINE_FOCAL_POINT was issued to the same node while this verb was outstanding, specifying a different focal point for the same MS category. This verb was abandoned; the node will attempt to contact the focal point specified by the second verb.

Returned Parameters: Unsuccessful

If the verb does not execute successfully because the focal point relationship cannot be established, CS Linux returns the following parameters:

primary_rc
AP_UNSUCCESSFUL

secondary_rc
Possible values are:

AP_IMPLICIT_REQUEST_REJECTED
The specified focal point rejected the request.

AP_IMPLICIT_REQUEST_FAILED
The node could not send the request to the specified focal point; this may be because the specified control point or application was not found.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_INTERNAL_PU

The DEFINE_INTERNAL_PU verb defines a PU on the local node that is served by DLUR. (To define a downstream PU served by DLUR or SNA gateway, or to define a local PU that is directly attached to the host, use DEFINE_LS instead of DEFINE_INTERNAL_PU.)

VCB Structure

```
typedef struct define_internal_pu
{
      AP_UINT16             opcode;              /* verb operation code     */
      unsigned char         reserv2;             /* reserved                */
      unsigned char         format;              /* reserved                */
      AP_UINT16             primary_rc;          /* primary return code     */
      AP_UINT32             secondary_rc;        /* secondary return code   */
      unsigned char         pu_name[8];          /* internal PU name        */
      INTERNAL_PU_DEF_DATA  def_data;            /* defined data            */
} DEFINE_INTERNAL_PU;

typedef struct internal_pu_def_data
{
  unsigned char    description[32];             /* resource description     */
  unsigned char    initially_active;            /* is PU initially active?  */
  unsigned char    reserv1[15];                 /* reserved                 */
  unsigned char    dlus_name[17];               /* DLUS name                */
  unsigned char    bkup_dlus_name[17];          /* backup DLUS name         */
```

```
  unsigned char    pu_id[4];                    /* PU identifier           */
  AP_UINT16        dlus_retry_timeout;          /* DLUS retry timeout      */
  AP_UINT16        dlus_retry_limit;            /* DLUS retry limit        */
  unsigned char   conventional_lu_compression; /* compression for LU 0-3?   */
  unsigned char    conventional_lu_cryptography; /* reserved               */
  unsigned char    pu_can_send_dddlu_offline;   /* does the PU send NMVT   */
                                                /* (power off) to host?    */
  unsigned char    reserv2[1];                  /* reserved                */
} INTERNAL_PU_DEF_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_INTERNAL_PU

pu_name
Name of the internal PU that is being defined. This is a type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

This name should match the PU name configured on the host. (CS Linux sends both the PU name and PU ID to the host to identify the PU. The host normally identifies the PU by its PU name, or by the PU ID if it cannot find a matching PU name.)

def_data.description
A null-terminated text string (0–31 characters followed by a null character) describing the internal PU. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_DLUR_PU and QUERY_PU verbs, but CS Linux does not make any other use of it.

def_data.initially_active
Specifies whether this internal PU is automatically started when the node is started. Possible values are:

AP_YES The PU is automatically started when the node is started.

AP_NO The PU is not automatically started; it must be started manually.

def_data.dlus_name
Name of DLUS node which DLUR will use when it initiates SSCP-PU activation. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

To indicate that DLUR should use the global default DLUS, set this parameter to 17 binary zeros. In this case, you must also use DEFINE_DLUR_DEFAULTS to define the global default DLUS.

def_data.bkup_dlus_name
Name of DLUS node which will serve as the backup DLUS for this PU. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

To indicate that DLUR should use the global backup default DLUS, set this parameter to 17 binary zeros. In this case, you must also use DEFINE_DLUR_DEFAULTS to define the global backup default DLUS.

def_data.pu_id
PU identifier. This is a 4-byte hexadecimal string, consisting of a block number (3 hexadecimal digits) and a node number (5 hexadecimal digits). The PU ID should match the *pu_id* configured at the host. (CS Linux sends

both the PU name and PU ID to the host to identify the PU. The host normally identifies the PU by its PU name, or by the PU ID if it cannot find a matching PU name.)

def_data.dlus_retry_timeout
Reactivation timer for contacting a DLUS. If CS Linux fails to contact the DLUS, this parameter specifies the time in seconds between retries. The interval between the first and second attempts is always 1 second.

Specify a value in the range `0x0001–0xFFFF`. If zero is specified, then the defaults specified using the DEFINE_DLUR_DEFAULTS verb are used.

def_data.dlus_retry_limit
Retry count for contacting a DLUS. This parameter is used to specify the number of times CS Linux should retry if it fails to contact the DLUS on the first attempt.

Specify a value in the range `0x0001–0xFFFE`, or specify `0xFFFF` to indicate that CS Linux should retry indefinitely until it contacts the DLUS.

def_data.conventional_lu_compression
Specifies whether data compression is requested for LU 0–3 sessions using this PU.

Possible values are:

AP_YES Data compression should be used for LU 0–3 sessions using this PU if the host requests it.

AP_NO Data compression should not be used for LU 0–3 sessions using this PU.

def_data.pu_can_send_dddlu_offline
Specifies whether the local PU should send NMVT (power off) messages to the host. If the host system supports DDDLU (Dynamic Definition of Dependent LUs), CS Linux sends NMVT (power off) to the host when it has finished using a dynamically defined LU. This allows the host to save resources by removing the definition when it is no longer required.

Possible values are:

AP_YES The local PU sends NMVT (power off) messages to the host.

AP_NO The local PU does not send NMVT (power off) messages to the host.

If the host supports DDDLU but does not support the NMVT (power off) message, this parameter must be set to `AP_NO`.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
`AP_PARAMETER_CHECK`

secondary_rc
Possible values are:

AP_INVALID_PU_NAME
The *pu_name* parameter contained a character that was not valid.

AP_INVALID_PU_ID
The *pu_id* parameter contained a character that was not valid.

AP_INVALID_DLUS_NAME
The *dlus_name* parameter contained a character that was not valid or was not in the correct format.

AP_INVALID_BKUP_DLUS_NAME
The *bkup_dlus_name* parameter contained a character that was not valid or was not in the correct format.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_PU_ALREADY_DEFINED
A PU with the specified name has already been defined.

Returned Parameters: Function Not Supported

If the verb does not execute because the node's configuration does not support it, CS Linux returns the following parameter:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The node does not support DLUR; this is defined by the *dlur_support* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_LOCAL_LU

The DEFINE_LOCAL_LU verb defines a new local LU. It can also be used to modify the attach routing data, *disable* parameter, or description of an existing LU (or of the default LU associated with the local node's Control Point), but not any of the other parameters; when modifying an existing LU, all the other parameters must be set to their currently defined values.

VCB Structure

```
typedef struct define_local_lu
{
   AP_UINT16           opcode;          /* verb operation code          */
   unsigned char       reserv2;         /* reserved                     */
   unsigned char       format;          /* reserved                     */
   AP_UINT16           primary_rc;      /* primary return code          */
```

```
   AP_UINT32            secondary_rc;      /* secondary return code         */
   unsigned char        lu_name[8];        /* local LU name                 */
   LOCAL_LU_DEF_DATA    def_data;          /* defined data                  */
} DEFINE_LOCAL_LU;

typedef struct local_lu_def_data
{
   unsigned char    description[32];       /* resource description          */
   unsigned char    reserv1;               /* reserved                      */
   unsigned char    security_list_name[14];   /* security access list name  */
   unsigned char    reserv3;               /* reserved                      */
   unsigned char    lu_alias[8];           /* local LU alias                */
   unsigned char    nau_address;           /* NAU address                   */
   unsigned char    syncpt_support;        /* is Syncpoint supported?       */
   AP_UINT16        lu_session_limit;      /* LU session limit              */
   unsigned char    default_pool;          /* is LU in the pool of default  */
                                           /*  LUs?                         */
   unsigned char    reserv2;               /* reserved                      */
   unsigned char    pu_name[8];            /* PU name                       */
   unsigned char    lu_attributes;         /* LU attributes                 */
   unsigned char    sscp_id[6];            /* SSCP ID                       */
   unsigned char    disable;               /* disable or enable local LU    */
   ROUTING_DATA     attach_routing_data;   /* routing data for incoming     */
                                           /* attaches                      */
   unsigned char    reserv6;               /* reserved                      */
   unsigned char    reserv4[7];            /* reserved                      */
   unsigned char    reserv5[16];           /* reserved                      */
} LOCAL_LU_DEF_DATA;

typedef struct routing_data
{
   unsigned char    sys_name[128];         /* Name of target system for TP  */
   AP_INT32         timeout;               /* timeout value in seconds      */
   unsigned char    back_level;            /* reserved                      */
   unsigned char    reserved[59];          /* reserved                      */
} ROUTING_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_LOCAL_LU

lu_name

Name of the local LU. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces. It must not match any other local LU name, or the fully-qualified partner LU name of any partner LU.

To modify the attach routing data or description of the default LU associated with the local node's Control Point, set this parameter to 8 binary zeros.

def_data.description

A null-terminated text string (0–31 characters followed by a null character) describing the local LU. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_LOCAL_LU verb, but CS Linux does not make any other use of it.

def_data.security_list_name

Name of the security access list used by this local LU (defined using the DEFINE_SECURITY_ACCESS_LIST verb). This parameter restricts the LU so that only the users named in the specified list can use it. To specify that the LU is available for use by any user, set this parameter to 14 binary zeros.

def_data.lu_alias
Alias of the local LU. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right to 8 bytes if necessary.

def_data.nau_address
Network accessible unit address of the LU. Specify zero if the LU is an independent LU, or an address in the range 1–255 if the LU is a dependent LU.

def_data.syncpt_support
Specifies whether the LU supports Syncpoint functions. Set this to AP_YES only if you have a Sync Point Manager (SPM) and Conversation Protected Resource Manager (C-PRM) in addition to the standard CS Linux product. Possible values are:

AP_YES Syncpoint is supported.

AP_NO Syncpoint is not supported.

def_data.lu_session_limit
The maximum total number of sessions (across all modes) supported by the LU.

For a dependent LU, this must be set to 1. For an independent LU, specify zero for no limit, or a value in the range 1–65,535. If you specify an explicit limit, note the following:

- If the LU will be communicating with parallel-session remote LUs, the session limit must include sufficient sessions for CNOS negotiation; a safe minimum is 3, or an additional 2 sessions for each partner LU.
- The LU session limit must be greater than or equal to the sum of the session limits for all modes that the LU will use.
- If the LU will be used by full-duplex APPC conversations, each full-duplex conversation requires two sessions.

def_data.default_pool
Specifies whether the LU is in the pool of default dependent LUs. For more information, see "Default LUs" on page 117. Possible values are:

AP_YES The LU is in the pool of default LUs, and can be used by applications that do not specify an LU name.

AP_NO The LU is not in the pool.

If the LU is an independent LU, this parameter is reserved.

def_data.pu_name
Name of the PU which this LU will use, as specified on the DEFINE_LS verb. This field is used only by dependent LUs, and should be set to 8 binary zeros for independent LUs. The name is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if necessary.

def_data.lu_attributes
Identifies additional information about the LU. Possible values are:

AP_NONE
No additional information identified.

AP_DISABLE_PWSUB
Disable password substitution support for the local LU. Password substitution means that passwords are encrypted before

transmission between the local and remote LUs, rather than being sent as clear text. CS Linux normally uses password substitution if the remote system supports it.

This value is provided as a work-around for communications with some remote systems that do not implement password substitution correctly. If you use this option, you should be aware that this involves sending and receiving passwords in clear text (which may represent a security risk). Do not set it unless there are problems with the remote system's implementation of password substitution.

def_data.sscp_id
Specifies the ID of the SSCP permitted to activate this LU. This ID is a 6-byte binary string. This parameter is used only by dependent LUs, and is set to all binary zeros if the LU is an independent LU or if the LU can be activated by any SSCP.

def_data.disable
Specifies whether the local LU should be disabled or enabled. Possible values are:

AP_YES Disable the local LU.

AP_NO Enable the local LU.

def_data.attach_routing_data.sys_name
The system name of the target computer for incoming Allocate requests (requests from a partner TP to start an APPC or CPI-C conversation) that arrive at this local LU.

If the target TP is a broadcast queued TP (that is, servers are informed of its location when it starts, so that they can route incoming Allocate requests to it), or if it always runs on the same CS Linux server as the node that owns this LU, set this parameter to binary zeros. Otherwise, set it to the name of the computer where the TP runs.

The name must be either an alias or a fully-qualified name; you cannot specify an IP address. If the system name includes a **.** (period) character, CS Linux assumes that it is a fully-qualified name; otherwise it performs a DNS lookup to determine the system name.

def_data.attach_routing_data.timeout
The timeout value for dynamic load requests. A request will time out if the invoked TP has not issued a Receive_Allocate verb (APPC), or Accept_Conversation or Accept_Incoming (CPI-C), within this time. Specify the timeout value in seconds, or -1 to indicate no timeout (dynamic load requests will wait indefinitely).

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_DISABLE
The *disable* parameter was not set to a valid value.

AP_INVALID_LU_NAME
The supplied LU name contained a character that was not valid.

AP_INVALID_NAU_ADDRESS
The supplied NAU address was not in the valid range.

AP_INVALID_SESSION_LIMIT
The supplied session limit was not in the valid range.

AP_INVALID_TIMEOUT
The supplied timeout value was not in the valid range.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
Either the *lu_name* or *lu_alias* parameter contained a character that was not valid, or the LU name matched the fully-qualified name of a partner LU.

AP_LU_ALREADY_DEFINED
An LU with this name has already been defined. You cannot use this verb to modify any parameters of an existing LU except the attach routing data.

AP_PU_NOT_DEFINED
The *pu_name* parameter did not match any defined PU name.

AP_SECURITY_LIST_NOT_DEFINED
The *security_list_name* parameter did not match any defined security access list name.

AP_LU_ALIAS_ALREADY_USED
An LU with this alias has already been defined. You cannot use this verb to modify any parameters of an existing LU except the attach routing data.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

Default LUs

You can set up the configuration of local LUs so that applications do not have to specify an LU name explicitly when starting a conversation; the node will select a suitable default LU for the application to use. The method for doing this depends on whether the applications require dependent or independent LUs, as follows. You cannot provide this facility for both dependent and independent LUs.

- If the applications require dependent LUs, use the *default_pool* parameter on DEFINE_LOCAL_LU for one or more dependent LUs, to specify that they can be used as default LUs. When an application attempts to start a conversation without specifying a local LU name, CS Linux will select an unused LU from the pool of LUs defined as default LUs.
- You can define LUs on more than one node as default LUs. An application requesting a default LU may be assigned to any of these LUs as available; there is no requirement for the LU to be on the same computer as the application. However, if you are defining partner LUs for the applications, these must be defined on all nodes where default LUs are defined (so that the application can contact the correct partner LU using any of the default local LUs).
- If the applications require independent LUs, do not use the *default_pool* parameter to define any local LUs as default LUs. In this case, an application requesting a default LU will be assigned to the LU associated with a local node's CP (this is an independent LU automatically defined by CS Linux for each node).

DEFINE_LS

DEFINE_LS is used to define a new link station (LS) or modify an existing one. Before issuing this verb, you must issue the DEFINE_PORT verb to define the port that this LS uses. Link specific data is concatenated to the basic structure.

If you are defining a Multipath Channel (MPC) LS, only one active LS can be associated with each MPC port (which defines the MultiPath Channel device **/dev/mpc***n*), because the port configuration includes the addressing information that identifies the host. If you need to support more than one active MPC LS at a time, you must define multiple ports, and define an LS for each of these ports. (Multipath Channel is available only with CS Linux for System z.)

You cannot use DEFINE_LS to modify the port used by an existing LS; the *port_name* specified on the verb must match the previous definition of the LS. The LS can be modified only if it is not started.

VCB Structure

```
typedef struct define_ls
{
   AP_UINT16       opcode;                 /* verb operation code           */
   unsigned char   reserv2;                /* reserved                      */
   unsigned char   format;                 /* reserved                      */
   AP_UINT16       primary_rc;             /* primary return code           */
   AP_UINT32       secondary_rc;           /* secondary return code         */
   unsigned char   ls_name[8];             /* name of link station          */
   LS_DEF_DATA     def_data;               /* LS defined data               */
} DEFINE_LS;

typedef struct ls_def_data
{
   unsigned char   description[32];        /* resource description          */
   unsigned char   initially_active;       /* is this LS initially active?  */
   unsigned char   reserv2;                /* reserved                      */
```

```
   AP_UINT16       react_timer;            /* timer for retrying failed LS   */
   AP_UINT16       react_timer_retry;      /* retry count for failed LS      */
   AP_UINT16       activation_count;       /* reserved                       */
   unsigned char   restart_on_normal_deact;  /* restart the link on any      */
                                             /* failure                      */
   unsigned char   reserv3[7];             /* reserved                       */
   unsigned char   port_name[8];           /* name of associated port        */
   unsigned char   adj_cp_name[17];        /* adjacent CP name               */
   unsigned char   adj_cp_type;            /* adjacent node type             */
   LINK_ADDRESS    dest_address;           /* destination address            */
   unsigned char   auto_act_supp;          /* auto-activate supported        */
   unsigned char   tg_number;              /* pre-assigned TG number         */
   unsigned char   limited_resource;       /* limited resource               */
   unsigned char   solicit_sscp_sessions;  /* solicit SSCP sessions          */
   unsigned char   pu_name[8];             /* Local PU name (reserved if     */
                                           /*  solicit_sscp_sessions is set  */
                                           /*  to AP_NO)                     */
   unsigned char   disable_remote_act;     /* disable remote activation      */
   unsigned char   dspu_services;          /* Services provided for          */
                                           /*  downstream PU                 */
   unsigned char   dspu_name[8];           /* Downstream PU name (reserved   */
                                           /*  if dspu_services is AP_NONE)  */
   unsigned char   dlus_name[17];          /* DLUS name if dspu_services     */
                                           /*  set to AP_DLUR                */
   unsigned char   bkup_dlus_name[17];     /* Backup DLUS name if            */
                                           /*  dspu_services set to AP_DLUR  */
   unsigned char   hpr_supported;          /* does the link support HPR?     */
   unsigned char   hpr_link_lvl_error;     /* does the link use link-level   */
                                           /*  error recovery for HPR frms?  */
   AP_UINT16       link_deact_timer;       /* link deactivation timer        */
   unsigned char   reserv1;                /* reserved                       */
   unsigned char   default_nn_server;      /* default LS to NN server?       */
   unsigned char   ls_attributes[4];       /* LS attributes                  */
   unsigned char   adj_node_id[4];         /* adjacent node ID               */
   unsigned char   local_node_id[4];       /* local node ID                  */
   unsigned char   cp_cp_sess_support;     /* CP-CP session support          */
   unsigned char   use_default_tg_chars;   /* Use the default tg_chars       */
   TG_DEFINED_CHARS tg_chars;              /* TG characteristics             */
   AP_UINT16       target_pacing_count;    /* target pacing count            */
   AP_UINT16       max_send_btu_size;      /* maximum send BTU size          */
   unsigned char   ls_role;                /* link station role              */
   unsigned char   max_ifrm_rcvd;          /* no. before acknowldgement      */
   AP_UINT16       dlus_retry_timeout;     /* seconds to recontact a DLUS    */
   AP_UINT16       dlus_retry_limit;       /* attempts to recontact a DLUS   */
   unsigned char   conventional_lu_compression; /* compression for LU 0-3?   */
   unsigned char   conventional_lu_cryptography; /* reserved                  */
   unsigned char   reserv3a;                 /* reserved                     */
   unsigned char   retry_flags;              /* reserved                     */
   AP_UINT16       max_activation_attempts;  /* reserved                     */
   AP_UINT16       activation_delay_timer;   /* reserved                     */
   unsigned char   branch_link_type;         /* is link an up or down link   */
   unsigned char   adj_brnn_cp_support;      /* adj CP allowed to be BrNN?   */
   unsigned char   mltg_pacing_algorithm;    /* reserved                     */
   unsigned char   reserv5;                  /* reserved                     */
   AP_UINT16       max_rcv_btu_size;         /* reserved                     */
   unsigned char   tg_sharing_prohibited;    /* reserved                     */
   unsigned char   link_spec_data_format;    /* reserved                     */
   unsigned char   pu_can_send_dddlu_offline;  /* does the PU send NMVT      */
                                               /* (power off) to host?       */
   unsigned char   reserv4[13];              /* reserved                     */
   AP_UINT16       link_spec_data_len;       /* length of link specific data */
} LS_DEF_DATA;

typedef struct tg_defined_chars
{
   unsigned char   effect_cap;             /* effective capacity             */
   unsigned char   reserve1[5];            /* reserved                       */
   unsigned char   connect_cost;           /* connection cost                */
```

```
   unsigned char   byte_cost;              /* byte cost                     */
   unsigned char   reserve2;               /* reserved                      */
   unsigned char   security;               /* security                      */
   unsigned char   prop_delay;             /* propagation delay             */
   unsigned char   modem_class;            /* reserved                      */
   unsigned char   user_def_parm_1;        /* user-defined parameter 1      */
   unsigned char   user_def_parm_2;        /* user-defined parameter 2      */
   unsigned char   user_def_parm_3;        /* user-defined parameter 3      */
} TG_DEFINED_CHARS;

typedef struct link_address
{
  unsigned char   format;                  /* type of link address         */
  unsigned char   reserve1;                /* reserved                     */
  AP_UINT16       length;                  /* length                       */
  unsigned char   address[135];            /* address                      */
} LINK_ADDRESS;
```

DLC-specific data for SDLC:

```
typedef struct sdl_link_spec_data
{
   V0_MUX_INFO     mux_info;               /* Streams config info          */
   AP_UINT16       reserve8;               /* reserved                     */
   AP_UINT16       reserve9;               /* reserved                     */
   AP_UINT32       contact_timer;          /* reserved                     */
   AP_UINT16       contact_timer_retry;    /* reserved                     */
   AP_UINT16       reserve1;               /* reserved                     */
   AP_UINT32       contact_timer2;         /* reserved                     */
   AP_UINT16       contact_timer_retry2;   /* reserved                     */
   AP_UINT16       reserve2;               /* reserved                     */
   AP_UINT32       disc_timer;             /* reserved                     */
   AP_UINT16       disc_timer_retry;       /* reserved                     */
   AP_UINT16       reserve3;               /* reserved                     */
   AP_UINT32       nve_poll_timer;         /* reserved                     */
   AP_UINT16       nve_poll_timer_retry;   /* reserved                     */
   AP_UINT16       reserve4;               /* reserved                     */
   AP_UINT32       nve_poll_timer2;        /* reserved                     */
   AP_UINT16       nve_poll_timer_retry2;  /* reserved                     */
   AP_UINT16       reserve5;               /* reserved                     */
   AP_UINT32       no_resp_timer;          /* reserved                     */
   AP_UINT16       no_resp_timer_retry;    /* reserved                     */
   AP_UINT16       reserve6;               /* reserved                     */
   AP_UINT32       rem_busy_timer;         /* reserved                     */
   AP_UINT16       rem_busy_timer_retry;   /* reserved                     */
   unsigned char   re_tx_threshold;        /* reserved                     */
   unsigned char   repoll_threshold;       /* reserved                     */
   AP_UINT32       rr_timer;               /* reserved                     */
   unsigned char   group_address;          /* reserved                     */
   unsigned char   poll_frame;             /* Poll frame to use when Primary */
                                           /*  and contact polling secondary */
                                           /*  XID, SNRM                   */
   AP_UINT16       poll_on_iframe;         /* reserved                     */
   AP_UINT16       stub_spec_data_len;     /* reserved                     */
   STUB_SPEC_DATA  stub_spec_data;         /* reserved                     */
} SDL_LINK_SPEC_DATA;
```

DLC-specific data for QLLC:

```
typedef struct vql_ls_spec_data
{
   V0_MUX_INFO    mux_info;                /* streams config info          */
   AP_UINT16      reserve1;                /* reserved                     */
   AP_UINT16      reserve2;                /* reserved                     */
   unsigned char  vc_type;                 /* Virtual Circuit type         */
   unsigned char  req_rev_charge;          /* reserved                     */
   unsigned char  loc_packet;              /* reserved                     */
   unsigned char  rem_packet;              /* reserved                     */
```

```
   unsigned char  loc_wsize;              /* reserved                        */
   unsigned char  rem_wsize;              /* reserved                        */
   AP_UINT16      fac_len;                /* X.25 facilities length          */
   unsigned char  fac[128];               /* X.25 facilities                 */
   AP_UINT16      retry_limit;            /* reserved                        */
   AP_UINT16      retry_timeout;          /* reserved                        */
   AP_UINT16      idle_timeout;           /* reserved                        */
   AP_UINT16      pvc_id;                 /* PVC logical channel identifier */
   AP_UINT16      sn_id_len;              /* reserved                        */
   unsigned char  sn_id[4];               /* reserved                        */
   AP_UINT16      cud_len;                /* length of any call user data    */
                                          /*  to send                        */
   unsigned char  cud[128];               /* actual call user data           */
   AP_UINT32      xtras;                  /* reserved                        */
   AP_UINT32      xtra_len;               /* reserved                        */
   unsigned char  rx_thruput_class;       /* reserved                        */
   unsigned char  tx_thruput_class;       /* reserved                        */
   unsigned char  cugo;                   /* reserved                        */
   unsigned char  cug;                    /* reserved                        */
   AP_UINT16      cug_index;              /* reserved                        */
   AP_UINT16      nuid_length;            /* reserved                        */
   unsigned char  nuid_data[109];         /* reserved                        */
   unsigned char  reserve3[2];            /* reserved                        */
   unsigned char  rpoa_count;             /* reserved                        */
   AP_UINT16      rpoa_ids[30];           /* reserved                        */
} VQL_LS_SPEC_DATA;
```

DLC-specific data for Token Ring, Ethernet:

```
typedef struct llc_link_spec_data
{
   V0_MUX_INFO     mux_info;              /* Streams config info             */
   AP_UINT16       reserve1;              /* reserved                        */
   AP_UINT16       reserve2;              /* reserved                        */
   AP_UINT16       length;                /* reserved                        */
   AP_UINT16       xid_timer;             /* XID timeout value in seconds    */
   AP_UINT16       xid_timer_retry;       /* XID retry limit                 */
   AP_UINT16       test_timer;            /* TEST timeout value in seconds   */
   AP_UINT16       test_timer_retry;      /* TEST retry limit                */
   AP_UINT16       ack_timeout;           /* acknowledgment timeout in ms    */
   AP_UINT16       p_bit_timeout;         /* POLL response timeout in ms     */
   AP_UINT16       t2_timeout;            /* acknowledgment delay in ms      */
   AP_UINT16       rej_timeout;           /* REJ response timeout in seconds*/
   AP_UINT16       busy_state_timeout;    /* remote busy timeout in seconds */
   AP_UINT16       idle_timeout;          /* idle RR interval in seconds     */
   AP_UINT16       max_retry;             /* retry limit for any response    */
} LLC_LINK_SPEC_DATA;
```

DLC-specific data for multipath channel (MPC), CS Linux for System z only:

```
typedef struct chnl_link_spec_data
{
   V0_MUX_INFO     mux_info;              /* streams information             */
   AP_UINT16       device_end;            /* BlkMux protocol flag            */
   unsigned char   escd_port;             /* reserved                        */
   unsigned char   cuadd;                 /* reserved                        */
   unsigned char   local_name[8];         /* reserved                        */
   unsigned char   remote_name[8];        /* reserved                        */
   unsigned char   reserv1[32];           /* pad and future expansion        */
} CHNL_LINK_SPEC_DATA;
```

DLC-specific data for Enterprise Extender (HPR/IP):

```
typedef struct ipdlc_link_spec_data
{
   V0_MUX_INFO     mux_info;             /* streams information             */
   AP_UINT16       ack_timeout;          /* ACK timer for command frames    */
   AP_UINT16       max_retry;            /* Retry limit for command frames  */
```

```
   AP_UINT16       liveness_timeout;      /* Liveness timer                  */
   unsigned char   short_hold_mode;       /* Run in short-hold mode          */
   unsigned char   remote_hostname[255];  /* Name of remote host to contact  */
} IPDLC_LINK_SPEC_DATA;
```

Data for all DLC types:

```
typedef struct v0_mux_info
{
   AP_UINT16         dlc_type;               /* DLC implementation type     */
   unsigned char     need_vrfy_fixup;        /* reserved                    */
   unsigned char     num_mux_ids;            /* reserved                    */
   AP_UINT32         card_type;              /* type of adapter card        */
   AP_UINT32         adapter_number;         /* DLC adapter number          */
   AP_UINT32         oem_data_length;        /* reserved                    */
   AP_INT32          mux_ids[5];             /* reserved                    */
} V0_MUX_INFO;
```

For Token Ring or Ethernet, the *address* parameter in the `link_address` structure is replaced by the following:

```
typedef struct tr_address
{
   unsigned char   mac_address[6];         /* MAC address                   */
   unsigned char   lsap_address;           /* local SAP address             */
} TR_ADDRESS;
```

For Enterprise Extender (HPR/IP), the *address* parameter in the `link_address` structure is replaced by the following:

```
typedef struct ip_address_info
{
  unsigned char lsap;                      /* Local Service Access Point addr */
  unsigned char version;                   /* IPv4 or IPv6                    */
  unsigned char address[272];              /* reserved                        */

} IP_ADDRESS_INFO;
```

For MPC, the `link_address` structure is reserved.

Supplied Parameters

The application supplies the following parameters:

opcode `AP_DEFINE_LS`

ls_name
: Name of link station. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

def_data.description
: A null-terminated text string (0–31 characters followed by a null character) describing the LS. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_LS, QUERY_PU, and QUERY_DOWNSTREAM_PU verbs, but CS Linux does not make any other use of it.

def_data.initially_active
: Specifies whether this LS is automatically started when the node is started. Possible values are:

  AP_YES The LS is automatically started when the node is started.

  AP_NO The LS is not automatically started; it must be started manually.

If the LS is a leased SDLC link or a QLLC PVC link, you are recommended to set this parameter to AP_YES to ensure that the link is always available.

def_data.react_timer
Reactivation timer for reactivating a failed LS. If the *react_timer_retry* parameter below is nonzero, to specify that CS Linux should retry activating the LS if it fails, this parameter specifies the time in seconds between retries. When the LS fails, or when an attempt to reactivate it fails, CS Linux waits for the specified time before retrying the activation. If *react_timer_retry* is zero, this parameter is ignored.

def_data.react_timer_retry
Retry count for reactivating a failed LS. This parameter is used to specify whether CS Linux should attempt to reactivate the LS if it fails while in use (or if an attempt to start the LS fails).

Specify zero to indicate that CS Linux should not attempt to reactivate the LS, or specify the number of retries to be made. A value of 65,535 indicates that CS Linux should retry indefinitely until the LS is activated.

CS Linux waits for the time specified by the *react_timer* parameter above between successive retries. If the retry count is reached without successfully reactivating the LS, or if a STOP_LS is issued while CS Linux is retrying the activation, no further retries are made; the LS remains inactive unless START_LS is issued for it.

If the *auto_act_supp* parameter is set to AP_YES, the reactivation timer fields are ignored; if the link fails, CS Linux does not attempt to reactivate it until the user application that was using the session attempts to restart the session.

If the LS is a leased SDLC link or a QLLC PVC link, you are recommended to set this parameter to a non-zero value to ensure that the link is always available.

def_data.restart_on_normal_deact
Specifies whether CS Linux should attempt to reactivate the LS if it is deactivated normally by the remote system. Possible values are:

AP_YES If the remote system deactivates the LS normally, CS Linux attempts to reactivate it, using the same retry timer and count values as for reactivating a failed LS (the *react_timer* and *react_timer_retry* parameters above).

AP_NO If the remote system deactivates the LS normally, CS Linux does not attempt to reactivate it.

If the LS is a host link (specified by the *def_data.adj_cp_type* parameter), or is automatically started when the node is started (the *initially_active* parameter is set to AP_YES), this parameter is ignored; CS Linux always attempts to reactivate the LS if it is deactivated normally by the remote system (unless *react_timer_retry* is zero).

def_data.port_name
Name of port associated with this link station. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes, which must match the name of a defined port.

def_data.adj_cp_name
Fully qualified name of the adjacent CP for this LS.

If the *adj_cp_type* parameter below is set to AP_NETWORK_NODE or AP_END_NODE, and preassigned TG numbers are being used, set this parameter to the CP name defined at the adjacent node; if the adjacent node sends a CP name during XID exchange, it will be checked against this value.

If *adj_cp_type* is set to AP_BACK_LEVEL_LEN_NODE, CS Linux uses this value only as an identifier; set it to any string (of the format described below) that does not match other CP names defined at this node.

If *adj_cp_type* is set to any other value, or if preassigned TG numbers are not being used, there is no need to specify this parameter; CS Linux will check the CP name only if one is specified.

The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

def_data.adj_cp_type
Adjacent node type.

If the adjacent node is an APPN node, and preassigned TG numbers are not being used, this is normally set to AP_APPN_NODE, indicating that the node type is unknown; CS Linux will determine the type during XID exchange.

If preassigned TG numbers are being used, you must specify the node type explicitly. You can also specify it as an additional security check if preassigned TG numbers are not being used. In this case, CS Linux will reject a connection attempt from the adjacent node if its node type does not match the one specified here. Use one of the following values:

AP_APPN_NODE
The node type is unknown. CS Linux will determine the type during XID exchange.

AP_END_NODE
End node, Branch Network Node acting as an End Node from the local node's perspective, or up-level LEN node (one that includes the Network Name CV in its XID3).

AP_NETWORK_NODE
Network node, or Branch Network Node acting as a Network Node from the local node's perspective.

If the adjacent node is not an APPN node, use one of the following values. These values are not valid for an Enterprise Extender, MPC link, which must be to an APPN node.

AP_BACK_LEVEL_LEN_NODE
Back-level LEN node (one that does not include the Network Name CV in its XID3).

AP_HOST_XID3
Host node; CS Linux should respond to a polling XID from the node with a format 3 XID.

AP_HOST_XID0
Host node; CS Linux should respond to a polling XID from the node with a format 0 XID.

AP_DSPU_XID
Downstream PU; CS Linux should include XID exchange in link activation. The *dspu_name* and *dspu_services* fields must also be set.

AP_DSPU_NOXID
Downstream PU; CS Linux should not include XID exchange in link activation. The *dspu_name* and *dspu_services* fields must also be set.

If you want to run independent LU 6.2 traffic over this LS, you must set the *adj_cp_type* parameter to AP_APPN_NODE, AP_END_NODE, AP_NETWORK_NODE, or AP_BACK_LEVEL_LEN_NODE.

def_data.dest_address.format
For MPC, this parameter is reserved.

The type of link address specified. Possible values:

AP_IP_ADDRESS_INFO
IP address. Specify this value for an Enterprise Extender (HPR/IP) link.

AP_UNSPECIFIED
Unspecified address format. Specify this value for any link type other than Enterprise Extender (HPR/IP).

def_data.dest_address.length
For MPC, this parameter is reserved.

Length of the destination address field, as specified in the following parameter or parameters.

For Enterprise Extender (HPR/IP), this parameter and *dest_address.address* are reserved. Instead, you specify the address using the *remote_hostname* parameter in the link-specific data.

For SDLC:

def_data.dest_address.address
Address of the secondary station on this LS.

- If the port that owns this LS is used only for incoming calls (*out_link_act_lim* on DEFINE_PORT is zero), this parameter is reserved.
- If the port that owns this LS is switched primary and is used for outgoing calls (*port_type* is AP_SWITCHED, *ls_role* is AP_LS_PRI, and *out_link_act_lim* on DEFINE_PORT is nonzero), either set this parameter to 0xFF to accept whatever address is configured at the secondary station, or set it to a 1-byte value in the range 0x01–0xFE which must match the value configured at the secondary station.
- Otherwise, set it to a 1-byte value in the range 0x01–0xFE to identify the link station. If the port is primary multi-drop (*ls_role* on DEFINE_PORT is AP_LS_PRI and *tot_link_act_lim* is greater than 1), this address must be different for each LS on the port.

For QLLC:

def_data.dest_address.address
Address of the destination node for this LS. This parameter is used only for SVC outgoing calls (defined by the *vc_type* parameter in the link-specific data, and by the link activation limit parameters on DEFINE_PORT); it is ignored for incoming calls or for PVC.

The address is a string of 1–14 characters. The address is in X.25 (1980) format; later address formats are not supported.

For Token Ring, Ethernet:

def_data.dest_address.mac_address
MAC address of adjacent node.

If you need to define a non-selective listening LS (one that can be used only for incoming calls, but can have LUs defined on it to support dependent LU traffic), set this parameter to a null string. The LS can then be used to receive incoming calls from any remote link station, but cannot be used for outgoing calls. There is no need to define a non-selective listening LS if only independent LU traffic is used, because an LS for independent LU traffic can be set up dynamically when required.

If the local and adjacent nodes are on LANs of different types (one Token Ring , the other Ethernet) connected by a bridge, you will probably need to reverse the bit order of the bytes in the MAC address. For more information, see "Bit Ordering in MAC Addresses" on page 141. If the two nodes are on the same LAN, or on LANs of the same type connected by a bridge, no change is required.

def_data.dest_address.lsap_address
Local SAP address of adjacent node. This must be a multiple of `0x04`.

For Enterprise Extender (HPR/IP):

def_data.dest_address.ip_address_info.lsap
For Enterprise Extender: Local SAP address of the port. Specify a multiple of `0x04` in the range `0x04`–`0xEC`. The usual value is `0x04`, but VTAM® may use `0x08` in some circumstances.

If you need to use two or more ports with different LSAP addresses on the same TCP/IP interface, you will need to create two or more Enterprise Extender DLCs, and then create a separate Enterprise Extender port for each DLC with the same *if_name* but a different LSAP address.

def_data.dest_address.ip_address_info.version
For Enterprise Extender: Specifies whether the following field represents an IPv4 or IPv6 address. Possible values:

IP_VERSION_4_HOSTNAME
The *address* field specifies an IPv4 address, or a hostname or alias that resolves to an IPv4 address.

IP_VERSION_6_HOSTNAME
The *address* field specifies an IPv6 address, or a hostname or alias that resolves to an IPv6 address.

For all link types:

def_data.auto_act_supp
Specifies whether the link can be activated automatically when required by a session. Possible values are:

AP_YES The link can be activated automatically.

AP_NO The link cannot be activated automatically.

If this parameter is set to `AP_YES`:

- The reactivation timer fields are ignored. If the LS fails, CS Linux does not attempt to reactivate it until a dependent LU application that was using the session attempts to restart the session; an LS used by independent LUs will not be reactivated by CS Linux, and must be restarted manually.
- If the link is to an APPN node, the LS must have a preassigned TG number defined (see the following parameter), and *cp_cp_sess_support* must be set to AP_NO.
- If either the local node or the adjacent node is an end node, the LS must also be defined as auto-activatable at the adjacent node.

def_data.tg_number
Preassigned TG number. This parameter is used only if the adjacent node is an APPN node (*adj_cp_type* is either AP_NETWORK_NODE or AP_END_NODE); it is ignored otherwise.

This TG number is used to represent the link when the link is activated. The node will not accept any other number from the adjacent node during activation of this link; if the adjacent node is using preassigned TG numbers, the same TG number must be defined by the adjacent node on the adjacent link station.

If the local node is a LEN node, or if the adjacent node is a LEN node and the link is to be auto-activatable, set the TG number to 1. Otherwise, specify a number in the range 1–20, or zero to indicate that the TG number is not preassigned and is negotiated when the link is activated.

If a preassigned TG number is defined, the *adj_cp_name* parameter must also be defined, and the *adj_cp_type* parameter must be set to either AP_END_NODE or AP_NETWORK_NODE.

def_data.limited_resource
Specifies whether this link station is to be deactivated when there are no sessions using the link. Link stations on a nonswitched port cannot be configured as limited resource. Possible values are:

AP_NO The link is not a limited resource and will not be deactivated automatically.

AP_NO_SESSIONS
The link is a limited resource and will be deactivated automatically when no active sessions are using it.

AP_INACTIVITY
The link is a limited resource and will be deactivated automatically when no active sessions are using it, or when no data has flowed on the link for the time period specified by the *link_deact_timer* field.

- If no SSCP-PU session is active across the link, the node deactivates the link immediately.
- If an SSCP-PU session is active but no traffic has flowed for the specified time period, the node sends REQDISCONT(normal) to the host. The host is then responsible for deactivating all LUs and the PU, at which time the local node will deactivate the link. However, the host may not deactivate LUs with active PLU-SLU sessions; in this case, the link remains active until all these sessions are deactivated (for example by the user logging out). This behavior can be changed by using options in the *ptf* field of the DEFINE_NODE verb.

A limited resource link station may be configured for CP-CP session support, by setting this field to AP_NO_SESSIONS and *cp_cp_sess_support* to AP_YES. In this case, if CP-CP sessions are brought up over the link, CS Linux will not treat the link as a limited resource (and so will not deactivate it).

def_data.solicit_sscp_sessions
For an Enterprise Extender (HPR/IP) or MPC port, this parameter is reserved.

Specifies whether to request the adjacent node to initiate sessions between the SSCP and the local CP and dependent LUs. This parameter is used only if the adjacent node is an APPN node (*adj_cp_type* is either AP_NETWORK_NODE or AP_END_NODE); it is ignored otherwise. If the adjacent node is a host (*adj_cp_type* is either AP_HOST_XID3 or AP_HOST_XID0), CS Linux always requests the host to initiate SSCP sessions.

Possible values are:

AP_YES Request the adjacent node to initiate SSCP sessions.

AP_NO Do not request the adjacent node to initiate SSCP sessions.

If the adjacent node is an APPN node and *dspu_services* is set to a value other than AP_NONE, this parameter must be set to AP_NO.

def_data.pu_name
For an Enterprise Extender (HPR/IP) or MPC port, this parameter is reserved.

Name of the local PU that uses this link. This parameter is used only if *adj_cp_type* is set to AP_HOST_XID3 or AP_HOST_XID0, or if *solicit_sscp_sessions* is set to AP_YES; it is ignored otherwise. This is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

def_data.disable_remote_act
Specifies whether to prevent activation of the LS by the remote node. Possible values are:

AP_YES The LS can only be activated by the local node; if the remote node attempts to activate it, CS Linux will reject the attempt.

AP_NO The LS can be activated by the remote node.

def_data.dspu_services
For an Enterprise Extender (HPR/IP) or MPC port, this parameter is reserved.

Specifies the services which the local node will provide to the downstream PU across this link. This parameter is used only if the adjacent node is a downstream PU or an APPN node with *solicit_sscp_sessions* set to AP_NO; it is reserved otherwise. Possible values are:

AP_PU_CONCENTRATION
Local node will provide SNA gateway for the downstream PU. The local node must be defined to support SNA gateway.

AP_DLUR
Local node will provide DLUR services for the downstream PU. The local node must be defined to support DLUR. (Not supported on end node.)

AP_NONE
Local node will provide no services for this downstream PU.

def_data.dspu_name
For an Enterprise Extender (HPR/IP) or MPC port, this parameter is reserved.

Name of the downstream PU. The name is an 8-byte type-A EBCDIC string (starting with a letter), padded to the right with EBCDIC spaces.

This parameter is required when both of the following conditions are true; otherwise, it is reserved:

- The *solicit_sscp_sessions* parameter is set to AP_NO
- The *dspu_services* parameter is set to AP_PU_CONCENTRATION or AP_DLUR

If the downstream PU is used for DLUR, this name should match the PU name configured on the host. (CS Linux sends both the PU name and PU ID to the host to identify the PU. The host normally identifies the PU by its PU name, or by the PU ID if it cannot find a matching PU name.)

def_data.dlus_name
For an Enterprise Extender (HPR/IP) or MPC port, this parameter is reserved.

Name of the DLUS node from which DLUR solicits SSCP services when the link to the downstream node is activated. This field is reserved if *dspu_services* is not set to AP_DLUR.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

To specify the global default DLUS, defined using the DEFINE_DLUR_DEFAULTS verb, set this parameter to 17 binary zeros. If this parameter is set to zeros and there is no global default DLUS, then DLUR will not initiate SSCP contact when the link is activated.

def_data.bkup_dlus_name
For an Enterprise Extender (HPR/IP) or MPC port, this parameter is reserved.

Name of the backup DLUS node from which DLUR solicits SSCP services if the node specified by *dlus_name* is not active. This field is reserved if *dspu_services* is not set to AP_DLUR.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

To specify the global backup default DLUS, defined using the DEFINE_DLUR_DEFAULTS verb, set this parameter to 17 binary zeros.

def_data.hpr_supported
Specifies whether HPR is supported on this link. If the link is an Enterprise Extender (HPR/IP) link, this parameter must be set to AP_YES. If it is an MPC link, this parameter must be set to AP_NO. Otherwise, it must be set to AP_NO unless the *adj_cp_type* parameter indicates that the link connects to an APPN node. Possible values are:

AP_YES HPR is supported on this link.

AP_NO HPR is not supported on this link.

def_data.hpr_link_lvl_error
Specifies whether HPR traffic should be sent on this link using link-level error recovery. This parameter is ignored unless *hpr_supported* is set to AP_YES.

This parameter is reserved for SDLC / Channel/ MPC+ / Enterprise Extender (HPR/IP) links.

Possible values are:

AP_YES HPR traffic should be sent on this link using link-level error recovery.

AP_NO HPR traffic should not be sent on this link using link-level error recovery.

def_data.link_deact_timer
Limited resource link deactivation timer, in seconds. A limited resource link is automatically deactivated if no data flows over the link for the time specified by this parameter. This parameter is not used if *limited_resource* is set to any value other than INACTIVITY.

The minimum value is 5; values in the range 1–4 will be interpreted as 5.

The value 0 (zero) indicates one of the following:

- If the *hpr_supported* parameter is set to AP_YES, the default deactivation timer value of 30 is used.
- If the *hpr_supported* parameter is set to AP_NO, no timeout is used (the link is not deactivated, as if *limited_resource* were set to AP_NO).

def_data.default_nn_server
End node: Specifies whether this is a link supporting CP-CP sessions to a network node that can act as the local node's network node server. When the local node has no CP-CP sessions to a network node server and needs to establish them, it checks this parameter on its defined LSs to find a suitable LS to activate. This allows you to specify which adjacent NNs are suitable to act as the NN server (for example, to avoid using NNs that are accessed by expensive or slow links).

Possible values are:

AP_YES This link supports CP-CP sessions to a network node that can act as the local node's NN server; the local node can automatically activate this link if it needs to contact an NN server. The *cp_cp_sess_support* parameter must be set to AP_YES.

AP_NO This link should not be automatically activated in an attempt to contact a network node server.

If the local node is not an end node, this parameter is ignored.

def_data.ls_attributes
This array contains further information about the adjacent node, as described in the following parameters:

def_data.ls_attributes[0]
Host type. Set this to AP_SNA unless you are communicating with a host of one of the other types listed below. Possible values are:

AP_SNA Standard SNA host.

AP_FNA Fujitsu Network Architecture (VTAM-F) host.

AP_HNA Hitachi Network Architecture host.

def_data.ls_attributes[1]
Network Name CV suppression for a link to a back-level LEN node.

If *adj_cp_type* is set to AP_BACK_LEVEL_LEN_NODE or AP_HOST_XID3, specify whether to suppress inclusion of the Network Name CV in the format 3 XID sent to the LEN node, using one of the following values:

AP_NO Include the Network Name CV in the XID.

AP_SUPPRESS_CP_NAME
Do not include the Network Name CV.

If *adj_cp_type* is set to any other value, this parameter is ignored.

def_data.adj_node_id
For an MPC link, this parameter is reserved.

Node ID of adjacent node. This is a 4-byte hexadecimal string, consisting of a block number (three hexadecimal digits) and a node number (five hexadecimal digits). Set it to zeros to disable node ID checking. If this link station is defined on a switched port, the *node_id* must be unique, and there may only be one null *node_id* on each switched port.

def_data.local_node_id
For an MPC link, this parameter is reserved.

Node ID sent in XIDs on this LS. This is a 4-byte hexadecimal string, consisting of a block number (3 hexadecimal digits) and a node number (5 hexadecimal digits). Set it to zeros to use the node ID specified in the DEFINE_NODE verb.

def_data.cp_cp_sess_support
Specifies whether CP-CP sessions are supported. This parameter is valid only if the adjacent node is an end node or network node (*adj_cp_type* is AP_NETWORK_NODE, AP_END_NODE, or AP_APPN_NODE); it is ignored otherwise. If both the local node and the adjacent node are network nodes, this parameter should be set to AP_YES in order to use APPN functions between these nodes.

Possible values are:

AP_YES CP-CP sessions are supported. For an MPC or MPC+ LS, the *solicit_sscp_sessions* parameter must be set to AP_NO.

AP_NO CP-CP sessions are not supported.

def_data.use_default_tg_chars
Specifies whether the default TG characteristics supplied on the DEFINE_PORT verb should be used. The TG characteristics apply only if the link is to an APPN node; this parameter, and the parameters in the tg_chars structure, are ignored otherwise. Possible values are:

AP_YES Use the default TG characteristics; ignore the tg_chars structure on this verb.

AP_NO Use the tg_chars structure on this verb.

def_data.tg_chars.effect_cap
Actual bits per second rate (line speed). The value is encoded as a 1-byte floating point number, represented by the formula 0.1 mmm * 2^{eeeee} where the bit representation of the byte is b'eeeeemmm'. Each unit of effective capacity is equal to 300 bits per second.

For an Ethernet or Enterprise Extender (HPR/IP) link, ensure that you set this parameter to the true 'effective capacity' of the link, including any step-downs or bottlenecks in the path, and not just to the theoretical capacity of the adapter used by the link. For example, a GigE adapter may be capable of processing one gigabit, but if the link goes through an ethernet switch to a target box that uses FastEthernet you should specify 100MBps or less.

def_data.tg_chars.connect_cost
Cost per connect time. Valid values are integer values in the range `0`–`255`, where `0` is the lowest cost per connect time and `255` is the highest.

def_data.tg_chars.byte_cost
Cost per byte. Valid values are integer values in the range `0`–`255`, where `0` is the lowest cost per byte and `255` is the highest.

def_data.tg_chars.security
Security level of the network. Possible values are:

AP_SEC_NONSECURE
No security.

AP_SEC_PUBLIC_SWITCHED_NETWORK
Data is transmitted over a public switched network.

AP_SEC_UNDERGROUND_CABLE
Data is transmitted over secure underground cable.

AP_SEC_SECURE_CONDUIT
Data is transmitted over a line in a secure conduit that is not guarded.

AP_SEC_GUARDED_CONDUIT
Data is transmitted over a line in a conduit that is protected against physical tapping.

AP_SEC_ENCRYPTED
Data is encrypted before transmission over the line.

AP_SEC_GUARDED_RADIATION
Data is transmitted over a line that is protected against physical and radiation tapping.

def_data.tg_chars.prop_delay
Propagation delay: the time that a signal takes to travel the length of the link. Specify one of the following values, according to the type of link:

AP_PROP_DELAY_MINIMUM
Minimum propagation delay.

AP_PROP_DELAY_LAN
Delay is less than 480 microseconds (typical for a LAN).

AP_PROP_DELAY_TELEPHONE
Delay is in the range 480–49,512 microseconds (typical for a telephone network).

AP_PROP_DELAY_PKT_SWITCHED_NET
Delay is in the range 49,512–245,760 microseconds (typical for a packet-switched network).

AP_PROP_DELAY_SATELLITE
Delay is greater than 245,760 microseconds (typical for a satellite link).

AP_PROP_DELAY_MAXIMUM
Maximum propagation delay.

def_data.tg_chars.user_def_parm_1 **through** *def_data.tg_chars.user_def_parm_3*
User-defined parameters, which you can use to include other TG characteristics not covered by the above parameters. Each of these parameters must be set to a value in the range 1–255.

def_data.target_pacing_count
Numeric value between 1 and 32,767 inclusive indicating the desired pacing window size. (The current version of CS Linux does not make use of this value.)

def_data.max_send_btu_size
Maximum BTU size that can be sent from this link station. This value is used to negotiate the maximum BTU size that a pair of link stations can use to communicate with each other. The value includes the length of the TH and RH (total 9 bytes) as well as the RU. Specify a value in the range 265–65535 (265–4105 for SDLC).

def_data.ls_role
Link station role. This is normally set to AP_USE_PORT_DEFAULTS, specifying that the LS role is to be taken from the definition of the port that owns this LS. For an MPC link, this is the only valid value.

If you need to override the port's LS role for an individual LS, specify one of the following values:

AP_LS_PRI
Primary

AP_LS_SEC
Secondary

AP_LS_NEG
Negotiable

For an Enterprise Extender (HPR/IP) port, you must use AP_USE_PORT_DEFAULTS; you cannot override the port's LS role.

def_data.max_ifrm_rcvd
The maximum number of I-frames that can be received by this link station before an acknowledgment is sent. Specify a value in the range 0–127. If 0 is specified, the value from the port definition is used.

def_data.dlus_retry_timeout
For an Enterprise Extender (HPR/IP) or MPC port, this parameter is reserved.

Reactivation timer for contacting a DLUS. If CS Linux fails to contact the DLUS, this parameter specifies the time in seconds between retries.

Specify a value in the range 0x0001–0xFFFF.

def_data.dlus_retry_limit
For an Enterprise Extender (HPR/IP) or MPC port, this parameter is reserved.

The interval in seconds between the second and subsequent attempts to contact the DLUS specified by the *dlus_name* and *bkup_dlus_name* parameters. Specify a value in the range 0x0001–0xFFFE, or specify 0xFFFF to indicate that CS Linux should retry indefinitely until it contacts the DLUS. The interval between the first and second attempts is always 1

second. If zero is specified, then the defaults specified using the DEFINE_DLUR_DEFAULTS verb are used. This parameter is ignored if the *dspu_services* parameter is not set to AP_DLUR.

def_data.conventional_lu_compression
For an MPC link, this parameter is reserved.

Specifies whether data compression is requested for LU 0–3 sessions on this link. This parameter is used only if this link carries LU 0–3 traffic; it does not apply to LU 6.2 sessions.

Possible values are:

AP_YES Data compression should be used for LU 0–3 sessions on this link if the host requests it.

AP_NO Data compression should not be used for LU 0–3 sessions on this link.

def_data.branch_link_type
This parameter applies only if the local node is a Branch Network Node; it is reserved if the local node is any other type.

If the parameter *def_data.adj_cp_type* is set to AP_NETWORK_NODE, AP_END_NODE, AP_APPN_NODE, or AP_BACK_LEVEL_LEN_NODE, this parameter defines whether the link is an uplink or a downlink. Possible values are:

AP_UPLINK
The link is an uplink.

AP_DOWNLINK
The link is a downlink.

If *def_data.adj_cp_type* is set to AP_NETWORK_NODE, this parameter must be set to AP_UPLINK.

def_data.adj_brnn_cp_support
This parameter applies only if the local node is a Branch Network Node and the adjacent node is a network node (the parameter *def_data.adj_cp_type* is set to AP_NETWORK_NODE, or it is set to AP_APPN_NODE and the node type discovered during XID exchange is network node). It is reserved if the local and remote nodes are any other type.

This parameter defines whether the adjacent node can be a Branch Network Node that is acting as a Network Node from the point of view of the local node. Possible values are:

AP_BRNN_ALLOWED
The adjacent node is allowed (but not required) to be a Branch Network Node.

AP_BRNN_REQUIRED
The adjacent node must be a Branch Network Node.

AP_BRNN_PROHIBITED
The adjacent node must not be a Branch Network Node.

If *def_data.adj_cp_type* is set to AP_NETWORK_NODE and *auto_act_supp* is set to AP_YES, this parameter must be set to AP_BRNN_REQUIRED or AP_BRNN_PROHIBITED.

def_data.pu_can_send_dddlu_offline
For an MPC link, this parameter is reserved.

Specifies whether the local PU should send NMVT (power off) messages to the host. If the host system supports DDDLU (Dynamic Definition of Dependent LUs), CS Linux sends NMVT (power off) to the host when it has finished using a dynamically defined LU. This allows the host to save resources by removing the definition when it is no longer required.

This parameter is used only if this link is to a host (*solicit_sscp_sessions* is set to AP_YES and *dspu_services* is not set to AP_NONE).

Possible values are:

AP_YES The local PU sends NMVT (power off) messages to the host.

AP_NO The local PU does not send NMVT (power off) messages to the host.

If the host supports DDDLU but does not support the NMVT (power off) message, this parameter must be set to AP_NO.

def_data.link_spec_data_len
Length of the link-specific data. The data should be concatenated to the basic structure.

Link-specific data for SDLC:

mux_info.dlc_type
Type of the DLC. Set this to AP_IMPL_SDLC_SL.

poll_frame
The frame to use for pre-activation polling. This is normally XID, indicating that polling is in the control of the DLC user. However, when CS Linux is primary talking to an old secondary implementation, it may be necessary to poll using some other frame. Possible values are: XID, SNRM.

Link-specific data for QLLC:

mux_info.dlc_type
Type of the DLC. Set this to AP_IMPL_NLI_QLLC.

vc_type
The Virtual Circuit type of the LS. Possible values are:

VQL_SVC
Switched Virtual Circuit

VQL_PVC
Permanent Virtual Circuit

If you define both SVC and PVC LSs between the same local node and remote node, unpredictable results may occur if the SVC LS is started first (since it may not be possible to match the incoming call to the correct LS). To avoid these problems, ensure that PVC LSs are activated before any SVC LSs between the same pair of nodes.

fac_len Length of the additional X.25 facilities data that follows (in the *fac* parameter). If no additional data is required, specify zero. If the X.25 network does not support facilities negotiation, specify zero and see the *fac* parameter below for more information.

fac Specify any facilities data required in the call packet sent to the remote system. Check with the administrator of your X.25 network, or the administrator of the remote system, to determine what to specify in this parameter.

pvc_id PVC identifier. Set this to a decimal number to identify which PVC (from the range of PVCs defined for your X.25 provider software) is to be used for this LS. This field is reserved if *vc_type* above is set to `VQL_SVC`.

cud_len
Length of the Call User Data that follows (in the *cud* parameter).

cud Call User Data: this parameter identifies the protocol to be used over the underlying X.25 virtual circuit, and is used only if the *vc_type* parameter is set to `VQL_SVC`. For most implementations, this should be set to a single hex byte, which is `0xC3` to request that the called node supports the 1980 QLLC level, or `0xCB` to request 1984 support. Some remote systems may require additional bytes; check with the System Administrator of the remote system.

DLC-specific data for Token Ring, Ethernet:

mux_info.dlc_type
Type of the DLC.

Possible values are:

AP_IMPL_TR_SNAP_LLC2
Token Ring

AP_IMPL_ETHER_SNAP_LLC2
Ethernet

xid_timer
Timeout required before an XID is retransmitted when trying to contact a remote station. The timer is specified in seconds. Higher values may be needed if the remote station is on a separate Token Ring connected by a bridge.

xid_timer_retry
Number of times transmission and retransmission of an XID is allowed. This count does not include the initial transmission; that is, a value of 1 indicates “transmit once and then retry once”. Higher values may be needed if the remote station is on a separate Token Ring connected by a bridge.

test_timer
Timeout required before a TEST frame is retransmitted when trying to contact a remote station. The timer is specified in seconds. Higher values may be needed if the remote station is on a separate Token Ring connected by a bridge.

test_timer_retry
Number of times transmission and retransmission of a TEST frame is allowed. This count does not include the initial transmission; that is, a value of 1 indicates “transmit once and then retry once”. Higher values may be needed if the remote station is on a separate Token Ring connected by a bridge.

ack_timeout
Acknowledgment timeout: the time in milliseconds within which a response must be received for any I-frames sent to the adjacent link station.

p_bit_timeout
Poll bit timeout: the time in milliseconds within which a response must be received for any frames sent to the adjacent link station with the POLL bit set.

t2_timeout
The maximum time in milliseconds that the local station can wait before it must send a response to a received I-frame. A longer timeout allows the local station to respond to more than one I-frame with a single RR, and so reduces acknowledgment traffic.

rej_timeout
Reject timeout: the time in seconds within which a response must be received for a REJ frame sent to the adjacent link station.

busy_state_timeout
The time in seconds that the local station waits for indication from the adjacent link station that a busy state (RNR) has cleared.

idle_timeout
Idle timeout: used to detect a completely inactive line. The line is considered idle when nothing has been received in this time. The timer is specified in seconds.

max_retry
The maximum number of times that the local station will retry when waiting for a response or for a busy state to clear.

Link-specific data for multipath channel (MPC), CS Linux for System z only:

chnl_link_spec_data.mux_info.dlc_type
Type of DLC. This must be set to `AP_IMPL_MPC_GDLC`.

Link-specific data for Enterprise Extender (HPR/IP):

ipdlc_link_spec_data.mux_info.dlc_type
Type of DLC. Set this to `AP_IP`.

ipdlc_link_spec_data.ack_timeout
Duration for the acknowledgment timer (sometimes called the T1 timer): the time in milliseconds within which a response must be received for a command frame sent to the adjacent link station. If the response is not received within this time, a duplicate frame is sent.

A lower value for this parameter means that lost packets will be detected quickly, but may increase network traffic.

Specify a value in the range 0–65535. This parameter should be set to a value greater than twice the expected network latency. A typical value is 2000 milliseconds.

ipdlc_link_spec_data.max_retry
The maximum number of times that the local station will retry sending a command frame. If this retry count is exceeded without receiving a response, the link is considered to have failed.

A lower value for this parameter means that link failures will be detected quickly, but may cause unnecessary reporting of link failures if a few packets are lost.

Specify a value in the range 0–255. A typical value is 10 retries.

ipdlc_link_spec_data.liveness_timeout
Duration for the liveness timer (sometimes called the TL timer): the time in milliseconds for which the link will be held active if there is no evidence that the remote station is still active.

A lower value for this parameter means that link failures will be detected quickly, but may increase network traffic on idle active links.

Specify a value in the range 1–65535 milliseconds. A typical value is 10000 (10 seconds).

ipdlc_link_spec_data.short_hold_mode
Specifies whether the liveness protocol runs only if there has been no evidence that the remote system is still active since data was last transmitted (`AP_YES` or `AP_NO`).

Setting this parameter to `AP_YES` allows links to stay active and idle without unnecessary data traffic, but means that link failures are not detected until the local station attempts to send data. In general this parameter should be set to `AP_NO`.

ipdlc_link_spec_data.remote_hostname
Remote host name of the destination node for this link. This can be any of the following.

- An IPv4 dotted-decimal address (such as `193.1.11.100`).
- An IPv6 colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).
- A name (such as `newbox.this.co.uk`).
- An alias (such as `newbox`).

If you specify a name or alias, the Linux system must be able to resolve this to a fully qualified name (either using the local TCP/IP configuration or using a Domain Name server).

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
`AP_PARAMETER_CHECK`

secondary_rc
Possible values are:

`AP_CANT_MODIFY_PORT_NAME`
The *ls_name* parameter matched the name of an existing LS, but the *port_name* parameter did not match the existing definition. You cannot modify the port name when changing the definition of an existing LS.

`AP_DEF_LINK_INVALID_SECURITY`
The *tg_chars.security* parameter was not set to a valid value.

AP_INVALID_AUTO_ACT_SUPP
The *auto_act_supp* parameter was not set to a valid value, or was set to AP_YES when *cp_cp_sess_support* was also set to AP_YES.

AP_INVALID_CP_NAME
The *adj_cp_name* parameter contained a character that was not valid, was not in the correct format, or was not specified when required.

AP_INVALID_LIMITED_RESOURCE
The *limited_resource* parameter was not set to a valid value.

AP_INVALID_LINK_NAME
The *ls_name* parameter contained a character that was not valid.

AP_INVALID_LS_ROLE
The *ls_role* parameter was not set to a valid value.

AP_INVALID_NODE_TYPE
The *adj_cp_type* parameter was not set to a valid value.

AP_INVALID_PORT_NAME
The *port_name* parameter did not match the name of any defined port.

AP_INVALID_PU_NAME
The *pu_name* parameter did not match the name of any defined PU, or was set to a new value on an already-defined LS.

AP_INVALID_DSPU_NAME
The *dspu_name* parameter did not match the name of any defined PU, or was set to a new value on an already-defined LS.

AP_INVALID_DSPU_SERVICES
The *dspu_services* parameter was not set to a valid value, or was set when not expected.

AP_INVALID_SOLICIT_SSCP_SESS
The *solicit_sscp_sess* parameter was not set to a valid value.

AP_INVALID_TARGET_PACING_CNT
The *target_pacing_count* parameter was not set to a valid value.

AP_INVALID_DLUS_NAME
The *dlus_name* parameter contained a character that was not valid or was not in the correct format.

AP_INVALID_BKUP_DLUS_NAME
The *bkup_dlus_name* parameter contained a character that was not valid or was not in the correct format.

AP_INVALID_TG_NUMBER
The TG number supplied was not in the valid range.

AP_MISSING_CP_NAME
A TG number was defined, but no CP name was supplied.

AP_MISSING_CP_TYPE
A TG number was defined, but no CP type was supplied.

AP_MISSING_TG_NUMBER
The link was defined to be auto-activated, but no TG number was supplied.

AP_PARALLEL_TGS_NOT_SUPPORTED
This node cannot support more than one LS defined between it and the same adjacent node.

AP_INVALID_DLUS_RETRY_LIMIT
The value specified for *dlus_retry_limit* was not valid.

AP_INVALID_DLUS_RETRY_TIMEOUT
The value specified for *dlus_retry_timeout* was not valid.

AP_INVALID_LS_ROLE
The value specified for the *ls_role* parameter is not valid.

AP_INVALID_NODE_TYPE_FOR_HPR
The node type specified for the *adj_cp_type* parameter does not support HPR.

AP_INVALID_BTU_SIZE
The value specified for the *max_send_btu_size* parameter was not valid.

AP_INVALID_MAX_IFRM_RCVD
The value specified for the *max_ifrm_rcvd* parameter was not valid.

AP_UNKNOWN_IP_HOST
This value applies only for an Enterprise Extender (HPR/IP) link. The string specified for the *remote_hostname* parameter could not be resolved to a valid IP address.

AP_INVALID_IP_VERSION
This value applies only for an Enterprise Extender (HPR/IP) link. The value specified in the *ip_version* parameter did not match the value specified for the owning IP port.

AP_INVALID_BRANCH_LINK_TYPE
The *branch_link_type* parameter was not set to a valid value.

AP_INVALID_BRNN_SUPPORT
The *adj_brnn_cp_support* parameter was not set to a valid value.

AP_BRNN_SUPPORT_MISSING
The *adj_brnn_cp_support* parameter was set to AP_BRNN_ALLOWED; this value is not valid because the adjacent node is a Network Node and *auto_act_supp* is set to AP_YES.

AP_INVALID_UPLINK
The *branch_link_type* parameter was set to AP_UPLINK, but the definition of an existing LS between the local and adjacent nodes specifies that it is a downlink. The branch link type must be the same for all LSs between the same two nodes.

AP_INVALID_DOWNLINK
The *branch_link_type* parameter was set to AP_DOWNLINK, but the definition of an existing LS between the local and adjacent nodes specifies that it is an uplink. The branch link type must be the same for all LSs between the same two nodes.

AP_INVALID_LINK_SPEC_FORMAT
A reserved parameter was set to a nonzero value.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_DUPLICATE_CP_NAME
A link to the CP name specified in the *adj_cp_name* parameter has already been defined.

AP_DUPLICATE_DEST_ADDR
A link to the destination address specified in the *address* parameter has already been defined.

For LLC2 link types: A link to the destination address specified by the combination of the *mac_address* and *lsap_address* parameters has already been defined.

AP_DUPLICATE_ADJ_NODE_ID
The *adj_node_id* (node ID of adjacent node) has already been defined in another link station.

AP_INVALID_LINK_NAME
The link station value specified in the *ls_name* parameter was not valid.

AP_INVALID_NUM_LS_SPECIFIED
The number of link stations specified was not valid.

AP_LOCAL_CP_NAME
The name specified for the *adj_cp_name* parameter is identical to the local CP name.

AP_LS_ACTIVE
The link station specified in the *ls_name* parameter is currently active.

AP_PU_ALREADY_DEFINED
The PU specified in the *pu_name* parameter has already been defined.

AP_DSPU_ALREADY_DEFINED
The downstream PU specified in the *dspu_name* parameter has already been defined.

AP_DSPU_SERVICES_NOT_SUPPORTED
AP_PU_CONCENTRATIONor AP_DLUR has been specified on the *dspu_services* parameter, but the node does not support it.

AP_DUPLICATE_TG_NUMBER
The TG number specified in the *tg_number* parameter has already been defined.

AP_TG_NUMBER_IN_USE
The TG number specified for the *tg_number* parameter is already being used by another LS.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

Bit Ordering in MAC Addresses

Ethernet LANs use a different representation of MAC addresses from that used by Token Ring; the order of the bits in each byte of the address on Ethernet is the reverse of the order on Token Ring. Normally, the local and remote nodes are on the same LAN, or on LANs of the same type connected by a bridge; in this case, they will both use the same representation of the MAC address, and no conversion is required.

If the two nodes are on LANs of different types (one Ethernet, the other Token Ring) connected by a bridge, you will normally need to reverse the bit order of each byte of the address when specifying a remote MAC address. To do this, take the following steps:

1. List the MAC address as six bytes, each byte represented by two hexadecimal digits.
2. List the MAC address as six bytes, each byte represented by two hexadecimal digits.
3. Convert each digit as shown below:

0 → 0	8 → 1
1 → 8	9 → 9
2 → 4	A → 5
3 → C	B → D
4 → 2	C → 3
5 → A	D → B
6 → 6	E → 7
7 → E	F → F

Example of Bit Ordering in a MAC Address

Original address	1A	2B	3C	4D	5E	6F
Swap digits	A1	B2	C3	D4	E5	F6
Convert digits (the bit-reversed form of the original address)	58	D4	3C	B2	7A	F6

Modem Control Characters

For SDLC, if you need to include one or more non-printable control characters in the *hmod_data* parameter, you can do this by specifying the hexadecimal value of the control character, as listed in Table 2.

Table 2. Escape Sequences for Modem Control Characters

Escape Sequence	Decimal Value	Hexadecimal Value
NUL	0	0x00
SOH	1	0x01
STX	2	0x02
ETX	3	0x03
EOT	4	0x04
ENQ	5	0x05

Table 2. Escape Sequences for Modem Control Characters (continued)

Escape Sequence	Decimal Value	Hexadecimal Value
ACK	6	0x06
BEL	7	0x07
BS	8	0x08
HT	9	0x09
LF	10	0x0A
VT	11	0x0B
FF	12	0x0C
CR	13	0x0D
SO	14	0x0E
SI	15	0x0F
DLE	16	0x10
DC1	17	0x11
DC2	18	0x12
DC3	19	0x13
DC4	20	0x14
NAK	21	0x15
SYN	22	0x16
ETB	23	0x17
CAN	24	0x18
EM	25	0x19
SUB	26	0x1A
ESC	27	0x1B
FS	28	0x1C
GS	29	0x1D
RS	30	0x1E
US	31	0x1F
SP	32	0x20
DEL	127	0x7F

DEFINE_LS_ROUTING

The DEFINE_LS_ROUTING verb defines the location of a partner LU using a link station.

Note: You cannot use DEFINE_LS_ROUTING with an Enterprise Extender (HPR/IP) link station. This is because all traffic on this link type must flow over an RTP connection, which is not fixed to a particular link station and can switch to a different path.

VCB Structure

```
typedef struct define_ls_routing
{
  AP_UINT16         opcode;               /* verb operation code           */
  unsigned char     reserv2;              /* reserved                      */
  unsigned char     format;               /* reserved                      */
  AP_UINT16         primary_rc;           /* primary return code           */
  AP_UINT32         secondary_rc;         /* secondary return code         */
  unsigned char     lu_name[8];           /* LU Name                       */
  unsigned char     lu_alias[8];          /* reserved                      */
  unsigned char     fq_partner_lu[17];    /* partner lu name               */
```

```
  unsigned char     wildcard_fqplu;        /* wildcard partner LU flag       */
  unsigned char     ls_name[8];            /* link to use                    */
  unsigned char     reserv3[2];            /* reserved                       */
} DEFINE_LS_ROUTING;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_LS_ROUTING

lu_name
Name of the local LU that will communicate with the partner LU (specified by the *fq_partner_lu* parameter) over the link specified by the *ls_name* parameter. This is an 8–byte type-A character string.

fq_partner_lu
Fully qualified name of the partner LU with which the local LU (specified by the *lu_name* parameter) will communicate over the link specified by the *ls_name* parameter. Specify 3–17 characters that consists of a 1–8 character network name, followed by a period, followed by a 1–8 character partner LU name.

You can specify a partial or full wildcard partner LU name by specifying only part of the name and setting the *wildcard_fqplu* parameter to AP_YES. For example:

- APPN.NEW matches APPN.NEW1, APPN.NEWLU, and so on
- APPN. matches any LU with a network name of APPN, regardless of its LU name
- APPN matches any LU with a network name beginning with APPN: APPN.NEW1, APPNNEW.LUTWO, and so on.

To specify a full wildcard entry, so that all partner LUs will be accessed using the same link, set *wildcard_fqplu* to AP_YES and set *fq_partner_lu* to a null string.

wildcard_fqplu
Wildcard partner LU flag indicating whether the *fq_partner_lu* parameter contains a full or partial wildcard. Possible values are:

AP_YES The *fq_partner_lu* parameter contains a wildcard entry.

AP_NO The *fq_partner_lu* parameter does not contain a wildcard entry.

ls_name
Name of the link station to use for communication between the local LU (specified by the *lu_name* parameter) and the partner LU (specified in the *fq_partner_lu* parameter). Specify 1–8 locally displayable characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameter:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
The *lu_name* parameter contained a character that was not valid.

AP_INVALID_PLU_NAME
The *fq_partner_lu* parameter contained a character that was not valid or the name was not fully qualified.

AP_INVALID_WILDCARD_NAME
The *wildcard_fqplu* parameter was specified but the *fq_partner_lu* parameter was not a valid wildcard name.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
The local LU identified by the *lu_name* parameter does not exist.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_LU62_TIMEOUT

The DEFINE_LU62_TIMEOUT verb defines a timeout period for unused LU 6.2 sessions. Each timeout is for a specified resource type and resource name. If a DEFINE_* verb is issued for a resource type and name pair already defined, the command overwrites the previous definitions. New timeout periods are only used for sessions activated after the definition is changed.

If more than one relevant timeout period is defined for a session, the shortest period applies.

VCB Structure

```
typedef struct define_lu62_timeout
{
  AP_UINT16         opcode;                     /* verb operation code   */
  unsigned char     reserv2;                    /* reserved              */
  unsigned char     format;                     /* reserved              */
  AP_UINT16         primary_rc;                 /* primary return code   */
  AP_UINT32         secondary_rc;               /* secondary return code */
```

```
  unsigned char     resource_type;              /* resource type        */
  unsigned char     resource_name[17];          /* resource name        */
  AP_UINT16         timeout;                    /* timeout              */
} DEFINE_LU62_TIMEOUT;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_LU62_TIMEOUT

resource_type
Specifies the type of timeout to be defined. Possible values are:

AP_GLOBAL_TIMEOUT
Timeout applies to all LU 6.2 sessions for the local node. The *resource_name* parameter should be set to all zeros.

AP_LOCAL_LU_TIMEOUT
Timeout applies to all LU 6.2 sessions for the local LU specified in the *resource_name* parameter.

AP_PARTNER_LU_TIMEOUT
Timeout applies to all LU 6.2 sessions to the partner LU specified in the *resource_name* parameter.

AP_MODE_TIMEOUT
Timeout applies to all LU 6.2 sessions on the mode specified in the *resource_name* parameter.

resource_name
Name of the resource being queried. This value can be one of the following:

- If *resource_type* is set to AP_GLOBAL_TIMEOUT, do not specify this parameter.
- If *resource_type* is set to AP_LOCAL_LU_TIMEOUT, specify 1–8 locally displayable type-A characters as a local LU name.
- If *resource_type* is set to AP_PARTNER_LU_TIMEOUT, specify the fully qualified name of the partner LU as follows: 17 locally displayable type-A characters consisting of a 1–8 character network name, followed by a period, followed by a 1–8 character partner LU name.
- If *resource_type* is set to AP_MODE_TIMEOUT, specify 1–8 locally displayable type-A characters as a mode name.

timeout
Timeout period in seconds. A value of 0 (zero) indicates that the session immediately becomes free.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_RESOURCE_TYPE
The type of timeout defined was not valid.

AP_INVALID_LU_NAME
The *resource_type* parameter specified an LU name that was not valid.

AP_INVALID_PARTNER_LU
The *resource_type* parameter specified a partner LU name that was not valid.

AP_INVALID_MODE_NAME
The *resource_type* parameter specified a mode name that was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_LU_0_TO_3

The DEFINE_LU_0_TO_3 verb defines an LU for use with 3270 emulation or LUA (an LU of type 0, 1, 2, or 3), and optionally assigns the LU to an LU pool.

If this verb is used to modify an existing LU, only the *description*, *priority*, and *lu_model* parameters can be changed; all other parameters must be set to their existing values.

VCB Structure

```
typedef struct define_lu_0_to_3
{
    AP_UINT16           opcode;                 /* verb operation code       */
    unsigned char       reserv2;                /* reserved                  */
    unsigned char       format;                 /* reserved                  */
    AP_UINT16           primary_rc;             /* primary return code       */
    AP_UINT32           secondary_rc;           /* secondary return code     */
    unsigned char       lu_name[8];             /* LU name                   */
    LU_0_TO_3_DEF_DATA  def_data;               /* defined data              */
} DEFINE_LU_0_TO_3;

typedef struct lu_0_to_3_def_data
{
    unsigned char       description[32];         /* resource description      */
    unsigned char       reserv1[16];            /* reserved                  */
    unsigned char       nau_address;            /* LU NAU address            */
    unsigned char       pool_name[8];           /* LU Pool name              */
    unsigned char       pu_name[8];             /* PU name                   */
    unsigned char       priority;               /* LU priority               */
    unsigned char       lu_model;               /* LU model (type)           */
    unsigned char       sscp_id[6];             /* SSCP ID                   */
    AP_UINT16           timeout;                /* Timeout                   */
    unsigned char       app_spec_def_data[16];  /* reserved                  */
    unsigned char       model_name[7];          /* reserved                  */
```

```
    unsigned char       term_method;            /* session termination type  */
    unsigned char       disconnect_on_unbind;   /* disconnect on UNBIND flag */
    unsigned char       reserv3[15];            /* reserved                  */
} LU_0_TO_3_DEF_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_LU_0_TO_3

lu_name
Name of the local LU. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

def_data.description
A null-terminated text string (0–31 characters followed by a null character) describing the LU. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_LU_0_TO_3 verb, but CS Linux does not make any other use of it.

def_data.nau_address
Network accessible unit address of the LU. This is a number in the range 1–255.

def_data.pool_name
Name of pool to which this LU belongs. This is a type-A EBCDIC string, padded on the right with EBCDIC spaces if the name is shorter than 8 bytes. If a pool with the specified name is not already defined, CS Linux adds a new pool with this name and assigns the LU to it.

If the LU does not belong to a pool, set this field to 8 binary zeros.

def_data.pu_name
Name of the PU (as specified on the DEFINE_LS verb) which this LU will use. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 bytes.

def_data.priority
LU priority when sending to the host. Possible values are:

AP_NETWORK

AP_HIGH

AP_MEDIUM

AP_LOW

def_data.lu_model
Type of the LU. Possible values are:

AP_3270_DISPLAY_MODEL_2

AP_3270_DISPLAY_MODEL_3

AP_3270_DISPLAY_MODEL_4

AP_3270_DISPLAY_MODEL_5

AP_PRINTER

AP_SCS_PRINTER

AP_RJE_WKSTN

AP_UNKNOWN (LU type will be determined when the session to the host is established)

If you are not using the LU for 3270 emulation, it is not necessary to specify an explicit LU type; set this parameter to AP_UNKNOWN.

Depending on the value you specify, CS Linux sends one of the following strings to the host in the DDDLU NMVT, to match the values used in the standard VTAM tables:

3270002 for AP_3270_DISPLAY_MODEL_2
3270003 for AP_3270_DISPLAY_MODEL_3
3270004 for AP_3270_DISPLAY_MODEL_4
3270005 for AP_3270_DISPLAY_MODEL_5
3270DSC for AP_PRINTER
3270SCS for AP_SCS_PRINTER
3270000 for AP_RJE_WKSTN
327000*n* for AP_UNKNOWN with a TN3270 client, where *n* is the model number (2–5) provided by the client
327000@ for AP_UNKNOWN with an LUA client

If the host system supports Dynamic Definition of Dependent LUs (DDDLUs), CS Linux will define the LU dynamically on the host when the communications link to the host is established. For a TN3270 client, set this parameter to AP_UNKNOWN. CS Linux then determines the LU model using a standard mapping from the terminal type (device type) specified by the client; if you need to change this mapping, you can do this using the **tn3270dev.dat** file as described in *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

If the host does not support DDDLU, the LU must be included in the host configuration.

def_data.sscp_id

Specifies the ID of the SSCP permitted to activate this LU. Set this parameter to 0 (zero) if the LU can be activated by any SSCP. If the LU is to be activated only by a specific SSCP, set the first four bytes of this parameter to 0x05000000 and the last two bytes to the SSCP ID that identifies the SSCP that is permitted to activate the LU.

def_data.timeout

Timeout for the LU specified in seconds. If the timeout is set to a nonzero value and the user of the LU supports session inactivity timeouts, then the LU is deactivated after the PLU-SLU session is left inactive for the specified period and one of the following conditions exist:

- The session passes over a limited resource link.
- Another application requests to use the LU before the session is used again.

If the timeout is set to 0 (zero), the LU is not deactivated.

Support for session inactivity timeouts depends on the application that is using the LU (such as a 3270 emulation program). If the LU is being used by SNA gateway, session inactivity timeouts are supported only if *allow_timeout* is specified on the DEFINE_DOWNSTREAM_LU verb.

def_data.term_method

This parameter specifies how CS Linux should attempt to end a PLU-SLU session to a host from this LU. Possible values are:

AP_USE_NODE_DEFAULT
Use the node's default termination method, specified by the *send_term_self* parameter on DEFINE_NODE.

AP_SEND_UNBIND
End the session by sending an UNBIND.

AP_SEND_TERM_SELF
End the session by sending a TERM_SELF.

def_data.disconnect_on_unbind
This parameter applies only when this LU is being used by a TN3270 client. It specifies whether to end the session when the host sends an UNBIND instead of displaying the VTAM MSG10 or returning to a host session manager. Possible values are:

AP_YES End the session if the host sends an UNBIND that is not type 2 (BIND forthcoming).

AP_NO Do not end the session if the host sends an UNBIND.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
The *lu_name* parameter contained a character that was not valid.

AP_INVALID_POOL_NAME
The *pool_name* parameter contained a character that was not valid.

AP_INVALID_NAU_ADDRESS
The *nau_address* parameter was not in the permitted range.

AP_INVALID_PRIORITY
The *priority* parameter was not set to a valid value.

AP_INVALID_TERM_METHOD
The *term_method* parameter was not set to a valid value.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_INVALID_PU_NAME
The *pu_name* parameter was not valid.

AP_PU_NOT_DEFINED
The *pu_name* parameter did not match any defined PU name.

AP_INVALID_PU_TYPE
The PU specified by the *pu_name* parameter is not a host PU.

AP_LU_NAME_POOL_NAME_CLASH
The LU name clashes with the name of an LU pool.

AP_LU_ALREADY_DEFINED
An LU with the specified name has already been defined.

AP_LU_NAU_ADDR_ALREADY_DEFD
An LU with the specified NAU address has already been defined.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_LU_0_TO_3_RANGE

The DEFINE_LU_0_TO_3_RANGE verb defines a range of LUs for use with 3270 emulation or LUA (LUs of type 0, 1, 2, or 3), and optionally assigns the LUs to an LU pool. This verb cannot be used to modify existing LUs.

The supplied parameters to this verb include a base name for the new LUs and the range of NAU addresses. The new LU names are generated by combining the base name with the NAU addresses. For example, a base name of LUNME combined with a NAU range of 11 to 14 would define the LUs LUNME011, LUNME012, LUNME013 and LUNME014.

VCB Structure

```
typedef struct define_lu_0_to_3_range
{
     AP_UINT16        opcode;                 /* verb operation code       */
     unsigned char    reserv2;                /* reserved                  */
     unsigned char    format;                 /* reserved                  */
     AP_UINT16        primary_rc;             /* primary return code       */
     AP_UINT32        secondary_rc;           /* secondary return code     */
     unsigned char    base_name[6];           /* Base name                 */
     unsigned char    description[32];        /* resource description      */
     unsigned char    reserv1[16];            /* reserved                  */
     unsigned char    min_nau;                /* Minimum NAU address       */
     unsigned char    max_nau;                /* Maximum NAU address       */
     unsigned char    pool_name[8];           /* LU Pool name              */
     unsigned char    pu_name[8];             /* PU name                   */
     unsigned char    priority;               /* LU priority               */
     unsigned char    lu_model;               /* LU model (type)           */
     unsigned char    sscp_id[6];             /* SSCP ID                   */
     AP_UINT16        timeout;                /* Timeout                   */
     unsigned char    app_spec_def_data[16];  /* reserved                  */
     unsigned char    reserv3[7];             /* reserved                  */
     unsigned char    name_attributes;        /* Extension type            */
     unsigned char    base_number;            /* First extension number    */
```

```
    unsigned char    term_method;             /* session termination type  */
    unsigned char    disconnect_on_unbind;    /* disconnect on UNBIND flag */
    unsigned char    reserv4[13];             /* reserved                  */
} DEFINE_LU_0_TO_3_RANGE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_LU_0_TO_3_RANGE

base_name

Base name for the names of the new LUs. This is a 6-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the base name is less than 6 characters.

- If the *name_attributes* parameter is set to AP_USE_HEX_IN_NAME, this name may be up to 6 characters long. CS Linux generates the LU name for each LU by appending a 2-digit hexadecimal number to this name (starting from a base number specified by the *base_number* parameter).
- Otherwise, this name may be up to 5 characters long. CS Linux generates the LU name for each LU by appending a 3-digit decimal number to this name (taken from the NAU address or from a defined base number, as specified by the *name_attributes* parameter).

description

A null-terminated text string (0–31 characters followed by a null character) describing the LUs; the same string is used for each LU in the range. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_LU_0_TO_3 verb, but CS Linux does not make any other use of it.

min_nau

NAU address of the first LU, in the range 1–255.

max_nau

NAU address of the last LU, in the range 1–255.

pool_name

Name of pool to which these LUs belong. This is an 8-byte type-A EBCDIC string, padded on the right with EBCDIC spaces if the name is shorter than 8 bytes. If a pool with the specified name is not already defined, CS Linux adds a new pool with this name and assigns the LUs to it.

If the LUs do not belong to a pool, set this field to 8 binary zeros.

pu_name

Name of the PU (as specified on the DEFINE_LS verb) which these LUs will use. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

priority

LU priority when sending to the host. Possible values are:

AP_NETWORK

AP_HIGH

AP_MEDIUM

AP_LOW

lu_model

Type of the LUs. Possible values are:

AP_3270_DISPLAY_MODEL_2

AP_3270_DISPLAY_MODEL_3

AP_3270_DISPLAY_MODEL_4

AP_3270_DISPLAY_MODEL_5

AP_PRINTER

AP_SSCP_PRINTER

AP_RJE_WKSTN

AP_UNKNOWN (LU type will be determined when the session to the host is established)

If you are not using the LUs for 3270 emulation, it is not necessary to specify an explicit LU type; set this parameter to AP_UNKNOWN.

Depending on the value you specify, CS Linux sends one of the following strings to the host in the DDDLU NMVT, to match the values used in the standard VTAM tables:

3270002 for AP_3270_DISPLAY_MODEL_2
3270003 for AP_3270_DISPLAY_MODEL_3
3270004 for AP_3270_DISPLAY_MODEL_4
3270005 for AP_3270_DISPLAY_MODEL_5
3270DSC for AP_PRINTER
3270SCS for AP_SCS_PRINTER
3270000 for AP_RJE_WKSTN
327000*n* for AP_UNKNOWN with a TN3270 client, where *n* is the model number (2–5) provided by the client
327000@ for AP_UNKNOWN with an LUA client

If the host system supports Dynamic Definition of Dependent LUs (DDDLUs), CS Linux will define the LU dynamically on the host when the communications link to the host is established. For a TN3270 client, set this parameter to AP_UNKNOWN. CS Linux then determines the LU model using a standard mapping from the terminal type (device type) specified by the client; if you need to change this mapping, you can do this using the **tn3270dev.dat** file as described in *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

If the host does not support DDDLU, or if this parameter is set to AP_UNKNOWN, the LUs must be included in the host configuration.

sscp_id Specifies the ID of the SSCP permitted to activate this LU. Specify a value in the range 0–65,535. If this parameter is set to 0 (zero), the LU can be activated by any SSCP.

timeout

Timeout for the LU specified in seconds. If the timeout is set to a nonzero value and the user of the LU supports session inactivity timeouts, then the LU is deactivated after the PLU-SLU session is left inactive for the specified period and one of the following conditions exist:

- The session passes over a limited resource link.
- Another application requests to use the LU before the session is used again.

If the timeout is set to 0 (zero), the LU is not deactivated.

Support for session inactivity timeouts depends on the application that is using the LU (such as a 3270 emulation program). If the LU is being used

by SNA gateway, session inactivity timeouts are supported only if *allow_timeout* is specified on the DEFINE_DOWNSTREAM_LU verb.

name_attributes
Attributes of the LUs to be defined. Possible values are:

AP_NONE
LU names have numbers corresponding to the NAU numbers. The numbers are specified in decimal and the *base_name* parameter can only be 5 characters.

AP_USE_BASE_NUMBER
Start naming the LUs in the range from the value specified in the *base_number* parameter.

AP_USE_HEX_IN_NAME | AP_USE_BASE_NUMBER
Start naming the LUs in the range from the value specified in the *base_number* parameter, and add the extension to the LU name in hex rather than decimal. The *base_name* parameter can contain 6 characters if this value is specified.

base_number
If AP_USE_BASE_NUMBER is specified in the *name_attributes* parameter, specify a number from which to start naming the LUs in the range. This value will be used instead of the value of the *min_nau* parameter.

term_method
This parameter specifies how CS Linux should attempt to end a PLU-SLU session to a host from one of these LUs. Possible values are:

AP_USE_NODE_DEFAULT
Use the node's default termination method, specified by the *send_term_self* parameter on DEFINE_NODE.

AP_SEND_UNBIND
End the session by sending an UNBIND.

AP_SEND_TERM_SELF
End the session by sending a TERM_SELF.

disconnect_on_unbind
This parameter applies only when an LU in this range is being used by a TN3270 client. It specifies whether to end the session when the host sends an UNBIND instead of displaying the VTAM MSG10 or returning to a host session manager. Possible values are:

AP_YES End the session if the host sends an UNBIND that is not type 2 (BIND forthcoming).

AP_NO Do not end the session if the host sends an UNBIND.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
The *base_name* parameter contained a character that was not valid.

AP_INVALID_POOL_NAME
The *pool_name* parameter contained a character that was not valid.

AP_INVALID_NAU_ADDRESS
One or more of the LU addresses were not in the permitted range.

AP_INVALID_PRIORITY
The *priority* parameter was not set to a valid value.

AP_INVALID_TERM_METHOD
The *term_method* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_INVALID_PU_NAME
The *pu_name* parameter was not valid.

AP_PU_NOT_DEFINED
The *pu_name* parameter did not match any defined PU name.

AP_INVALID_PU_TYPE
The PU specified by the *pu_name* parameter is not a host PU.

AP_LU_NAME_POOL_NAME_CLASH
One of the LU names in the range clashes with the name of an LU pool.

AP_LU_ALREADY_DEFINED
An LU has already been defined with the name of one of the LUs in the range.

AP_LU_NAU_ADDR_ALREADY_DEFD
An LU has already been defined with the address of one of the LUs in the range.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_LU_LU_PASSWORD

DEFINE_LU_LU_PASSWORD provides a password which is used for session-level security verification between a local LU and a partner LU.

VCB Structure

```
typedef struct define_lu_lu_password
{
   AP_UINT16        opcode;                  /* verb operation code        */
   unsigned char    reserv2;                 /* reserved                   */
   unsigned char    format;                  /* reserved                   */
   AP_UINT16        primary_rc;              /* primary return code        */
   AP_UINT32        secondary_rc;            /* secondary return code      */
   unsigned char    lu_name[8];              /* local LU name              */
   unsigned char    lu_alias[8];             /* local LU alias             */
   unsigned char    fqplu_name[17];          /* fully qualified partner    */
                                             /*  LU name                   */
   unsigned char    verification_protocol;   /* verification protocol      */
   unsigned char    description[32];         /* resource description       */
   unsigned char    reserv1[16];             /* reserved                   */
   unsigned char    reserv3[8];              /* reserved                   */
   unsigned char    password[8];             /* password                   */
} DEFINE_LU_LU_PASSWORD;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_LU_LU_PASSWORD

lu_name

LU name of the local LU, as defined to CS Linux. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 bytes. To indicate that the LU is defined by its LU alias instead of its LU name, set this parameter to 8 binary zeros.

lu_alias

LU alias of the local LU, as defined to CS Linux. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes. It is used only if *lu_name* is set to zeros.

To indicate the LU associated with the CP (the default LU), set both *lu_name* and *lu_alias* to 8 binary zeros.

fqplu_name

Fully qualified LU name for the partner LU, as defined to CS Linux. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

verification_protocol

Requested LU-LU verification protocol to use. Possible values are:

AP_BASIC

Use basic LU-LU verification protocols.

AP_ENHANCED

Use enhanced LU-LU verification protocols.

AP_EITHER

Basic or enhanced verification is accepted.

description
A null-terminated text string (0–31 characters followed by a null character) describing the password. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_LU_LU_PASSWORD verb, but CS Linux does not make any other use of it.

password
Password. This is an 8-byte hexadecimal string, which must not be set to all blanks or all zeros. It must match the equivalent parameter configured for the partner LU on the remote system (except that the least significant bit of each byte is not used in session-level security verification and does not need to match).

Whatever value the application supplies for this parameter is immediately replaced by the encrypted version of the password. Therefore, the value supplied for the *password* parameter is never written out.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_ALIAS
The *lu_alias* parameter did not match any defined LU alias.

AP_INVALID_LU_NAME
The *lu_name* parameter did not match any defined local LU name.

AP_INVALID_PLU_NAME
The *fqplu_name* parameter did not match any defined partner LU name.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_LU_POOL

This verb is used to define an LU pool and assign LUs to it, or to assign additional LUs to an existing pool. The LUs must be defined before adding them to the pool. You can also define a pool by specifying the pool name when defining an LU; for more information, see "DEFINE_LU_0_TO_3" on page 146.

This verb cannot be used to modify an existing pool by removing LUs from it; the DELETE_LU_POOL verb is used to do this.

VCB Structure

```
typedef struct define_lu_pool
{
     AP_UINT16         opcode;              /* verb operation code          */
     unsigned char     reserv2;             /* reserved                     */
     unsigned char     format;              /* reserved                     */
     AP_UINT16         primary_rc;          /* primary return code          */
     AP_UINT32         secondary_rc;        /* secondary return code        */
     unsigned char     pool_name[8];        /* LU pool name                 */
     unsigned char     description[32];     /* resource description         */
     unsigned char     reserv1[16];         /* reserved                     */
     unsigned char     reserv3[4];          /* reserved                     */
     AP_UINT16         num_lus;             /* number of LUs to add         */
     unsigned char     lu_names[10][8];     /* LU names                     */
} DEFINE_LU_POOL;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_LU_POOL

pool_name

Name of the LU pool. This is an 8-byte type-A EBCDIC string, padded on the right with EBCDIC spaces if the name is shorter than 8 bytes. If a pool of this name is not already defined, CS Linux creates it.

description

A null-terminated text string (0–31 characters followed by a null character) describing the pool. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_LU_POOL verb, but CS Linux does not make any other use of it.

num_lus

Number of LUs to be added to the pool. This can be zero to define the pool without adding any LUs, or 1–10. To create a pool containing more than 10 LUs, issue multiple DEFINE_LU_POOL verbs for the same pool name.

lu_names

Names of the LUs that are being assigned to the pool. Each of these LUs must already be defined to CS Linux as an LU of type 0–3. Each LU name is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

If a specified LU is currently assigned to a different pool, CS Linux removes it from that pool (because an LU cannot be in more than one pool) and assigns it to the pool specified by this verb.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc

AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
One or more of the supplied LU names did not match any defined LU name.

AP_INVALID_POOL_NAME
The *pool_name* parameter contained a character that was not valid.

AP_INVALID_NUM_LUS
The *num_lus* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_LU_NAME_POOL_NAME_CLASH
The specified pool name clashes with the name of an LU.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_MODE

The DEFINE_MODE verb defines a mode (a set of networking characteristics to be used by a group of sessions) or modifies a previously defined mode. You cannot modify the SNA-defined mode CPSVCMG or change the COS name used by the SNA-defined mode SNASVCMG.

If you use this verb to modify an existing mode, the changes will apply to any new combination of local LU and partner LU that start to use the mode after you have made the change. However, any combination of LUs already using the mode will not pick up the changes until after the next locally or remotely initiated CNOS command.

This verb can also be used to specify the default COS to which any unrecognized modes will be mapped. If no default COS is specified, the SNA-defined COS #CONNECT is used.

VCB Structure

```
typedef struct define_mode
{
  AP_UINT16       opcode;                /* verb operation code            */
  unsigned char   reserv2;               /* reserved                       */
  unsigned char   format;                /* reserved                       */
  AP_UINT16       primary_rc;            /* primary return code            */
  AP_UINT32       secondary_rc;          /* secondary return code          */
  unsigned char   mode_name[8];          /* mode name                      */
  AP_UINT16       reserv3;               /* reserved                       */
  MODE_CHARS      mode_chars;            /* mode characteristics           */
} DEFINE_MODE;

typedef struct mode_chars
{
  unsigned char   description[32];        /* resource description          */
  unsigned char   reserv2[16];            /* reserved                      */
  AP_UINT16       max_ru_size_upp;        /* maximum RU size upper bound   */
  unsigned char   receive_pacing_win;     /* receive pacing window         */
  unsigned char   default_ru_size;        /* default RU size to maximize   */
                                          /*  performance                  */
  AP_UINT16       max_neg_sess_lim;       /* maximum negotiable session limit*/
  AP_UINT16       plu_mode_session_limit; /* LU-mode session limit         */
  AP_UINT16       min_conwin_src;         /* minimum source contention winner*/
                                          /*  sessions                     */
  unsigned char   cos_name[8];            /* class of service name         */
  unsigned char   cryptography;           /* reserved                      */
  unsigned char   compression;            /* data compression supported?   */
  AP_UINT16       auto_act;               /* initial auto-activation count */
  AP_UINT16       min_conloser_src;       /* min source contention loser   */
  AP_UINT16       max_ru_size_low;        /* maximum RU size lower bound   */
  AP_UINT16       max_receive_pacing_win; /* maximum receive pacing window */
  unsigned char   max_compress_lvl;       /* max level of data compression */
  unsigned char   max_decompress_lvl;     /* max level of data decompression */
  unsigned char   comp_in_series;         /* reserved                      */
  unsigned char   reserv4[25];            /* reserved                      */
} MODE_CHARS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_MODE

mode_name

Name of the mode. This is an 8-byte type-A EBCDIC string, padded on the right with EBCDIC spaces if the name is shorter than 8 bytes. The name must start with a letter, or can start with # for one of the SNA-defined modes such as #INTER. For information about SNA-defined modes, see the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

To specify the default COS that will be used for any unrecognized mode names, set this parameter to 8 binary zeros. In this case, the *mode_chars.cos_name* parameter is taken as the default COS name; all other parameters supplied on this verb are ignored.

mode_chars.description

A null-terminated text string (0–31 characters followed by a null character) describing the mode. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_MODE_DEFINITION and QUERY_MODE verbs, but CS Linux does not make any other use of it.

mode_chars.max_ru_size_upp
Upper bound for the maximum size of RUs sent and received on sessions in this mode. The value is used when the maximum RU size is negotiated during session activation.

Range: 256–61,440. If the *default_ru_size* parameter (see below) is set to AP_YES, this parameter is ignored (and the value is not checked).

mode_chars.receive_pacing_win
Session pacing window for sessions using this mode; the range is 1–63. This value is used only for fixed pacing (not for adaptive pacing), and specifies the maximum number of frames that can be received from the partner LU before the local LU must send a response. CS Linux always uses adaptive pacing unless the adjacent node specifies that it is not supported.

mode_chars.default_ru_size
Specifies whether a default upper bound for the maximum RU size will be used. Possible values are:

AP_YES CS Linux ignores the *max_ru_size_upp* parameter, and sets the upper bound for the maximum RU size to the largest value that can be accommodated in the link BTU size.

AP_NO CS Linux uses the *max_ru_size_upp* parameter to define the maximum RU size.

mode_chars.max_neg_sess_lim
Maximum number of sessions allowed on this mode between any local LU and partner LU. This value may be lowered for a particular LU-LU-mode combination when issuing *initialize_session_limit* or *change_session_limit*.

Range: 1–32,767. Zero indicates that CS Linux should not initiate implicit CNOS exchange when an application attempts to start a session using this mode; session limits must be specified explicitly using *initialize_session_limit*.

If the mode will be used by full-duplex APPC conversations, note that each full-duplex conversation requires two sessions.

mode_chars.plu_mode_session_limit
Default session limit for this mode. This limits the number of sessions on this mode between any one local LU and partner LU pair. This value is used when CNOS (Change Number of Sessions) exchange is initiated implicitly.

Specify a value in the range 1–32,767 (which must not exceed the value in *max_neg_sess_lim*). Zero indicates that CS Linux should not initiate implicit CNOS exchange when an application attempts to start a session using this mode; session limits must be specified explicitly using *initialize_session_limit*.

If you specify an explicit limit, the LU session limit for any LU that uses this mode must be greater than or equal to the sum of the session limits for all modes that the LU will use.

If the mode will be used by full-duplex APPC conversations, note that each full-duplex conversation requires two sessions.

mode_chars.min_conwin_src
Minimum number of contention winner sessions that a local LU using this mode can activate. This value is used when CNOS (Change Number of

Sessions) exchange is initiated either by the remote system or implicitly by CS Linux. Specify a value in the range 0–32,767. The sum of the *min_conwin_src* and *min_conloser_src* parameters must not exceed *plu_mode_session_limit*.

mode_chars.cos_name
Name of the class of service to request when activating sessions on this mode.

If the node supports mode to COS mapping (as defined by the *mode_to_cos_map_supp* parameter on DEFINE_NODE), the COS specified by this field must be either an SNA defined COS or a COS previously defined by issuing a DEFINE_COS verb. Otherwise, this parameter is ignored.

The name is an 8-byte type-A character string, padded on the right with spaces if the name is shorter than 8 characters.

mode_chars.compression
Specifies whether sessions activated using this mode can use compression. Possible values are:

AP_COMP_PROHIBITED
Compression is not supported for sessions using this mode.

AP_COMP_REQUESTED
Compression is supported and requested for sessions using this mode. (It is not mandatory; compression will not be used if the BIND from the partner does not request it.)

mode_chars.auto_act
Number of sessions that will be activated automatically for this mode. This value is used when CNOS (Change Number of Sessions) exchange is initiated implicitly. Specify a value in the range 0–32,767.

mode_chars.min_conloser_src
Minimum number of contention loser sessions that can be activated by any one local LU that uses this mode. This value is used when CNOS (Change Number of Sessions) exchange is initiated implicitly. Specify a value in the range 0–32,767. The sum of the *min_conwin_src* and *min_conloser_src* parameters must not exceed *plu_mode_session_limit*.

mode_chars.max_ru_size_low
Lower bound for the maximum size of RUs sent and received on sessions that use this mode. Specify a value in the range 256–61,440. The value 0 means that there is no lower bound.

The value is used when the maximum RU size is negotiated during session activation. This parameter is ignored if the *default_ru_size* parameter is set to AP_YES.

mode_chars.max_receive_pacing_win
Maximum session pacing window for sessions in this mode. For adaptive pacing, this value is used to limit the receive pacing window that the session will grant. For fixed pacing, this parameter is not used. (CS Linux always uses adaptive pacing unless the adjacent node specifies that it does not support it.)

Specify a value in the range 0–32,767. The value zero means that there is no upper bound.

mode_chars.max_compress_lvl
Specifies the maximum level of compression that CS Linux will attempt to negotiate for data flowing from the local node. Possible values are:

- AP_NONE
- AP_RLE_COMPRESSION
- AP_LZ9_COMPRESSION
- AP_LZ10_COMPRESSION

If compression is negotiated using a non-extended BIND, which does not specify a maximum compression level, RLE compression will be used.

mode_chars.max_decompress_lvl
Specifies the maximum level of decompression that CS Linux will attempt to negotiate for data flowing into the local node. Possible values are:

- AP_NONE
- AP_RLE_COMPRESSION
- AP_LZ9_COMPRESSION
- AP_LZ10_COMPRESSION

If compression is negotiated using a non-extended BIND, which does not specify a maximum compression level, RLE compression will be used.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_CPSVCMG_ALREADY_DEFD
The SNA-defined mode CPSVCMG cannot be changed.

AP_INVALID_CNOS_SLIM
The *plu_mode_session_limit* parameter is not valid.

AP_INVALID_COMPRESSION
The *compression* parameter is not valid.

AP_INVALID_COS_NAME
The *cos_name* parameter did not match any defined COS name.

AP_INVALID_COS_SNASVCMG_MODE
The COS for the SNA-defined mode SNASVCMG cannot be changed.

AP_INVALID_DEFAULT_RU_SIZE
The *default_ru_size* parameter was not in the valid range.

AP_INVALID_MAX_COMPRESS_LVL
The *max_compress_lvl* parameter is not valid.

AP_INVALID_MAX_DECOMPRESS_LVL
The *max_decompress_lvl* parameter is not valid.

AP_INVALID_MAX_NEGOT_SESS_LIM
The *max_neg_sess_lim* parameter was not in the valid range.

AP_INVALID_MAX_RU_SIZE_UPPER
The *max_ru_size_upp* parameter was not in the valid range.

AP_INVALID_MIN_CONLOSERS
The *min_conloser_src* parameter was not in the valid range, or was greater than *plu_mode_session_limit*.

AP_INVALID_MIN_CONWINNERS
The *min_conwin_src* parameter was not in the valid range, or was greater than *plu_mode_session_limit*.

AP_INVALID_MIN_CONTENTION_SUM
The sum of the *min_conwin_src* and *min_conloser_src* parameters was greater than *plu_mode_session_limit*.

AP_INVALID_MODE_NAME
The *mode_name* parameter contained a character that was not valid.

AP_INVALID_RECV_PACING_WINDOW
The *receive_pacing_win* parameter was not in the valid range.

AP_INVALID_SNASVCMG_MODE_LIMIT
The SNA-defined mode SNASVCMG must have a session limit of 2 and *min_conwin_src* of 1. You cannot define SNASVCMG with different values for these parameters.

AP_MODE_SESS_LIM_EXCEEDS_NEG
The value specified for *plu_mode_session_limit* was larger than the value specified for *max_neg_sess_lim*.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_NODE

An application issues this verb in order to define a new node, or to modify the parameters of an inactive node.

This verb must be issued to a server where the node is not running. It cannot be issued to a running node.

VCB Structure

```
typedef struct define_node
{
  AP_UINT16         opcode;           /* verb operation code              */
  unsigned char     reserv2;          /* reserved                         */
  unsigned char     format;           /* reserved                         */
  AP_UINT16         primary_rc;       /* primary return code              */
  AP_UINT32         secondary_rc;     /* secondary return code            */
```

```
  unsigned char     node_name[128];     /* name of Node                      */
  AP_UINT32         target_handle;      /* handle for subsequent verbs       */
  CP_CREATE_PARMS   cp_create_parms;    /* CP create parameters              */
} DEFINE_NODE;

typedef struct cp_create_parms
{
  AP_UINT16       crt_parms_len;        /* length of CP_CREATE_PARMS         */
  unsigned char   description[32];      /* resource description              */
  unsigned char   reserv1[2];           /* reserved                          */
  unsigned char   ms_support;           /* reserved                          */
  unsigned char   queue_nmvts;          /* reserved                          */
  unsigned char   reserv3[12];          /* reserved                          */
  unsigned char   node_type;            /* node type                         */
  unsigned char   fqcp_name[17];        /* fully qualified CP name           */
  unsigned char   cp_alias[8];          /* CP alias                          */
  unsigned char   mode_to_cos_map_supp; /* mode to COS mapping support       */
  unsigned char   mds_supported;        /* MDS and MS capabilities           */
  unsigned char   node_id[4];           /* node ID                           */
  AP_UINT16       max_locates;          /* maximum locates node can process  */
  AP_UINT16       dir_cache_size;       /* directory cache size (reserved    */
                                        /*  is not NN)                       */
  AP_UINT16       max_dir_entries;      /* maximum directory entries (zero   */
                                        /*  means unlimited)                 */
  AP_UINT16       locate_timeout;       /* locate timeout in seconds         */
  unsigned char   reg_with_nn;          /* register resources with NNS       */
  unsigned char   reg_with_cds;         /* register resources with CDS       */
  AP_UINT16       mds_send_alert_q_size;/* size of MDS send alert queue      */
  AP_UINT16       cos_cache_size;       /* number of cos definitions         */
  AP_UINT16       tree_cache_size;      /* Topology Database routing tree    */
                                        /*  cache size                       */
  AP_UINT16       tree_cache_use_limit; /* number of times a tree can be used*/
  AP_UINT16       max_tdm_nodes;        /* max number of nodes that can be   */
                                        /*  stored in Topology Database      */
  AP_UINT16       max_tdm_tgs;          /* max number of TGs that can be     */
                                        /*  stored in Topology Database      */
  AP_UINT32       max_isr_sessions;     /* maximum ISR sessions              */
  AP_UINT32       isr_sessions_upper_threshold;  /* upper threshold for ISR  */
                                                 /*  sessions                */
  AP_UINT32       isr_sessions_lower_threshold;  /* lower threshold for ISR  */
                                                 /*  sessions                */
  AP_UINT16       isr_max_ru_size;      /* max RU size for ISR               */
  AP_UINT16       isr_rcv_pac_window;   /* ISR receive pacing window size    */
  unsigned char   store_endpt_rscvs;    /* endpoint RSCV storage             */
  unsigned char   store_isr_rscvs;      /* ISR RSCV storage                  */
  unsigned char   store_dlur_rscvs;     /* DLUR RSCV storage                 */
  unsigned char   dlur_support;         /* is DLUR supported?                */
  unsigned char   pu_conc_support;      /* is PU conc supported?             */
  unsigned char   nn_rar;               /* Route additional resistance       */
  unsigned char   hpr_support;          /* Level of hpr support              */
  unsigned char   mobile;                  /* reserved                       */
  unsigned char   discovery_support;       /* reserved                       */
  unsigned char   discovery_group_name[8]; /* reserved                       */
  unsigned char   implicit_lu_0_to_3;      /* reserved                       */
  unsigned char   default_preference;      /* reserved                       */
  unsigned char   anynet_supported;        /* reserved                       */
  AP_UINT16       max_ls_exception_events; /* Max # exception entries        */
  unsigned char   comp_in_series;          /* reserved                       */
  unsigned char   max_compress_lvl;        /* reserved                       */
  unsigned char   node_spec_data_len;      /* reserved                       */
  unsigned char   ptf[64];                 /* program temporary fix array    */
  unsigned char   cos_table_version;       /* version of COS tables to use   */
  unsigned char   send_term_self;          /* default PLU-SLU session term   */
  unsigned char   disable_branch_awareness; /* disable BrNN awareness        */
  unsigned char   cplu_syncpt_support;     /* syncpoint support on CP LU?    */
  unsigned char   cplu_attributes;         /* attributes for CP LU           */
  unsigned char   reserved[95];            /* reserved                       */
} CP_CREATE_PARMS;
```

Supplied Parameters

opcode AP_DEFINE_NODE

node_name
Name of CS Linux node that the application wishes to define.

If the node name includes a . (period) character, CS Linux assumes that it is a fully-qualified name; otherwise it performs a DNS lookup to determine the node name.

cp_create_parms.crt_parms_len
Length of create parameters structure.

cp_create_parms.description
A text string (0–31 characters followed by a null character) describing the node. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_NODE verb, but CS Linux does not make any other use of it.

cp_create_parms.node_type
One of the following node types:

AP_NETWORK_NODE

AP_BRANCH_NETWORK_NODE

AP_END_NODE

AP_LEN_NODE

cp_create_parms.fqcp_name
Node's fully qualified CP name. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

cp_create_parms.cp_alias
Locally used CP alias. This alias can be used by APPC applications to access the CP LU. This is an 8-byte ASCII string. All 8 bytes are significant and must be set.

cp_create_parms.mode_to_cos_map_supp
Specifies whether the node provides mode-to-COS mapping. This parameter is ignored for a network node; mode-to-COS mapping is always supported. For a LEN node, mode-to-COS mapping is not supported. Possible values are:

AP_YES Mode-to-COS mapping is supported. A mode defined for this node must include an associated COS name, which specifies either an SNA-defined COS or one defined using DEFINE_COS.

AP_NO Mode-to-COS mapping is not supported. Default COS names will be used.

cp_create_parms.mds_supported
Specifies whether Management Services supports Multiple Domain Support and MS Capabilities. Possible values are:

AP_YES MDS is supported.

AP_NO MDS is not supported.

cp_create_parms.node_id
Node identifier used in XID exchange. This is a 4-byte hexadecimal string, consisting of a block number (3 hexadecimal digits) and a node number (5 hexadecimal digits).

cp_create_parms.max_locates
Maximum number of locate requests that the node can process simultaneously. When the number of outstanding locate requests (requests for which a response has not yet been received) reaches this limit, any further locate requests are rejected. The minimum is 8.

cp_create_parms.dir_cache_size
Network node only: Size of the directory cache. The minimum value is 3. You can use the information returned on QUERY_DIRECTORY_STATS to help determine the appropriate size.

cp_create_parms.max_dir_entries
Maximum number of directory entries. Specify zero for no limit.

cp_create_parms.locate_timeout
Specifies the time in seconds before a network search will timeout. Specify zero for no timeout.

cp_create_parms.reg_with_nn
Specifies whether to register the node's resources with the network node server when the node is started. Note that the valid values for this parameter are different depending on whether the node is an End Node or a Branch Network Node.If the local node is a Network Node or a LEN Node, this parameter is reserved.

Possible values for End Node:

AP_YES Register resources with the NN. The end node's network node server will only forward directed locates to it.

AP_NO Do not register resources. The network node server will forward all broadcast searches to the end node.

Possible values for Branch Network Node:

AP_REGISTER_NONE
The local node does not register any LUs with the NN Server. The NN Server will forward all broadcast searches to the branch network node.

AP_REGISTER_ALL
The local node registers all domain independent LUs with the NN Server; it also registers all local dependent LUs if the NN Server supports option set 1116. The NN Server will only forward directed locates to it (unless it owns dependent LUs that could not be registered).

AP_REGISTER_LOCAL_ONLY
The local node registers all local independent LUs with the NN Server; it also registers all local dependent LUs if the NN Server supports option set 1116. The NN Server will forward all broadcast searches to the branch network node.

cp_create_parms.reg_with_cds
End node: Specifies whether the network node server is allowed to register end node resources with a Central Directory server. This field is ignored if *reg_with_nn* is set to AP_NO.

Network node: Specifies whether local or domain resources can be optionally registered with Central Directory server.

Possible values are:

AP_YES Register resources with the CDS.

AP_NO Do not register resources.

Branch network node: Specifies whether BrNN resources (local to the Branch Network Node or from its domain) can be registered with Central Directory Server by the Network Server. This field is ignored if *reg_with_nn* is set to AP_REGISTER_NONE.

Possible values are:

AP_YES Register resources with the CDS.

AP_NO Do not register resources.

cp_create_parms.mds_send_alert_q_size
Size of the MDS send alert queue. If the number of queued alerts reaches this limit, CS Linux deletes the oldest alert on the queue. CS Linux uses the value 2 unless you specify a larger number.

cp_create_parms.cos_cache_size
Size of the COS Database weights cache. This value should be set to the maximum number of COS definitions required. CS Linux uses the value 8 unless you specify a larger number.

cp_create_parms.tree_cache_size
Network node: Size of the Topology Database routing tree cache size. The minimum is 8. For an end node or LEN node, this parameter is reserved.

cp_create_parms.tree_cache_use_limit
Network node: Maximum number of uses of a cached tree. Once this number is exceeded, the tree is discarded and recomputed. This allows the node to balance sessions among equal weight routes. A low value provides better load balancing at the expense of increased activation latency. The minimum is 1. For an end node or LEN node, this parameter is reserved.

cp_create_parms.max_tdm_nodes
Network node: Maximum number of nodes that can be stored in Topology Database (zero means unlimited). For an end node or LEN node, this parameter is reserved.

cp_create_parms.max_tdm_tgs
Network node: Maximum number of TGs that can be stored in Topology Database (zero means unlimited). For an end node or LEN node, this parameter is reserved.

cp_create_parms.max_isr_sessions
Network node: Maximum number of ISR sessions the node can participate in at once. CS Linux uses the value 100 unless you specify a larger number. For an end node or LEN node, this parameter is reserved.

cp_create_parms.isr_sessions_upper_threshold,
cp_create_parms.isr_sessions_lower_threshold
Network node: These thresholds control the node's congestion status, which is reported to other nodes in the network for use in route calculations. The node state changes from uncongested to congested if the number of ISR sessions exceeds the upper threshold. The node state changes back to uncongested once the number of ISR sessions dips below

the lower threshold. The lower threshold must be less than the upper threshold, and the upper threshold must be lower than *max_isr_sessions*. For an end node or LEN node, this parameter is reserved.

cp_create_parms.isr_max_ru_size
Network node or BrNN: Maximum RU size supported for intermediate or DLUR LU-LU sessions. If the supplied value is not a valid RU size (as described in *Systems Network Architecture: Formats*), CS Linux will round the value up to the next valid value.

End node: Maximum RU size supported for DLUR LU-LU sessions.

For a LEN node, this parameter is reserved.

cp_create_parms.isr_rcv_pac_window
Network node: Suggested receive pacing window size for intermediate sessions, in the range 1–63. This value is only used on the secondary hop of intermediate sessions if the adjacent node does not support adaptive pacing. For an end node or LEN node, this parameter is reserved.

cp_create_parms.store_endpt_rscvs
Specifies whether RSCVs should be stored for diagnostic purposes (AP_YES or AP_NO). If this field is set to AP_YES, then an RSCV will be returned on the QUERY_SESSION verb. (Setting this value to AP_YES means an RSCV will be stored for each endpoint session. This extra storage can be up to 256 bytes per session.)

cp_create_parms.store_isr_rscvs
Network node: Specifies whether RSCVs should be stored for diagnostic purposes (AP_YES or AP_NO). If this field is set to AP_YES, then an RSCV will be returned on the QUERY_ISR_SESSION verb. (Setting this value to AP_YES means an RSCV will be stored for each ISR session. This extra storage can be up to 256 bytes per session.) For an end node or LEN node, this parameter is reserved.

cp_create_parms.store_dlur_rscvs
Specifies whether RSCVs should be stored for diagnostic purposes (AP_YES or AP_NO). If this field is set to AP_YES, then an RSCV will be returned on the QUERY_DLUR_LU verb. (Setting this value to AP_YES means an RSCV will be stored for each PLU-SLU session using DLUR. This extra storage can be up to 256 bytes per session.)

cp_create_parms.dlur_support
Specifies whether DLUR is supported. For a LEN node, this parameter is reserved. Possible values are:

AP_YES DLUR is supported.

AP_LIMITED_DLUR_MULTI_SUBNET | AP_YES
End Node or Branch Network Node: DLUR is supported, but will not be used to connect to a DLUS in another subnet. If multi-subnet operation is not required, you should use this value instead of AP_YES, to reduce network traffic and congestion at the network node.

This value is not supported for a Network Node.

AP_NO DLUR is not supported.

cp_create_parms.pu_conc_support
Specifies whether SNA gateway is supported (AP_YES or AP_NO).

If the node will be used to run Primary RUI applications communicating with downstream LUs, this parameter must be set to AP_YES.

cp_create_parms.nn_rar
The network node's route additional resistance, in the range 0–255.

cp_create_parms.hpr_support
Specifies the level of HPR (High Performance Routing) support provided by the node. Possible values are:

AP_NONE
No support for HPR.

AP_BASE
This node can perform automatic network routing (ANR) but cannot act as an RTP (Rapid Transport Protocol) end point for HPR sessions.

AP_RTP This node can perform automatic network routing (ANR) and can act as an RTP (Rapid Transport Protocol) end point for HPR sessions.

AP_CONTROL_FLOWS
This node can perform all HPR functions including control flows.

If the local node is a LEN node, this parameter should be set to AP_NONE. Otherwise the recommended setting is AP_CONTROL_FLOWS.

If you are using Enterprise Extender (HPR/IP) or MPC+ links on this node, this parameter must be set to AP_CONTROL_FLOWS.

cp_create_parms.max_ls_exception_events
The maximum number of LS exception events to be recorded by the node.

cp_create_parms.ptf
Array for configuring and controlling future program temporary fix (ptf) operation, as follows:

cp_create_parms.ptf[0]
REQDISCONT support and Mandatory Search Status support.

CS Linux normally uses REQDISCONT to deactivate limited resource host links that are no longer required by session traffic. This byte can be used to suppress use of REQDISCONT, or to modify the settings used on REQDISCONT requests sent by CS Linux. Set this byte to one of the following values:

AP_NONE
Use the normal REQDISCONT support.

AP_SUPPRESS_REQDISCONT
Do not use REQDISCONT.

AP_OVERRIDE_REQDISCONT
Use a modified version of REQDISCONT support. If REQDISCONT is specified, it must be combined with one or both of the following values, using a logical OR operation:

AP_REQDISCONT_TYPE
Use type “immediate” on REQDISCONT; if this value is not specified, CS Linux uses type “normal”.

AP_REQDISCONT_RECONTACT
Use type "immediate recontact" on REQDISCONT; if this value is not specified, CS Linux uses type "no immediate recontact".

AP_ALLOW_BB_RQE
CS Linux normally rejects, with sense code 2003, any begin bracket (BB) exception (RQE) request from a host unless the host follows the SNA protocol that the request must also indicate change direction (CD). Setting this flag enables CS Linux to continue sessions with hosts that do not follow this protocol.

When CS Linux is running as an End Node or as a Branch Network Node, it may choose whether or not to invite network searches from its Network Node Server (NNS). Requesting network searches slows broadcast search processing for the network as a whole, so is undesirable. However, if the local node cannot register all its resources (LUs) with its NNS, requesting searches is the only way to make these resources visible to the network.

Normally, CS Linux determines whether all LUs can be registered, then intelligently requests network searches from its NNS. If this node makes LUs accessible to the network in an unusual manner (for example, if it is acting as a gateway for other nodes), combine the value above with the following value to override the standard operation:

AP_SET_SEARCH_STATUS
Unconditionally request network searches from the NNS.

cp_create_parms.ptf[1]
ERP support. CS Linux normally processes an ACTPU(ERP) as an ERP; this resets the PU-SSCP session, but does not implicitly deactivate the subservient LU-SSCP and PLU-SLU sessions. SNA implementations may legally process ACTPU(ERP) as if it were ACTPU(cold), implicitly deactivating the subservient LU-SSCP and PLU-SLU sessions. Set this byte to one of the following values:

AP_NONE
Use the normal processing.

AP_OVERRIDE_ERP
Process all ACTPU requests as ACTPU(cold).

cp_create_parms.ptf[2]
LU 6.2 session activation and deactivation. CS Linux normally does not include the ENQUEUE parameter on the INIT_SELF message when activating a dependent LU 6.2 session, and uses the BIS protocol prior to deactivating a limited resource LU 6.2 session.

To use the normal processing, set this parameter to `AP_NONE`.

To customize LU 6.2 session activation and deactivation, specify one of the following values:

AP_SUPPRESS_BIS
Do not use the BIS protocol. Limited resource LU 6.2 sessions are deactivated immediately using UNBIND(cleanup).

AP_LU62_INIT_SELF_ENQUEUE
Use the old format of the INIT_SELF message, which includes the ENQUEUE parameter.

cp_create_parms.ptf[3]
APINGD support. CS Linux normally includes a partner program for the APING connectivity tester. This byte allows you to disable the APING Daemon within the node, so that requests by an APING program arriving at the node will not be processed automatically. Set this byte to one of the following values:

AP_NONE
Include APINGD support within the node (the normal processing).

AP_EXTERNAL_APINGD
Disable APINGD within the node.

cp_create_parms.ptf[4]
LU 0–3 RU checks. This byte is used to provide workarounds for host systems that send non-standard SNA data; it should be set to AP_NONE unless you have encountered the specific problem described below.

To use CS Linux's normal checking on LU 0–3 RUs, set this parameter to AP_NONE.

To relax specific checks on LU 0–3 RUs, specify the following value:

AP_ALLOW_BB_RQE
The SNA protocols state that BB !EB RUs on LU 0–3 PLU-SLU sessions must be RQD. Several hosts send RQE BB !EB CD - a protocol violation which CS Linux always tolerates. If this value is set, CS Linux will tolerate RQE BB !EB !CD EC RUs as well.

cp_create_parms.ptf[5]
Security checking for received Attaches.

If a local invokable TP is defined not to require conversation security, or is not defined and therefore defaults to not requiring conversation security, the invoking TP need not send a user ID and password to access it. If the invoking TP supplies these parameters and they are included in the Attach message that CS Linux receives, CS Linux normally checks the parameters (and rejects the Attach if they are not valid) even though the invokable TP does not require conversation security. This parameter allows you to disable the checking. Set this byte to one of the following values:

AP_NONE
Always check security parameters if they are included on a received Attach, regardless of the security requirements of the invokable TP (the normal processing).

AP_LIMIT_TP_SECURITY
Do not check security parameters on a received Attach if the invokable TP does not require it.

cp_create_parms.ptf[6]
RTP options for HPR.

To use normal RTP processing, so that CS Linux will use the best available RTP mechanism according to the capability of the remote system, set this parameter to AP_NONE.

To customize RTP operation, specify one of the following values:

AP_NO_PROGRESSIVE_ARB
If this value is set, CS Linux will advertise support for the standard and responsive mode ARB algorithms but not for the progressive mode algorithm.

cp_create_parms.ptf[7]
DLUR unbind on DACTLU. CS Linux does not normally end the PLU-SLU session when it receives a DACTLU from the host for a session using DLUR. Set this byte to one of the following values:

AP_NONE
Use the normal processing.

AP_DLUR_UNBIND_ON_DACTLU
When DACTLU is received on a session using DLUR, end the PLU-SLU session.

cp_create_parms.ptf[8]
Suppress PU name on REQACTPU. CS Linux identifies the PU name in the REQACTPU message when activating DLUR PUs. Set this byte to one of the following values:

AP_NONE
Use the normal processing.

AP_SUPPRESS_PU_NAME_ON_REQACTPU
Suppress PU name when activating DLUR PUs.

cp_create_parms.ptf[9]
RUI bracket race options, limited resource override options for connection networks, and TCP/IP Information Control Vector options.

If an RUI application is using bracket protocols, and the host sends a BB (Begin Bracket) after the RUI application has already sent one, CS Linux normally rejects this with sense data of 0813 and does not pass it to the application. Set this byte to one of the following values:

AP_NONE
Use the normal processing.

AP_LUA_PASSTHRU_BB_RACE
Pass the BB through to the RUI application. The application should send a negative response with sense data of either 0813 or 0814.

A link in CS Linux that uses a connection network is normally a limited resource. To override this, combine the value above with the following value:

AP_CN_OVERRIDE_LIM_RES
Use the *implicit_limited_resource* parameter in the port associated with each connection network link to determine whether it is a limited resource.

CS Linux normally includes the TCP/IP Information Control Vector (0x64) in a NOTIFY request to the host for a TN3270 or LUA session. This vector contains information that can be displayed on the host console or used by the host (for example in billing): the TCP/IP address and port number used by the client, and the IP name corresponding to the client address. For TN3270, the TN3270 server normally performs a Domain Name Server (DNS) lookup to determine the client IP name.

If the client address is an IPv6 address but the host is running a back-level version of VTAM that cannot interpret IPv6 addresses, the client address may be displayed incorrectly on the host console.

The following flags allow you to override this behavior. To do this, combine the value above with one of the following values:

AP_NO_TCPIP_VECTOR
Do not include the TCP/IP Information Control Vector (0x64) in NOTIFY requests to the host for either TN3270 or LUA.

Use this value if the host is running an older version of VTAM that does not support this control vector.

AP_NO_TCPIP_NAME
Do not perform the DNS lookup, and send the CV64 control vector with the client IP address but no IP name.

This value applies only to TN3270; no DNS lookup is required for LUA clients. Use this value if the DNS environment is slow, or if you know that the clients are not included in the DNS data (for example if they are DHCP clients without DDNS).

cp_create_parms.ptf[10]
Suppress Logical Unit of Work Identifiers (LUWIDs) in FMH-5 Attach messages. CS Linux normally includes the LUWID in the FMH-5 Attach message that it sends to start an APPC conversation. Set this byte to one of the following values:

AP_NONE
Use the normal processing.

AP_DONT_SEND_LUWIDS
Do not include the LUWID in the FMH-5 Attach; specify the field length for this field as zero.

cp_create_parms.ptf[11]
LU management options.

To use normal LU processing, set this parameter to AP_NONE.

To customize LU management, specify one of the following values:

AP_DLUR_USE_REX_PACING
When the BIND from an upstream LU requests adaptive pacing with an unlimited pacing window,CS Linux normally indicates this by specifying a window size of 0 (zero). If the downstream LU does not support adaptive pacing, it may incorrectly interpret this zero value as “no pacing”, so CS Linux must specify a non-zero pacing window size instead. Set this option to use the REX stage pacing value from the ACTLU as the pacing window size specified to the downstream LU.

AP_CLI_OVERWRITE_SYS_NAME
Set this option to maintain the association between an APPC application running on a client and the pooled LU that it uses, so that subsequent conversations started by the partner application can be routed to the correct client. When a client application accesses an LU in a pool, CS Linux changes the *sys_name* parameter on the LU to the hostname of the client computer where the application is running. For more information about managing clients, refer to the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

cp_create_parms.cos_table_version
Specifies the version of the COS tables used by the node. Set this byte to one of the following values:

AP_VERSION_0_COS_TABLES
Use the COS tables originally defined in the APPN Architecture Reference.

AP_VERSION_1_COS_TABLES
Use the COS tables originally defined for HPR over ATM.

cp_create_parms.send_term_self
Specifies the default method for ending a PLU-SLU session to a host. The value you specify is used for all type 0–3 LUs on the node, unless you override it by specifying a different value in the LU definition. Specify one of the following values:

AP_YES Send a TERM_SELF on receipt of a CLOSE_PLU_SLU_SEC_RQ.

AP_NO Send an UNBIND on receipt of a CLOSE_PLU_SLU_SEC_RQ.

cp_create_parms.disable_branch_awareness
This parameter applies only if *node_type* is AP_NETWORK_NODE; it is reserved for other node types.

Specify whether the local node supports branch awareness, APPN Option Set 1120, using one of the following values:

AP_YES The local node does not support branch awareness. TGs between this node and served Branch Network Nodes do not appear in the network topology, and the local node does not report itself as being branch aware.

AP_NO The local node supports branch awareness.

cp_create_parms.cplu_syncpt_support
Specifies whether the node's Control Point LU supports Syncpoint functions. This parameter is equivalent to the *syncpt_support* parameter on DEFINE_LOCAL_LU, but applies only to the node's Control Point LU (which does not have an explicit LU definition).

Set this parameter to AP_YES only if you have a Sync Point Manager (SPM) and Conversation Protected Resource Manager (C-PRM) in addition to the standard CS Linux product. Possible values are:

AP_YES Syncpoint is supported.

AP_NO Syncpoint is not supported.

cp_create_parms.cplu_attributes
Identifies additional information about the node's Control Point LU. This parameter is equivalent to the *lu_attributes* parameter on DEFINE_LOCAL_LU, but applies only to the node's Control Point LU (which does not have an explicit LU definition).

Possible values are:

AP_NONE
No additional information identified.

AP_DISABLE_PWSUB
Disable password substitution support for the control point LU. Password substitution means that passwords are encrypted before transmission between the local and remote LUs, rather than being sent as clear text. CS Linux normally uses password substitution if the remote system supports it.

This value is provided as a work-around for communications with some remote systems that do not implement password substitution correctly. If you use this option, you should be aware that this involves sending and receiving passwords in clear text (which may represent a security risk). Do not set it unless there are problems with the remote system's implementation of password substitution.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

target_handle
Returned value for use on subsequent verbs.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_ISR_THRESHOLDS
The ISR threshold parameters were not valid (lower threshold above upper, or upper threshold above *max_isr_sessions*).

AP_INVALID_NODE_NAME
The *node_name* parameter contained a character that was not valid.

AP_INVALID_CP_NAME
The *cp_alias* or *fqcp_name* parameter contained a character that was not valid.

AP_INVALID_NODE_TYPE
The *node_type* parameter was not set to a valid value.

AP_PU_CONC_NOT_SUPPORTED
This version of CS Linux does not support the SNA gateway feature.

AP_DLUR_NOT_SUPPORTED
This version of CS Linux does not support the DLUR feature.

AP_INVALID_REG_WITH_NN
The *reg_with_nn* parameter was not set to a valid value.

AP_INVALID_COS_TABLE_VERSION
The *cos_table_version* parameter was not set to a valid value.

AP_INVALID_SEND_TERM_SELF
The *send_term_self* parameter was not set to a valid value.

AP_INVALID_DISABLE_BRANCH_AWRN
The *disable_branch_awareness* parameter was not set to a valid value.

AP_INVALID_DLUR_SUPPORT
The *dlur_support* parameter was not set to a valid value.

AP_INVALID_HPR_SUPPORT
The *hpr_support* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_NODE_ALREADY_STARTED
The target node is active, so you cannot use this verb to modify its configuration. DEFINE_NODE can be issued only to an inactive node.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_PARTNER_LU

The DEFINE_PARTNER_LU verb defines the parameters of a partner LU for LU-LU sessions between a local LU and the partner LU, or modifies an existing partner LU. You cannot change the partner LU alias of an existing partner LU.

There is normally no requirement to define partner LUs, because CS Linux will set up an implicit definition when the session to the partner LU is established; you should only need to define the LU if you need to enforce non-default values for logical record size, conversation security support, or parallel session support. You may also have an APPC application that uses a partner LU alias when allocating a session, therefore you need to define a partner LU in order to map the alias to a fully-qualified partner LU name.

If the local node or the remote node (where the partner LU is located) is a LEN node, note that you need to define a directory entry for the partner LU to allow CS Linux to access it. This can be done using either DEFINE_ADJACENT_LEN_NODE or DEFINE_DIRECTORY_ENTRY. If both the local and remote nodes are network nodes, or if one is a network node and the other is an end node, the directory entry is not required, because CS Linux can locate the LU dynamically.

VCB Structure

```
typedef struct define_partner_lu
{
   AP_UINT16        opcode;              /* verb operation code            */
   unsigned char    reserv2;             /* reserved                       */
   unsigned char    format;              /* reserved                       */
```

```
   AP_UINT16        primary_rc;           /* primary return code            */
   AP_UINT32        secondary_rc;         /* secondary return code          */
   PLU_CHARS        plu_chars;            /* partner LU characteristics     */
} DEFINE_PARTNER_LU;

typedef struct plu_chars
{
   unsigned char    fqplu_name[17];       /* fully qualified partner LU name */
   unsigned char    plu_alias[8];         /* partner LU alias               */
   unsigned char    description[32];      /* resource description           */
   unsigned char    reserv2[16];          /* reserved                       */
   unsigned char    plu_un_name[8];       /* partner LU uninterpreted name  */
   unsigned char    preference;           /* reserved                       */
   AP_UINT16        max_mc_ll_send_size;  /* maximum MC send LL size        */
   unsigned char    conv_security_ver;    /* already-verified security      */
                                          /*  supported?                    */
   unsigned char    parallel_sess_supp;   /* parallel sessions supported?   */
   unsigned char    reserv3[8];           /* reserved                       */
} PLU_CHARS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_PARTNER_LU

plu_chars.fqplu_name
Fully qualified LU name for the partner LU. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

The name must not match the fully-qualified partner LU name of any other partner LU, or the LU name of any local LU.

plu_chars.plu_alias
LU alias of the partner LU. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes.

If the *fqplu_name* parameter above matches the fully qualified name of an existing partner LU, this parameter must match the partner LU alias in the existing definition. You cannot change the partner LU alias for an existing partner LU, or set up more than one LU alias for the same fully qualified name.

plu_chars.description
A null-terminated text string (0–31 characters followed by a null character) describing the partner LU. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_PARTNER_LU and QUERY_PARTNER_LU_DEFINITION verbs, but CS Linux does not make any other use of it.

plu_chars.plu_un_name
Uninterpreted name of the partner LU (the name of the LU as defined to the remote SSCP). The name is an 8-byte EBCDIC character string.

To use the default uninterpreted name (the same as the network name taken from the *fqplu_name* parameter above), set this parameter to 8 binary zeros. This parameter is only relevant if the partner LU is on a host and dependent LU 6.2 is used to access it.

plu_chars.max_mc_ll_send_size
The maximum size of logical records that can be sent and received by

mapped conversation services at the partner LU. Specify a number in the range 1–32,767, or zero to specify no limit (in this case the maximum is 32,767).

plu_chars.conv_security_ver
Specifies whether the partner LU is authorized to validate user IDs on behalf of local LUs; that is, whether the partner LU may set the already verified indicator in an Attach request. Possible values are:

AP_YES The partner LU can validate user IDs.

AP_NO The partner LU cannot validate user IDs.

plu_chars.parallel_sess_supp
Specifies whether the partner LU supports parallel sessions. Possible values are:

AP_YES The partner LU supports parallel sessions.

AP_NO The partner LU does not support parallel sessions.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_DEF_PLU_INVALID_FQ_NAME
The *fqplu_name* parameter contained a character that was not valid.

AP_INVALID_UNINT_PLU_NAME
The *plu_un_name* parameter contained a character that was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_INVALID_FQ_LU_NAME
The *fqplu_name* parameter matched the name of an existing local LU.

AP_PLU_ALIAS_CANT_BE_CHANGED
The *plu_alias* parameter of an existing partner LU cannot be changed.

AP_PLU_ALIAS_ALREADY_USED
The *plu_alias* parameter is already used for an existing partner LU with a different LU name.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_PORT

DEFINE_PORT is used to define a new port or modify an existing one. Before issuing this verb, you must issue the DEFINE_DLC verb to define the DLC that this port uses.

You can modify an existing port only if it is not started. You cannot change the DLC used by an existing port; the *dlc_name* specified when modifying an existing port must match the DLC that was specified on the initial definition of the port.

If you are defining a port that will accept incoming calls, see "Incoming Calls" on page 193.

VCB Structure

```
typedef struct define_port
{
  AP_UINT16       opcode;                 /* verb operation code           */
  unsigned char   reserv2;                /* reserved                      */
  unsigned char   format;                 /* reserved                      */
  AP_UINT16       primary_rc;             /* primary return code           */
  AP_UINT32       secondary_rc;           /* secondary return code         */
  unsigned char   port_name[8];           /* name of port                  */
  PORT_DEF_DATA   def_data;               /* port defined data             */
} DEFINE_PORT;

typedef struct port_def_data
{
  unsigned char   description[32];         /* resource description          */
  unsigned char   initially_active;        /* is the port initially active? */
  unsigned char   reserv2[15];             /* reserved                      */
  unsigned char   dlc_name[8];             /* DLC name associated with port */
  unsigned char   port_type;               /* port type                     */
  unsigned char   port_attributes[4];      /* port attributes               */
  unsigned char   implicit_uplink_to_en;   /* implicit EN links up or down? */
  unsigned char   implicit_appn_links_len; /* reserved                      */
  unsigned char   reserv3;                 /* reserved                      */
  AP_UINT32       port_number;             /* port number                   */
  AP_UINT16       max_rcv_btu_size;        /* max receive BTU size          */
  AP_UINT16       tot_link_act_lim;        /* total link activation limit   */
  AP_UINT16       inb_link_act_lim;        /* inbound link activation limit */
  AP_UINT16       out_link_act_lim;        /* outbound link activation limit */
  unsigned char   ls_role;                 /* initial link station role     */
  unsigned char   retry_flags;             /* reserved                      */
  AP_UINT16       max_activation_attempts; /* reserved                      */
  AP_UINT16       activation_delay_timer;  /* reserved                      */
  unsigned char   mltg_pacing_algorithm;   /* reserved                      */
```

```
  unsigned char   implicit_tg_sharing_prohibited; /* reserved               */
  unsigned char   link_spec_data_format;   /* reserved                      */
  unsigned char   limit_enable;            /* reserved                      */
  unsigned char   reserv1[6];              /* reserved                      */
  unsigned char   implicit_dspu_template[8]; /* implicit dspu template      */
  AP_UINT16       implicit_ls_limit;       /* implicit ls limit             */
  unsigned char   reserv4;                 /* reserved                      */
  unsigned char   implicit_dspu_services;  /* implicit DSPU support         */
  AP_UINT16       implicit_deact_timer;    /* deact timer for implicit LSs  */
  AP_UINT16       act_xid_exchange_limit;  /* activation XID exchange limit */
  AP_UINT16       nonact_xid_exchange_limit;     /* non-activation XID      */
                                                 /*  exchange limit         */
  unsigned char   ls_xmit_rcv_cap;         /* LS transmit-receive capability */
  unsigned char   max_ifrm_rcvd;           /* maximum number of I-frames that*/
                                           /*  can be received              */
  AP_UINT16       target_pacing_count;     /* Target pacing count           */
  AP_UINT16       max_send_btu_size;       /* Desired maximum send BTU size */
  LINK_ADDRESS    dlc_data;                /* DLC data                      */
  LINK_ADDRESS    hpr_dlc_data;            /* reserved                      */
  unsigned char   implicit_cp_cp_sess_support;   /* implicit links allow    */
                                                 /*  CP-CP sessions         */
  unsigned char   implicit_limited_resource;     /* implicit links are      */
                                                 /*  limited resource       */
  unsigned char   implicit_hpr_support;    /* Is HPR supported?             */
  unsigned char   implicit_link_lvl_error; /* Send HPR traffic on implicit  */
                                           /*  links using link-level error */
                                           /*  recovery?                    */
  unsigned char   retired1;                /*  reserved                     */
  TG_DEFINED_CHARS default_tg_chars;       /* default TG chars              */
  unsigned char   discovery_supported;     /* reserved                      */
  AP_UINT16       port_spec_data_len;      /* length of port specification  */
                                           /*  data                         */
  AP_UINT16       link_spec_data_len;      /* length of link specification  */
                                           /*  data                         */
} PORT_DEF_DATA;

typedef struct link_address
{
  unsigned char   format;                  /* type of link address          */
  unsigned char   reserve1;                /* reserved                      */
  AP_UINT16       length;                  /* length                        */
  unsigned char   address[135];            /* address                       */
} LINK_ADDRESS;

typedef struct tg_defined_chars
{
  unsigned char   effect_cap;              /* effective capacity            */
  unsigned char   reserve1[5];             /* reserved                      */
  unsigned char   connect_cost;            /* connection cost               */
  unsigned char   byte_cost;               /* byte cost                     */
  unsigned char   reserve2;                /* reserved                      */
  unsigned char   security;                /* security                      */
  unsigned char   prop_delay;              /* propagation delay             */
  unsigned char   modem_class;             /* reserved                      */
  unsigned char   user_def_parm_1;         /* user-defined parameter 1      */
  unsigned char   user_def_parm_2;         /* user-defined parameter 2      */
  unsigned char   user_def_parm_3;         /* user-defined parameter 3      */
} TG_DEFINED_CHARS;
```

For SDLC, no port-specific or link-specific data is included.

Port-specific data for QLLC:

```
typedef struct vql_port_spec_data
{
  V0_MUX_INFO     mux_info;        /* streams config info                  */
  unsigned char   driver_name[13]; /* reserved                             */
  unsigned char   cud_mode;        /* matching required on CUD             */
```

```
  AP_UINT16       cud_len;         /* length of Call User Data in octets     */
  unsigned char   cud[128];        /* Call User Data                         */
  unsigned char   add_mode;        /* matching reqd on called address        */
  AP_UINT16       add_len;         /* length of called address to match      */
  AP_UINT32       xtras;           /* reserved                               */
  AP_UINT32       xtra_len;        /* reserved                               */
} VQL_PORT_SPEC_DATA;
```

Link-specific data for QLLC:

```
typedef struct vql_ls_spec_data
{
   V0_MUX_INFO    mux_info;               /* streams config info            */
   AP_UINT16      reserve1;               /* reserved                       */
   AP_UINT16      reserve2;               /* reserved                       */
   unsigned char  vc_type;                /* Virtual Circuit type           */
   unsigned char  req_rev_charge;         /* reserved                       */
   unsigned char  loc_packet;             /* reserved                       */
   unsigned char  rem_packet;             /* reserved                       */
   unsigned char  loc_wsize;              /* reserved                       */
   unsigned char  rem_wsize;              /* reserved                       */
   AP_UINT16      fac_len;                /* X.25 facilities length         */
   unsigned char  fac[128];               /* X.25 facilities                */
   AP_UINT16      retry_limit;            /* reserved                       */
   AP_UINT16      retry_timeout;          /* reserved                       */
   AP_UINT16      idle_timeout;           /* reserved                       */
   AP_UINT16      pvc_id;                 /* PVC logical channel identifier */
   AP_UINT16      sn_id_len;              /* reserved                       */
   unsigned char  sn_id[4];               /* reserved                       */
   AP_UINT16      cud_len;                /* length of any call user data   */
                                          /*  to send                       */
   unsigned char  cud[128];               /* actual call user data          */
   AP_UINT32      xtras;                  /* reserved                       */
   AP_UINT32      xtra_len;               /* reserved                       */
   unsigned char  rx_thruput_class;       /* reserved                       */
   unsigned char  tx_thruput_class;       /* reserved                       */
   unsigned char  cugo;                   /* reserved                       */
   unsigned char  cug;                    /* reserved                       */
   AP_UINT16      cug_index;              /* reserved                       */
   AP_UINT16      nuid_length;            /* reserved                       */
   unsigned char  nuid_data[109];         /* reserved                       */
   unsigned char  reserve3[2];            /* reserved                       */
   unsigned char  rpoa_count;             /* reserved                       */
   AP_UINT16      rpoa_ids[30];           /* reserved                       */
} VQL_LS_SPEC_DATA;
```

Port-specific data for Token Ring, Ethernet:

```
typedef struct llc_port_spec_data
{
  V0_MUX_INFO        mux_info;             /* Streams config info           */
  PROM_MODE_DATA     prom_data;            /* reserved                      */
  LLC_SAP_SPEC_DATA  sap_spec_data;        /* LLC2 timeouts and thresholds  */
  unsigned char      adapter_id[8];        /* adapter ID                    */
  unsigned char      adapt_spec_data[16];  /* reserved                      */
  AP_UINT32          max_rcv_pool_kb;      /* max size of receive buf pool  */
  unsigned char      throttle_back_pcent;  /* throttle back threshold       */
  unsigned char      pad[3];               /* reserved                      */
} LLC_PORT_SPEC_DATA;

typedef struct prom_mode_data
{
  AP_UINT16       port_spec_data_size;     /* reserved                      */
  unsigned char   promiscuous;             /* reserved                      */
  unsigned char   dlsw_flag;               /* reserved                      */
  AP_UINT16       vrn;                     /* reserved                      */
  AP_UINT16       bridge_num;              /* reserved                      */
} PROM_MODE_DATA;
```

```
typedef struct llc_sap_spec_data
{
  AP_UINT16       ack_timeout;              /* acknowlegment timeout in ms   */
  AP_UINT16       p_bit_timeout;            /* Poll response timeout in ms   */
  AP_UINT16       t2_timeout;               /* acknowledgment delay in ms    */
  AP_UINT16       rej_timeout;              /*REJ response timeout in seconds*/
  AP_UINT16       busy_state_timeout;       /* remote busy timeout in seconds*/
  AP_UINT16       idle_timeout;             /* idle RR interval in seconds   */
  AP_UINT16       max_retry;                /* retry limit for any response  */
  AP_UINT16       upward_cred_q_threshold;  /* reserved                      */
  AP_UINT16       window_inc_threshold;     /* window increment count for    */
                                            /*  dynamic window algorithm     */
  AP_UINT16       pad;                      /* reserved                      */
} LLC_SAP_SPEC_DATA;
```

Link-specific data for Token Ring, Ethernet:

```
typedef struct llc_link_spec_data
{
  V0_MUX_INFO     mux_info;              /* Streams config info              */
  AP_UINT16       reserve1;              /* reserved                         */
  AP_UINT16       reserve2;              /* reserved                         */
  AP_UINT16       length;                /* reserved                         */
  AP_UINT16       xid_timer;             /* XID timeout value in seconds     */
  AP_UINT16       xid_timer_retry;       /* XID retry limit                  */
  AP_UINT16       test_timer;            /* TEST timeout value in seconds    */
  AP_UINT16       test_timer_retry;      /* TEST retry limit                 */
  AP_UINT16       ack_timeout;           /* acknowledgment timeout in ms     */
  AP_UINT16       p_bit_timeout;         /* POLL response timeout in ms      */
  AP_UINT16       t2_timeout;            /* acknowledgment delay in ms       */
  AP_UINT16       rej_timeout;           /* REJ response timeout in seconds  */
  AP_UINT16       busy_state_timeout;    /* remote busy timeout in seconds   */
  AP_UINT16       idle_timeout;          /* idle RR interval in seconds      */
  AP_UINT16       max_retry;             /* retry limit for any response     */
} LLC_LINK_SPEC_DATA;
```

Port-specific data for multipath channel (MPC), CS Linux for System z only:

```
typedef struct chnl_port_spec_data
{
  V0_MUX_INFO     mux_info;          /* streams information                 */
  AP_UINT16       tx_buffers;        /* reserved                            */
  AP_UINT16       rx_buffers;        /* reserved                            */
  AP_UINT32       speed;             /* reserved                            */
  unsigned char   reserv1[32]        /* pad and future expansion            */
} CHNL_PORT_SPEC_DATA;
```

Link-specific data for multipath channel (MPC):

```
typedef struct chnl_link_spec_data
{
   V0_MUX_INFO     mux_info;          /* streams information                 */
   AP_UINT16       device_end;        /* BlkMux protocol flag                */
   unsigned char   escd_port;         /* reserved                            */
   unsigned char   cuadd;             /* reserved                            */
   unsigned char   local_name[8];     /* reserved                            */
   unsigned char   remote_name[8];    /* reserved                            */
   unsigned char   reserv1[32]        /* pad and future expansion            */
} CHNL_LINK_SPEC_DATA;
```

Port-specific data for Enterprise Extender (HPR/IP):

```
typedef struct ipdlc_port_spec_data
{
   V0_MUX_INFO    mux_info;           /* streams information                 */
   unsigned char  if_name[46];        /* Local interface id or IP address */
} IPDLC_PORT_SPEC_DATA;
```

Link-specific data for Enterprise Extender (HPR/IP):

```
typedef struct ipdlc_link_spec_data
{
   V0_MUX_INFO    mux_info;              /* streams information              */
   AP_UINT16      ack_timeout;           /* ACK timer for command frames     */
   AP_UINT16      max_retry;             /* Retry limit for command frames   */
   AP_UINT16      liveness_timeout;      /* Liveness timer                   */
   unsigned char  short_hold_mode;       /* Run in short-hold mode           */
   unsigned char  remote_hostname[255];  /* Name of remote host to contact   */
} IPDLC_LINK_SPEC_DATA;
```

Data for all DLC types:

```
typedef struct v0_mux_info
{
   AP_UINT16         dlc_type;               /* DLC implementation type     */
   unsigned char     need_vrfy_fixup;        /* reserved                    */
   unsigned char     num_mux_ids;            /* reserved                    */
   AP_UINT32         card_type;              /* type of adapter card        */
   AP_UINT32         adapter_number;         /* DLC adapter number          */
   AP_UINT32         oem_data_length;        /* reserved                    */
   AP_INT32          mux_ids[5];             /* reserved                    */
} V0_MUX_INFO;
```

For Token Ring or Ethernet, the *address* parameter in the `link_address` structure is replaced by the following:

```
typedef struct tr_address
{
  unsigned char   mac_address[6];        /* reserved                        */
  unsigned char   lsap_address;          /* local SAP address               */
} TR_ADDRESS;
```

For Enterprise Extender (HPR/IP), the *address* parameter in the `link_address` structure is replaced by the following:

```
typedef struct ip_address_info
{
  unsigned char lsap;                      /* Local Service Access Point addr */
  unsigned char version;                   /* IPv4 or IPv6                    */
  unsigned char address[272];              /* IP Address or hostname          */

} IP_ADDRESS_INFO;
```

For MPC, the complete `link_address` structure is reserved.

Supplied Parameters

The application supplies the following parameters:

opcode `AP_DEFINE_PORT`

port_name
: Name of port being defined. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes.

def_data.description
: A null-terminated text string (0–31 characters followed by a null character) describing the port. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_PORT verb, but CS Linux does not make any other use of it.

def_data.initially_active
Specifies whether this port is automatically started when the node is started. Possible values are:

AP_YES The port is automatically started when the node is started.

AP_NO The port is automatically started only if an LS that uses it is defined to be initially active; otherwise it must be started manually.

def_data.dlc_name
Name of associated DLC. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes. The specified DLC must have already been defined by a DEFINE_DLC verb.

def_data.port_type
Type of line used by the port.

For SDLC, the following values are allowed:

AP_PORT_SWITCHED
Switched line.

AP_PORT_NONSWITCHED
Nonswitched line.

For QLLC, this parameter must be set to AP_PORT_SWITCHED.

For Token Ring / Ethernet , this parameter must be set to AP_PORT_SATF (shared access transport facility).

For Enterprise Extender (HPR/IP), this parameter must be set to AP_PORT_SATF (shared access transport facility).

For MPC, this parameter must be set to AP_PORT_SWITCHED.

def_data.port_attributes
This is a one-bit parameter that may take the following values:

AP_NO Incoming calls are resolved by CP name.

AP_RESOLVE_BY_LINK_ADDRESS
This specifies that an attempt is made to resolve incoming calls by using the link address on CONNECT_IN before using the CP name (or node ID) carried on the received XID3 to resolve them. This bit is ignored unless the *port_type* parameter is set to AP_PORT_SWITCHED.

def_data.implicit_uplink_to_en
This parameter applies only if the local node is a Branch Network Node; it is reserved if the local node is any other type. For an MPC port, this parameter is reserved because implicit links are not supported.

If the adjacent node is an end node, this parameter specifies whether implicit link stations off this port are uplink or downlink. This parameter is ignored if there are existing links to the same adjacent node, because in this case the existing links are used to determine the link type. Possible values are:

AP_YES Implicit links to an End Node are uplinks.

AP_NO Implicit links to an End Node are downlinks.

def_data.port_number
The number of the port.

For Enterprise Extender (HPR/IP), this parameter is reserved.

For MPC, this is the number corresponding to the MultiPath Channel device: for example, port 0 is **/dev/mpc0** and port 1 is **/dev/mpc1**.

def_data.max_rcv_btu_size
Maximum BTU size that can be received. The value includes the length of the TH and RH (total 9 bytes) as well as the RU. Specify a value in the range `265–65535` (`265–4105` for SDLC).

def_data.tot_link_act_lim
Total link activation limit (the maximum number of links that can be active at any time using this port).

For an SDLC port with *port_type* set to `AP_NONSWITCHED` and *ls_role* set to `AP_LS_PRI`or `AP_LS_SEC`, the range is `1–256` (a value greater than 1 defines a multi-drop primary link or a multi-PU secondary link). For all other SDLC ports, this parameter must be set to 1.

For an MPC link, this parameter must be set to 1.

def_data.inb_link_act_lim
Inbound link activation limit (the number of links reserved for inbound activation). The sum of *inb_link_act_lim* and *out_link_act_lim* must not exceed *tot_link_act_lim*; the difference between *inb_link_act_lim* and *tot_link_act_lim* defines the maximum number of links that can be activated outbound at any time.

For an SDLC port with *port_type* set to `AP_NONSWITCHED`, this parameter must be zero. If *port_type* is set to `AP_SWITCHED`, then the port must be defined to accept either incoming calls (*inb_link_act_lim = 1* and *out_link_act_lim = 0*) or outgoing calls (*inb_link_act_lim = 0* and *out_link_act_lim = 1*).

def_data.out_link_act_lim
Outbound link activation limit (the number of links reserved for outbound activation). The sum of *inb_link_act_lim* and *out_link_act_lim* must not exceed *tot_link_act_lim*; the difference between *out_link_act_lim* and *tot_link_act_lim* defines the maximum number of links that can be activated inbound at any time.

For an SDLC port with *port_type* set to `AP_NONSWITCHED`, this parameter must be equal to *tot_link_act_lim*. If *port_type* is set to `AP_SWITCHED`, then the port must be defined to accept either incoming calls (*inb_link_act_lim = 1* and *out_link_act_lim = 0*) or outgoing calls (*inb_link_act_lim = 0* and *out_link_act_lim = 1*).

def_data.ls_role
Link station role.

For SDLC or QLLC, the following values are allowed:

`AP_LS_PRI`
Primary

`AP_LS_SEC`
Secondary

`AP_LS_NEG`
Negotiable

For Token Ring / Ethernet/ Enterprise Extender (HPR/IP), this must be set to `AP_LS_NEG`.

For MPC, this must be set to AP_LS_NEG.

def_data.implicit_dspu_template
For Enterprise Extender (HPR/IP), MPC, this parameter is reserved.

Specifies the DSPU template, defined on the DEFINE_DSPU_TEMPLATE verb. This template is used for definitions if the local node is to provide SNA gateway for an implicit link activated on this port. If the template specified does not exist or is already at its instance limit when the link is activated, activation will fail. This template name is an 8-byte string in a locally displayable character set.

If the *implicit_dspu_services* parameter is not set to AP_PU_CONCENTRATION, the *implicit_dspu_template* parameter is reserved.

def_data.implicit_ls_limit
Specifies the maximum number of implicit link stations that can be active on this port simultaneously, including dynamic links and links activated for Discovery. Specify a value in the range 1–65,534 or specify 0 (zero) to indicate no limit. A value of AP_NO_IMPLICIT_LINKS indicates that no implicit links are allowed.

def_data.implicit_dspu_services
For Enterprise Extender (HPR/IP), MPC, this parameter is reserved.

Specifies the services that the local node will provide to the downstream PU across implicit links activated on this port. Possible values are:

AP_DLUR
Local node will provide DLUR services for the downstream PU (using the default DLUS configured through the DEFINE_DLUR_DEFAULTS verb).

AP_PU_CONCENTRATION
Local node will provide SNA gateway for the downstream PU. It will also put in place definitions as specified by the DSPU template specified for the parameter *implicit_dspu_template*.

AP_NONE
Local node will provide no services for this downstream PU.

def_data.implicit_deact_timer
If *implicit_hpr_support* is set to AP_YES and *implicit_limited_resource* is set to AP_NO_SESSIONS, an HPR-capable implicit link is automatically deactivated if no data flows on it for the time specified by this parameter and no sessions are using the link.

Implicit limited resource link deactivation timer (in seconds). If *implicit_limited_resource* is set to AP_INACTIVITY, an implicit link using this port will be deactivated if no data flows on it for the time specified by this parameter.

The minimum value is 5; values in the range 1–4 will be interpreted as 5. Zero indicates no timeout (the link is not deactivated, as though *implicit_limited_resource* were set to AP_NO). This parameter is reserved if *implicit_limited_resource* is set to any value other than AP_INACTIVITY.

def_data.act_xid_exchange_limit
Activation XID exchange limit.

def_data.nonact_xid_exchange_limit
Non-activation XID exchange limit.

def_data.ls_xmit_rcv_cap
This parameter is reserved.

Specifies the link station transmit/receive capability. Possible values are:

AP_LS_TWS
Two-way simultaneous

AP_LS_TWA
Two-way alternating

For Enterprise Extender (HPR/IP), this parameter must be set to AP_LS_TWS.

def_data.max_ifrm_rcvd
Maximum number of I-frames that can be received by the local link stations before an acknowledgment is sent. Range: 1–127.

def_data.target_pacing_count
Numeric value between 1 and 32,767 inclusive indicating the desired pacing window size. (The current version of CS Linux does not make use of this value.)

def_data.max_send_btu_size
Maximum BTU size that can be sent from this port. This value is used to negotiate the maximum BTU size that a pair of link stations can use to communicate with each other. The value includes the length of the TH and RH (total 9 bytes) as well as the RU. Specify a value in the range 265–65535 (265–4105 for SDLC).

def_data.dlc_data.format
The type of link address specified for this port. Possible values:

AP_IP_ADDRESS_INFO
IP address. Specify this value for an Enterprise Extender (HPR/IP) port.

AP_UNSPECIFIED
Unspecified address format. Specify this value for any port type other than Enterprise Extender (HPR/IP).

def_data.dlc_data.length
For MPC, this parameter is reserved.

Length of the port address (in the following parameter).

def_data.dlc_data.address
Port address.

For MPC, this parameter is reserved.

For SDLC, this is a 1-byte address. If *ls_role* is set to AP_LS_SEC, or if *ls_role* is set to AP_LS_NEG and the local station becomes secondary after LS role negotiation, this address is used in the response to an incoming call. If the local station is primary, or if the port is used only for outgoing calls, this parameter is reserved.

For QLLC, this is a string of 1–14 bytes, specifying the local X.25 DTE address of the port. This address must match the address configured in your X.25 driver for this network.

Note: If no address is specified on a QLLC port, an outgoing call request generated by CS Linux will not contain the X.25 calling address.

Some hosts require this address as a security measure on incoming calls, and may not accept the connection without it.

def_data.dlc_data.tr_address.lsap_address
For Token Ring or Ethernet: Local SAP address of the port. Specify a multiple of `0x04` in the range `0x04–0xEC`.

(The first parameter in the address structure normally contains the MAC address, but this value is used only on the LS and is reserved on the port.)

def_data.dlc_data.ip_address_info.lsap
For Enterprise Extender: Local SAP address of the port. Specify a multiple of `0x04` in the range `0x04–0xEC`. The usual value is `0x04`, but VTAM may use `0x08` in some circumstances.

If you need to use two or more ports with different LSAP addresses on the same TCP/IP interface, you will need to create two or more Enterprise Extender DLCs, and then create a separate Enterprise Extender port for each DLC with the same *if_name* but a different LSAP address.

def_data.dlc_data.ip_address_info.version
For Enterprise Extender: Specifies whether the following field represents an IPv4 or IPv6 address. All link stations that use the port must use the same type of address. You cannot change this parameter if one or more link stations already use this port. Possible values:

IP_VERSION_4_HOSTNAME
The *address* field specifies an IPv4 address, or a hostname or alias that resolves to an IPv4 address.

IP_VERSION_6_HOSTNAME
The *address* field specifies an IPv6 address, or a hostname or alias that resolves to an IPv6 address.

def_data.dlc_data.ip_address_info.address
For Enterprise Extender: IP address of the port. This can be any of the following.

- An IPv4 dotted-decimal address (such as `193.1.11.100`).
- An IPv6 colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).
- A name (such as `newbox.this.co.uk`).
- An alias (such as `newbox`).

def_data.implicit_cp_cp_sess_support
Specifies whether CP-CP sessions are permitted for implicit link stations using this port. Possible values are:

AP_YES CP-CP sessions are permitted for implicit LSs.

AP_NO CP-CP sessions are not permitted for implicit LSs.

def_data.implicit_limited_resource
Specifies whether implicit link stations off this port should be defined as limited resources. Possible values are:

AP_NO Implicit links are not limited resources, and will not be deactivated automatically.

AP_NO_SESSIONS
Implicit links are limited resources, and will be deactivated automatically when no active sessions are using them.

AP_INACTIVITY
Implicit links are limited resources, and will be deactivated automatically when no active sessions are using them or when no data has flowed for the time period specified by the *implicit_deact_timer* field.

- If no SSCP-PU session is active across the link, the node deactivates the link immediately.
- If an SSCP-PU session is active but no traffic has flowed for the specified time period, the node sends REQDISCONT(normal) to the host. The host is then responsible for deactivating all LUs and the PU, at which time the local node will deactivate the link. However, the host may not deactivate LUs with active PLU-SLU sessions; in this case, the link remains active until all these sessions are deactivated (for example by the user logging out). This behavior can be changed by using options in the *ptf* field of the DEFINE_NODE verb.

def_data.implicit_hpr_support
Specifies whether High Performance Routing (HPR) is supported on implicit links. Possible values are:

AP_YES HPR is supported on implicit links.

AP_NO HPR is not supported on implicit links.

For Enterprise Extender (HPR/IP), this parameter must be set to AP_YES.

def_data.implicit_link_lvl_error
For SDLC, Enterprise Extender (HPR/IP)MPC, this parameter is reserved.

Specifies whether HPR traffic should be sent on implicit links using link-level error recovery (AP_YES or AP_NO). The parameter is reserved if *implicit_hpr_support* is set to AP_NO.

def_data.default_tg_chars
Default TG characteristics. These are used for implicit link stations using this port, and as the default TG characteristics for defined link stations that do not have TG characteristics explicitly defined. The TG characteristics parameters are ignored if the LS is to a downstream PU.

For details of these parameters, see “DEFINE_LS” on page 117.

def_data.port_spec_data_len
Length of port-specific data. The data should be concatenated to the basic VCB structure.

Port-specific data is not used for SDLC; set this parameter to zero.

def_data.link_spec_data_len
Length of link-specific data. The link-specific data should be concatenated immediately following the port-specific data.

For details of these parameters, see “DEFINE_LS” on page 117; the values specified on DEFINE_PORT are used as defaults for processing incoming calls (when the LS name is not initially known).

Port-specific data for QLLC:

mux_info.dlc_type
Type of the DLC. Set this to AP_IMPL_NLI_QLLC.

cud_mode
Specifies the type of matching required between the Call User Data (CUD) supplied on an incoming call and the *cud* parameter below. Possible values are:

VQL_DONTCARE
CUD on incoming calls is not checked.

VQL_IDENTITY
The received CUD must match the string specified in the *cud* parameter.

VQL_STARTSWITH
The initial bytes (up to *cud_len*) of the received CUD must match the string specified in the *cud* parameter; any bytes following *cud_len* are not checked.

cud_len
Specifies the length of the Call User Data (in the *cud* parameter below).

cud Call user data to be used for verifying incoming calls. If *cud_mode* above is set to VQL_IDENTITY or VQL_STARTSWITH, incoming calls are accepted only if they specify a CUD string that matches the value defined in this parameter. If *cud_mode* is set to VQL_DONTCARE, this parameter is ignored and CUD strings on incoming calls are not checked.

add_mode
Specifies the type of matching required between the address supplied on an incoming call and the port address defined in the *address* parameter above. Possible values are:

VQL_DONTCARE
The address on incoming calls is not checked.

VQL_IDENTITY
The received address must match the string specified in the *address* parameter.

VQL_STARTSWITH
The initial bytes (up to *add_len*) of the received address must match the string specified in the *address* parameter; any bytes following *add_len* are not checked.

If the *address* parameter is set to a null string, this parameter must be set to VQL_DONTCARE.

add_len
If *add_mode* is set to VQL_STARTSWITH, this parameter specifies the number of bytes of the port address to be checked.

For example, if *add_len* is set to 2, an incoming call is accepted if the first two bytes of the address supplied on the call match the first two bytes of the *address* parameter (regardless of whether subsequent bytes match).

For other values of *add_mode*, this parameter is ignored.

Port-specific data for Token Ring or Ethernet:

mux_info.dlc_type
Type of the DLC.

Possible values are:

AP_IMPL_TR_SNAP_LLC2
Token Ring

AP_IMPL_ETHER_SNAP_LLC2
Ethernet

sap_spec_data.ack_timeout
Timeout in milliseconds within which CS Linux expects a response to any I-frames sent to the adjacent link station.

sap_spec_data.p_bit_timeout
Time in milliseconds that CS Linux waits for a response to a frame sent with the POLL bit set.

sap_spec_data.t2_timeout
Period in milliseconds that CS Linux will withhold a response to a received I-frame to allow further I-frames to be received and acknowledged with the same RR, thus reducing acknowledgment traffic. At the latest, CS Linux will send the acknowledgment after this period, but may send the acknowledgment before this period is over.

sap_spec_data.rej_timeout
Time in seconds during which CS Linux expects to receive a response to an REJ frame.

sap_spec_data.busy_state_timeout
Time in seconds that CS Linux waits for indication of clearance of a busy condition at the adjacent link station.

sap_spec_data.idle_timeout
RR keep-alive interval in seconds for an otherwise idle link.

sap_spec_data.max_retry
Maximum permitted number of retries when waiting for any response or busy state to clear.

sap_spec_data.window_inc_threshold
The number of I-frames that must be acknowledged successfully before the working window size is incremented. This value is used by the dynamic window algorithm to increase the window size after it has been reduced following an error condition.

adapter_id
Adapter identifier for the MAC device used by the port. Set this to the name of the DLC used by the port, as defined by a DEFINE_DLC verb.

throttle_back_pcent
Usage level, as a percentage of the receive buffer pool, at which to withhold granting a new send window to a remote LS.

max_rcv_pool_kb
Maximum memory, in Kbits, that can be used by the receive buffer pool.

Port-specific data for multipath channel (MPC):

mux_info.dlc_type
Type of DLC. Set this to `AP_IMPL_MPC_GDLC`.

Port-specific data for Enterprise Extender (HPR/IP):

mux_info.dlc_type
Type of the DLC. Set this to `AP_IP`.

if_name
Identifier for the local network adapter card to be used for the IP link, if you have access to multiple IP networks. If you have access to only one IP network, you can leave this field set to binary zeros.

If you need to specify the interface, you can use any of the following.

- An interface identifier (such as `eth0` or `en0`).
- An IPv4 dotted-decimal address (such as `193.1.11.100`).
- An IPv6 colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).

To determine the interface identifier, run the command **ipconfig —a** on the server where the card is installed. This lists the interface identifiers and their associated IP addresses.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
`AP_PARAMETER_CHECK`

secondary_rc
Possible values are:

AP_INVALID_PORT_NAME
The *port_name* parameter was not valid.

AP_INVALID_DLC_NAME
The specified *dlc_name* did not match any defined DLC.

AP_INVALID_PORT_TYPE
The *port_type* parameter was not set to a valid value.

AP_INVALID_BTU_SIZE
The *max_rcv_btu_size* parameter was not set to a valid value.

AP_INVALID_LS_ROLE
The *ls_role* parameter was not set to a valid value.

AP_INVALID_LINK_ACTIVE_LIMIT
One of the activation limit parameters was not set to a valid value.

AP_INVALID_MAX_IFRM_RCVD
The *max_ifrm_rcvd* parameter was not set to a valid value.

AP_INVALID_LS_ROLE
The *ls_role* parameter was not set to a valid value.

AP_INVALID_DSPU_SERVICES
The *implicit_dspu_services* parameter was not set to a valid value.

AP_PU_CONC_NOT_SUPPORTED
The *implicit_dspu_services* parameter was set to a reserved value.

AP_INVALID_TEMPLATE_NAME
The DSPU template specified on the *implicit_dspu_template* parameter was not valid.

AP_INVALID_IP_VERSION
The *version* parameter was changed on an existing port used by one or more link stations. You cannot change this parameter if the port has any link stations associated with it.

AP_UNKNOWN_IP_HOST
The string specified for the *remote_hostname* parameter could not be resolved to a valid IP address.

AP_INVALID_SHARING_PROHIBITED
A reserved parameter was set to a nonzero value.

AP_INVALID_LINK_SPEC_FORMAT
A reserved parameter was set to a nonzero value.

AP_INVALID_IMPLICIT_UPLINK
The *implicit_uplink_to_en* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_PORT_ACTIVE
The specified port cannot be modified because it is currently active.

AP_DUPLICATE_PORT_NUMBER
A port with the specified *port_number* has already been defined.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

Incoming Calls

If you are configuring a port that will accept incoming calls (as defined by the *tot_link_act_lim*, *inb_link_act_lim*, and *out_link_act_lim* parameters), there is generally no need to define an LS to be used for these calls, because CS Linux will define one dynamically when the incoming call is received. However, if the incoming calls are from a host computer that supports dependent LUs or from a downstream computer using SNA gateway, you need to define an LS explicitly, because the LS definition includes the name of the PU associated with the dependent LUs or the name of the downstream PU.

When an incoming call arrives at the port, CS Linux checks the address specified on the call against the addresses specified for LSs defined on the port (if any), to determine if an LS has already been defined for the call. If the address does not match, an LS is defined dynamically. To ensure that the explicit LS definition (including the required PU name) is used, ensure that the address defined for this LS matches the address that will be supplied by the host or the downstream computer on the incoming call. For Token Ring / Ethernet, both the MAC and SAP addresses must match in order to select the correct LS.

DEFINE_RCF_ACCESS

DEFINE_RCF_ACCESS specifies access to the CS Linux Remote Command Facility (RCF): the user ID used to run UNIX Command Facility (UCF) commands, and the restrictions on which administration commands can be issued using the Service Point Command Facility (SPCF). For more information about SPCF and UCF, see the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*. You can use this verb to permit access to both SPCF and UCF, or to only one of them.

This verb must be issued to the domain configuration file; it can be used to specify the RCF access for the first time, or to modify an existing definition. CS Linux acts on these parameters during node startup; if these parameters are changed while a node is running, the changes do not take effect on the server where the node is running until the node is stopped and restarted.

VCB Structure

```
typedef struct define_rcf_access
{
    AP_UINT16        opcode;                /* Verb operation code          */
    unsigned char    reserv2;               /* reserved                     */
    unsigned char    format;                /* reserved                     */
    AP_UINT16        primary_rc;            /* primary return code          */
    AP_UINT32        secondary_rc;          /* secondary return code        */
    unsigned char    ucf_username[32];      /* UCF username                 */
    AP_UINT32        spcf_permissions;      /* SPCF permissions             */
    unsigned char    reserv3[8];            /* Reserved                     */
} DEFINE_RCF_ACCESS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_RCF_ACCESS

ucf_username

Specifies the Linux user name of the UCF user. This parameter is a null-terminated ASCII string. Do not specify the name root, because CS Linux does not allow UCF commands to be run as root for security reasons.

All UCF commands will be run using this user's user ID, with the default shell, default group ID, and access permissions that are defined on the Linux system for this user.

To prohibit access to UCF, set this parameter to a null string.

spcf_permissions

Specifies the types of CS Linux verbs that can be accessed using SPCF. Set this to AP_NONE to prevent access to SPCF, or to one or more of the following values (combined using a logical OR):

AP_ALLOW_QUERY_LOCAL
QUERY_* verbs are permitted.

AP_ALLOW_DEFINE_LOCAL
DEFINE_*, SET_*, DELETE_*, ADD_*, and REMOVE_* verbs, and also INIT_NODE, are permitted.

AP_ALLOW_ACTION_LOCAL
"Action" verbs are permitted: START_*, STOP_*, ACTIVATE_*, DEACTIVATE_*, and also APING, INITIALIZE_SESSION_LIMIT, CHANGE_SESSION_LIMIT, and RESET_SESSION_LIMIT.

AP_ALLOW_QUERY_REMOTE
The QUERY_* verbs are allowed to be directed at any node in the domain.

AP_ALLOW_DEFINE_REMOTE
The DEFINE_*, SET_*, DELETE_*, ADD_*, REMOVE_*, and INIT_NODE verbs are allowed to be directed at any node in the domain.

AP_ALLOW_ACTION_REMOTE
The START_*, STOP_*, ACTIVATE_*, DEACTIVATE_*, APING, INITIALIZE_SESSION_LIMIT, CHANGE_SESSION_LIMIT, and RESET_SESSION_LIMIT verbs are allowed to be directed at any node in the domain.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_UCF_USER_CANNOT_BE_ROOT
The *ucf_username* parameter specified the name root, which is not allowed.

AP_INVALID_SPCF_SECURITY
The *spcf_permissions* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_RTP_TUNING

DEFINE_RTP_TUNING specifies parameters to be used when setting up RTP connections. After you issue this verb, the parameters you specify will be used for all future RTP connections until you modify them by issuing a new DEFINE_RTP_TUNING verb.

VCB Structure

```
typedef struct define_rtp_tuning
{
  AP_UINT16         opcode;               /* verb operation code            */
  unsigned char     reserv2;              /* reserved                       */
  unsigned char     format;               /* reserved                       */
  AP_UINT16         primary_rc;           /* primary return code            */
  AP_UINT32         secondary_rc;         /* secondary return code          */
  unsigned char     path_switch_attempts;  /* number of path switch attempts  */
  unsigned char     short_req_retry_limit; /* short request timer retry limit */
  AP_UINT16         path_switch_times[4];  /* path switch times              */
  AP_UINT32         refifo_cap;           /* maximum for refifo timer       */
  AP_UINT32         srt_cap;              /* maximum for short request timer */
  AP_UINT16         path_switch_delay;    /* minimum delay before path switch*/
  unsigned char     reserved[78];         /* reserved                       */
} DEFINE_RTP_TUNING;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_RTP_TUNING

path_switch_attempts
: Number of path switch attempts to set on new RTP connections. Specify a value in the range 1–255. If you specify 0(zero), CS Linux uses the default value of 6.

short_req_retry_limit
: Number of times a Status Request is sent before CS Linux determines that an RTP connection is disconnected and starts Path Switch processing. Specify a value in the range 1–255. If you specify 0(zero), CS Linux uses the default value of 6.

path_switch_times
: Length of time in seconds for which CS Linux attempts to path switch a disconnected RTP connection. This parameter is specified as four separate time limits for each of the valid transmission priorities in order: AP_LOW, AP_MEDIUM, AP_HIGH, and AP_NETWORK. Each of these must be in the range 1–65535. The value you specify for each transmission priority must not exceed the value for any lower transmission priority.

  If you specify 0(zero) for any of these values, CS Linux uses the corresponding default value as follows:

  - 480 seconds (8 minutes) for AP_LOW
  - 240 seconds (4 minutes) for AP_MEDIUM
  - 120 seconds (2 minutes) for AP_HIGH
  - 60 seconds (1 minute) for AP_NETWORK

refifo_cap
: The RTP protocol uses a timer called the Re-FIFO Timer. The value of this timer is calculated as part of the protocol, but this parameter specifies a maximum value in milliseconds beyond which the timer cannot increase.

In some situations, setting this maximum value can improve performance. Setting a value of 0 (zero) means that the timer is not limited and can take any value calculated by the protocol.

The default value for this parameter is 4000 milliseconds, with a minimum value of 5 milliseconds. If you specify a value in the range 1–4, the value of 5 will be used.

srt_cap The RTP protocol uses a timer called the Short Request Timer. The value of this timer is calculated as part of the protocol, but this parameter specifies a maximum value in milliseconds beyond which the timer cannot increase. In some situations, setting this maximum value can improve performance. Setting a value of 0 (zero) means that the timer is not limited and can take any value calculated by the protocol.

The default value for this parameter is 8000 milliseconds, with a minimum value of 5 milliseconds. If you specify a value in the range 1–4, the value of 5 will be used.

path_switch_delay
Minimum delay in seconds before a path switch occurs. Specifying a delay avoids unnecessary path switch attempts caused by transient delays in network traffic, in particular when there is no other route available.

Specify a value in the range 0–65535. The default value is zero, indicating that a path switch attempt can occur as soon as the protocol indicates it is required.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_PATH_SWITCH_TIMES
The *path_switch_times* parameter was not valid; for example, you may have specified a value for one transmission priority that exceeds the value specified for a lower transmission priority.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_SECURITY_ACCESS_LIST

DEFINE_SECURITY_ACCESS_LIST defines a list of users who can access a particular local LU or invokable TP, so that access to that LU or TP is restricted to the named users. It can also be used to add user names to an existing security access list. The user names in the list are defined using the DEFINE_USERID_PASSWORD verb.

To restrict access for a particular local LU or invokable TP, you need to do the following.

1. Ensure that each authorized user of the LU or TP is defined using the DEFINE_USERID_PASSWORD verb.
2. Use the DEFINE_SECURITY_ACCESS_LIST verb to define a security access list containing all of these user IDs.
3. Specify the name of this security access list on the DEFINE_LOCAL_LU or DEFINE_TP verb that defines the LU or TP.

When an incoming Allocate request arrives for a local LU or an invokable TP that has a security access list defined, the invoking application must indicate that conversation security is to be used, and specify a user ID. In addition to the standard conversation security checking (against user IDs specified using the DEFINE_USERID_PASSWORD verb), CS Linux checks the user ID in the incoming allocate request against the security access list defined for the LU or TP, and rejects the conversation if the user ID does not match. If both the LU and the TP have security access lists defined, the user ID must be in both lists.

If a local LU or an invokable TP does not have a security access list defined, but is still configured to require conversation security, the standard conversation security checking still applies.

VCB Structure

The DEFINE_SECURITY_ACCESS_LIST verb contains a variable number of `security_user_data` structures; these define the user names to be added to the security access list. The user name structures are included at the end of the `def_data` structure; the number of these structures is specified by the *num_users* parameter.

```
typedef struct define_security_access_list
{
  AP_UINT16         opcode;              /* verb operation code            */
  unsigned char     reserv2;             /* reserved                       */
  unsigned char     format;              /* reserved                       */
  AP_UINT16         primary_rc;          /* primary return code            */
  AP_UINT32         secondary_rc;        /* secondary return code          */
  unsigned char     list_name[14];       /* name of this list              */
  unsigned char     reserv3[2];          /* reserved                       */
  SECURITY_LIST_DEF def_data;            /* security access list           */
} DEFINE_SECURITY_ACCESS_LIST;

typedef struct security_list_def
{
  unsigned char     description[32];     /* description                    */
  unsigned char     reserv3[16];         /* reserved                       */
  AP_UINT32         num_users;           /* number of users being added    */
  unsigned char     reserv2[16];         /* reserved                       */
} SECURITY_LIST_DEF;
```

```
typedef struct security_user_data
{
  AP_UINT16         sub_overlay_size;     /* reserved                      */
  unsigned char     user_name[10];        /* user name                     */
} SECURITY_USER_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_SECURITY_ACCESS_LIST

list_name
Name of the security access list. This is an ASCII string, padded on the right with spaces.

If this name matches an existing security access list, the users defined by this verb are added to the list; otherwise a new list is created.

def_data.description
A null-terminated text string (0–31 characters followed by a null character) describing the security access list. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_SECURITY_ACCESS_LIST verb, but CS Linux does not make any other use of it.

def_data.num_users
Number of user names being defined by this verb. Each user must be specified by a security_user_data structure following the def_data structure.

For each user name in the list, up to the number specified in *num_users*, a security_user_data structure is required with the following information:

user_name
Name of the user.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LIST_NAME
The *list_name* parameter contained a character that was not valid.

AP_INVALID_USER_NAME
One or more of the specified user names was not valid.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_TN3270_ACCESS

DEFINE_TN3270_ACCESS defines TN3270 access details for a particular client (or default TN3270 access details for all clients) using the TN3270 Server feature of CS Linux. (To define access details for a client using TN Redirector, use DEFINE_TN_REDIRECT.)

Each verb specifies details for one or more sessions. Each session is uniquely identified by the client address and the server port number. The DEFINE_TN3270_ACCESS verb can be used to define a new client, to define new sessions for use by an existing client, or to modify the session parameters. (To delete sessions from an existing client, use DELETE_TN3270_ACCESS.)

VCB Structure

The DEFINE_TN3270_ACCESS verb contains a variable number of `tn3270_session_def_data` structures; these define the user's sessions. The session structures are included at the end of the `def_data` structure; the number of these structures is specified by the *num_sessions* parameter.

```
typedef struct define_tn3270_access
{
   AP_UINT16           opcode;             /* verb operation code            */
   unsigned char       reserv2;            /* reserved                       */
   unsigned char       format;             /* reserved                       */
   AP_UINT16           primary_rc;         /* primary return code            */
   AP_UINT32           secondary_rc;       /* secondary return code          */
   AP_UINT16           default_record;     /* is this the DEFAULT record?    */
   unsigned char       client_address[256]; /* address of TN3270 user         */
   TN3270_ACCESS_DEF_DATA def_data;
} DEFINE_TN3270_ACCESS;

typedef struct tn3270_access_def_data
{
   unsigned char       description[32];    /* Description - null terminated  */
   unsigned char       reserv1[16];        /* reserved                       */
   AP_UINT16           address_format;     /* Format of client address       */
   AP_UINT32           num_sessions;       /* Number of sessions being added */
   unsigned char       reserv3[64];        /* reserved                       */
} TN3270_ACCESS_DEF_DATA;

typedef struct tn3270_session_def_data
{
   AP_UINT16           sub_overlay_size;   /* reserved                       */
   unsigned char       description[32];    /* Session description            */
   unsigned char       tn3270_support;     /* Level of TN3270 support        */
   unsigned char       allow_specific_lu;  /* Allow access to specific LUs   */
   unsigned char       printer_lu_name[8]; /* Generic printer LU/pool        */
                                           /*   accessed                     */
   unsigned char       reserv1[6];         /* reserved                       */
   AP_UINT16           port_number;        /* TCP/IP port used to access     */
                                           /*  server                        */
   unsigned char       lu_name[8];         /* Generic display LU/pool        */
                                           /*  accessed                      */
   unsigned char       session_type;       /* Unused in current version      */
   unsigned char       model_override;     /* Unused in current version      */
   unsigned char       ssl_enabled;        /* Is this an SSL session?        */
   unsigned char       security_level;     /* SSL encryption strength        */
   unsigned char       cert_key_label[80]; /* Certificate key label          */
   unsigned char       listen_local_address[46];
```

```
                                        /* Local addr client connects to  */
  unsigned char        allow_ssl_timeout_to_nonssl;
                                        /* Allow non-SSL clients on SSL?  */
  unsigned char     reserv3[17];
   AP_UINT32           reserv4;         /* reserved                       */
} TN3270_SESSION_DEF_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_TN3270_ACCESS

default_record

Specifies whether this verb defines a default record, which will be used by any TN3270 user not explicitly identified by a TCP/IP address. If a TN3270 user attempts to contact the TN server node, and the user's TCP/IP address does not match any DEFINE_TN3270_ACCESS record in the configuration but there is a default record defined, the parameters from this record will be used. Possible values are:

AP_YES This verb defines a default record. The *client_address* and *address_format* parameters are reserved.

AP_NO This verb defines a normal TN3270 user record.

A default record provides access to the TN server function for any TN3270 user that can determine the TCP/IP address of the computer where the TN server is running. To restrict the use of TN server to a specific group of users, either do not include the default record, or leave it with no 3270 LU or LU pool configured so that it cannot be used.

You can also set up a default record for most users, but explicitly exclude one or more TCP/IP addresses. To do this, define the addresses to be excluded as TN server users, and leave them with no 3270 LU or LU pool configured.

client_address

The TCP/IP address of the computer on which the TN3270 program runs. This is a null-terminated ASCII string, which can be any of the following; the *address_format* parameter indicates whether it is an IP address or a name.

- An IPv4 dotted-decimal address (such as 193.1.11.100).
- An IPv6 colon-hexadecimal address (such as 2001:0db8:0000:0000:0000:0000:1428:57ab or 2001:db8::1428:57ab).
- A name (such as newbox.this.co.uk.
- An alias (such as newbox).

If you use a name or alias, the following restrictions apply:

- The Linux system must be able to resolve the name or alias to a fully qualified name (either using the local TCP/IP configuration or using a Domain Name server).
- Each name or alias must expand to a unique fully qualified name; you should not configure two names for users of the same TN server node that will be resolved to the same fully qualified name.
- Fully-qualified names are not case-sensitive; for example, Newbox.THIS.CO.UK is equivalent to newbox.this.co.uk.

def_data.description

An optional text string (0–31 characters followed by a null character). The

string is for information only; it is stored in the configuration file and returned on a `query_tn3270_access_def` structure for a QUERY_TN3270_ACCESS_DEF verb, but CS Linux does not make use of it. You can use it to store additional information to help distinguish between users.

def_data.address_format
Specifies the format of the *client_address* parameter. Possible values are:

AP_ADDRESS_IP
IP address (either IPv4 or IPv6)

AP_ADDRESS_FQN
Alias or fully qualified name

def_data.num_sessions
The number of sessions being defined or modified by this verb. Each TN3270 user may access the same TN server node with multiple sessions, by using a different TCP/IP port for each session. Each session must be specified by a `tn3270_session_def_data` structure following the `tn3270_access_def_data` structure.

For each session, a `tn3270_session_data` structure is required with the following information:

description
An optional text string (0–31 characters followed by a null character). The string is for information only; it is stored in the configuration file and returned on `aquery_tn3270_access_def` structure for a QUERY_TN3270_ACCESS_DEF verb, but CS Linux does not make use of it.

tn3270_support
Specifies the level of TN3270 support. Possible values are:

AP_TN3270
Specifies that TN3270E protocols are disabled.

AP_TN3270E
Specifies that TN3270E protocols are enabled.

TN3270 and TN3287 protocols are always enabled.

For an AS/400® TN3270 client, this parameter must be set to `AP_TN3270E`.

allow_specific_lu
Indicates whether access to specific LUs is allowed. Possible values are:

AP_YES Access to specific LUs is allowed.

AP_NO Access to specific LUs is not allowed.

printer_lu_name
Name of the printer LU or LU pool that this session uses for connections requesting a generic printer LU. This is a type-A EBCDIC string padded on the right with EBCDIC spaces. It must match the name of a LU type 0–3 printer LU defined on this node, or an LU pool containing LUs on this node.

If a single printer LU is specified, this printer LU should not be associated with any display LU by the DEFINE_TN3270_ASSOCIATION verb. If a printer LU pool is specified, none of the printer LUs in the pool should be associated with display LUs. Allowing a single LU to be accessed as both a

generic printer LU and as an associated printer LU may result in the LU not being available as an associated printer LU because it is already in use. (These rules are not enforced by the NOF API.)

This field has no effect on specific printer LU sessions.

port_number
The number of the server TCP/IP port that the TN3270 program uses to access the TN server node. If the port number matches an existing port number defined for one of this TN3270 user's sessions, the information for that session is replaced; otherwise a new session is added.

If two or more session structures use the same *port_number* (for the same *client_address* or a different one), the *listen_local_address* parameter must be specified on all of them or none of them; you cannot specify it on some sessions but leave it unspecified on others.

lu_name
Name of the LU or LU pool that this session uses for connections requesting a generic display LU. This is a type-A EBCDIC string padded on the right with EBCDIC spaces. It must match the name of a type 0–3 display LU defined on this node, or an LU pool containing LUs on this node.

If you specify an LU name, a TN3270 program with the specified TCP/IP address will be able to use only one session at a time by connecting to the specified server port number on this TN server node. If you specify an LU pool, the program can use multiple generic display LU sessions (or multiple copies of the program can access generic display LU sessions using this TN server), up to the number of LUs on this node that are available from the pool.

This parameter has no effect on specific display LU sessions.

ssl_enabled
Indicates whether this session uses Secure Sockets Layer (SSL) to access the server.

This parameter is reserved if you have not installed the additional software required to support SSL on the server. You can check this by using the NOF verb QUERY_NODE_LIMITS and checking the value of the *ssl_support* parameter.

Possible values are:

AP_NO This session does not use SSL.

AP_YES This session uses SSL.

AP_YES_WITH_CLI_AUTH
This session uses SSL, and the TN Server requires it to use client authentication. The client must send a valid certificate (information identifying it as a valid client authorized to use the TN Server).

As well as checking that the certificate is valid, the TN Server may also need to check the certificate against a certificate revocation list on an external LDAP server, to ensure that the user's authorization has not been revoked. In this case, you need to use DEFINE_TN3270_SSL_LDAP to specify how to access this server. If the user is permitted to use the TN3270 Express Logon feature, you also need to use DEFINE_TN3270_EXPRESS_LOGON to set up this feature.

Note:

1. If this session's *port_number* parameter indicates that it uses the Telnet daemon's TCP/IP port, do not use SSL for this session. If you use SSL on a session that uses the Telnet daemon's TCP/IP port, Telnet clients will not be able to use **telnet** to access the CS Linux computer while the node is active.
2. If you have large numbers of clients that use the same port, and are migrating them from non-SSL to SSL configuration, you can set up the configuration to accept both SSL and non-SSL connections on the same port while the migration is in progress. See the *allow_ssl_timeout_to_nonssl* parameter below.

security_level

Indicates the SSL security level required for this session. The session will use the highest security level that both client and server can support; if the client cannot support the requested level of security or higher, the session will not be started.

If the *ssl_enabled* parameter is set to `AP_NO`, this parameter is reserved.

Possible values are:

`AP_SSL_AUTHENTICATE_MIN`
Certificates must be exchanged; encryption is not required (but can be used if the client requests it).

`AP_SSL_AUTHENTICATE_ONLY`
Certificates must be exchanged, but encryption will not be used. This option is typically used to avoid the overhead of encryption when the client is connecting across a secure intranet.

`AP_SSL_40_BIT_MIN`
Use at least 40-bit encryption.

`AP_SSL_56_BIT_MIN`
Use at least 56-bit encryption.

`AP_SSL_128_BIT_MIN`
Use at least 128-bit encryption.

`AP_SSL_168_BIT_MIN`
Use at least 168-bit encryption.

`AP_SSL_256_BIT_MIN`
Use at least 256-bit encryption.

Note: Using encryption requires additional software to be installed with CS Linux; see *IBM Communications Server for Data Center Deployment on Linux Quick Beginnings* for more information. Depending on your location, you may not be able to use all the encryption levels listed because the software required to support them is not available in your country.

cert_key_label

The label identifying a certificate and key pair for use with SSL on this session. This must match a label specified when the SSL keyring database was set up; see *IBM Communications Server for Data Center Deployment on Linux Quick Beginnings* for more information.

The label is a null-terminated ASCII character string. To use the default SSL certificate and key pair, specified when the SSL keyring database was set up, set this parameter to a null string.

listen_local_address
The address on the local TN Server computer to which TN3270 clients will connect.

- If TN3270 clients are to be able to connect on any local address, or if there is only one valid local address on the TN Server, set this parameter to all binary zeros. In this case, any `tn3270_session_data` structure that uses the same *port_number* as this one (for the same *client_address* or a different one) must also have this parameter set to all binary zeros.
- If you need to restrict TN3270 clients to a particular local address, specify it as a null-terminated ASCII string. The address can be either of the following:
  - An IPv4 dotted-decimal address (such as `193.1.11.100`).
  - An IPv6 colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).

  If you specify an address, any `tn3270_session_data` structure that uses the same *port_number* as this one (for the same *client_address* or a different one) must also have a value specified for this parameter, although the address need not be the same for all sessions.

Note: If you specify a local address for one or more sessions, this client record will not be displayed in the Motif administration program, so you cannot use that program to view or manage it. You can still manage it using the command-line administration program, **snaadmin**, or a NOF application.

allow_ssl_timeout_to_nonssl
This parameter does not apply if *ssl_enabled* is set to `AP_NO`. Indicates whether non-SSL TN3270 clients can access the server using this session record even though it is configured to use SSL. Possible values are:

AP_YES TN3270 clients not using SSL can access the server. There will be a 5–second delay on startup while the server waits for SSL negotiation to begin; after this, the server will assume that the client is not using SSL and revert to normal TN3270 communications.

AP_NO Only TN3270 clients using SSL can access the server.

Note: This option is provided for migration purposes: if you have large numbers of clients that use the same port, and are migrating them from non-SSL to SSL configuration, you can set up the configuration to accept both SSL and non-SSL connections on the same port while the migration is in progress.

Allowing non-SSL clients to use SSL resources may be a security exposure, so this option is not intended for long-term use. You should set this parameter to `AP_YES` only for brief periods while migration is in progress, and then set it to `AP_NO` when migration is complete.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_UNKNOWN_CLIENT_ADDRESS
The specified name or alias could not be mapped to a fully qualified name.

AP_CLIENT_ADDRESS_CLASH
The fully qualified name, resolved from the *client_address* parameter, clashes with one that has already been defined.

AP_DUPLICATE_PORT_NUMBER
Another TN3270 access session record uses the same *port_number* parameter as this one, but the *listen_local_address* parameters are set inconsistently. The *listen_local_address* must be specified on all records with the same port number, or on none of them; it cannot be specified on one but not specified on another.

AP_TCPIP_PORT_IN_USE
The TCP/IP port number cannot be used by TN server because it is already in use by a different program.

AP_INVALID_TN3270_SUPPORT
The *tn3270_support* parameter for one or more sessions was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_TN3270_ASSOCIATION

DEFINE_TN3270_ASSOCIATION defines an association between a display LU and a printer LU. This association allows a TN3270E client to connect to the printer LU that is associated with a display LU without knowing the name of the printer LU. The DEFINE_TN3270_ASSOCIATION verb can be used to define a new association or to overwrite an existing association for a particular display LU.

VCB Structure

```
typedef struct define_tn3270_association
{
   AP_UINT16        opcode;              /* verb operation code          */
   unsigned char    reserv2;             /* reserved                     */
   unsigned char    format;              /* reserved                     */
   AP_UINT16        primary_rc;          /* primary return code          */
   AP_UINT32        secondary_rc;        /* secondary return code        */
```

```
   unsigned char    display_lu_name[8];    /* Display LU name              */
   TN3270_ASSOCIATION_DEF_DATA def_data;   /* association definition       */
} DEFINE_TN3270_ASSOCIATION;

typedef struct tn3270_association_def_data
{
   unsigned char    description[32];       /* description                  */
   unsigned char    reserve0[16];          /* reserved                     */
   unsigned char    printer_lu_name[8];    /* Printer LU name              */
   unsigned char    reserv2[8];            /* reserved                     */
} TN3270_ASSOCIATION_DEF_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_TN3270_ASSOCIATION

display_lu_name
Name of the display LU to be associated with the printer that was specified by the *def_data.printer_lu_name* parameter. This is a type-A EBCDIC string padded on the right with EBCDIC spaces.

The specified display LU should be a display LU defined on the local node, but this is not enforced by the NOF API.

def_data.description
Description of the association being defined. This parameter is optional.

def_data.printer_lu_name
Name of the printer LU to be associated with the display LU that was specified by the *display_lu_name* parameter. This is a type-A EBCDIC string padded on the right with EBCDIC spaces.

The specified printer LU should be a printer LU defined on the local node.

It is not possible for a single printer LU to be shared by two TN3270E emulators; no two TN3270 associations can specify the same printer LU.

The printer LU should not be accessible as a generic printer LU; otherwise it may not be available as an associated printer LU because it is already in use. Therefore, the associated printer LU should not be configured (directly or indirectly as a member of an LU pool) as the *printer_lu_name* in a DEFINE_TN3270_ACCESS verb.

(These rules are not enforced by the NOF API.)

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
Either the supplied display LU name or the supplied printer LU name was not a valid EBCDIC string.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_TN3270_DEFAULTS

DEFINE_TN3270_DEFAULTS defines TN3270 parameters used on all client sessions.

If you are using Secure Sockets Layer (SSL) client authentication, and checking clients against a certificate revocation list on an external LDAP server, you also need to configure details of how to access this server. To do this, use the DEFINE_TN3270_SSL_LDAP verb.

VCB Structure

```
typedef struct define_tn3270_defaults
{
   AP_UINT16        opcode;               /* verb operation code            */
   unsigned char    reserv2;              /* reserved                       */
   unsigned char    format;               /* reserved                       */
   AP_UINT16        primary_rc;           /* primary return code            */
   AP_UINT32        secondary_rc;         /* secondary return code          */
   TN3270_DEFAULTS_DEF_DATA def_data;     /* TN3270 defaults                */
} DEFINE_TN3270_DEFAULTS;

typedef struct tn3270_defaults_def_data
{
   unsigned char    force_responses;      /* force printer responses?       */
   unsigned char    keepalive_method;     /* method for sending keep-alives */
   AP_UINT32        keepalive_interval;   /* interval between keep-alives   */
   unsigned char    reserv2[32];          /* reserved                       */
} TN3270_DEFAULTS_DEF_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_TN3270_DEFAULTS

def_data.force_responses
Controls client responses on printer sessions. Possible values are:

AP_YES Always request definite responses from the client printer sessions. Some 3270 emulators are unable to print large jobs if definite responses are not requested. If necessary, set *force_responses* to AP_YES to avoid problems.

AP_NO Request responses matching SNA traffic.

def_data.keepalive_method
Method for sending keep-alive messages. Keep-alive messages are messages sent to TN3270 clients when there is no other activity on the connection, to keep the TCP/IP connections to the clients active; this ensures that failed connections and clients can be detected. If there is no

traffic at all on a TCP/IP connection, failure of the connection or of the client may never be detected, which wastes TN server resources and prevents LUs from being used for other sessions.

Possible values are:

AP_NONE
Do not send keep-alive messages.

AP_TN3270_NOP
Send Telnet NOP messages.

AP_TN3270_TM
Send Telnet DO TIMING-MARK messages.

def_data.keepalive_interval
Interval (in seconds) between consecutive keep-alive messages. The interval should be long enough to minimize network traffic, especially if there are typically many idle client connections. The shorter the keep-alive interval, the quicker failures are detected, but the more network traffic is generated. If the keep-alive interval is too short and there are many clients, this traffic can be significant.

Typical values are in the range 600–7200 (10 minutes to 2 hours). The value 0 (zero) is not valid when the *keepalive_method* parameter is set to AP_TN3270_NOP or AP_TN3270_TM.

Because of the way TCP/IP operates, the keepalive interval that you configure is not the exact time that it will take for the server to recognize that a client has disappeared. The exact time depends on various factors, but will be no more than twice the configured timeout plus a few extra minutes (the exact number depends on how TCP/IP is configured).

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_KEEPALIVE
The *keepalive_method* parameter was not set to a valid value.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_TN3270_EXPRESS_LOGON

DEFINE_TN3270_EXPRESS_LOGON sets up the TN3270 Express Logon feature. This feature means that TN3270 client users who connect to CS Linux TN Server or TN Redirector using the Secure Sockets Layer (SSL) client authentication feature do not need to supply the user ID and password normally used for TN3270 security. Instead, their security certificate is checked against a Digital Certificate Access Server (DCAS) at the host, which supplies the required user ID and password.

VCB Structure

```
typedef struct define_tn3270_express_logon
{
   AP_UINT16           opcode;             /* verb operation code            */
   unsigned char       reserv2;            /* reserved                       */
   unsigned char       format;             /* reserved                       */
   AP_UINT16           primary_rc;         /* primary return code            */
   AP_UINT32           secondary_rc;       /* secondary return code          */
   unsigned char       dcas_server[256];   /* IP hostname of DCAS server     */
   AP_UINT16           dcas_port;          /* port number to access server   */
   unsigned char       enabled;            /* is Express Logon enabled?      */
   unsigned char       reserv3[33];        /* reserved                       */
} DEFINE_TN3270_EXPRESS_LOGON;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_TN3270_EXPRESS_LOGON

dcas_server

The TCP/IP address of the host DCAS server that handles Express Logon authorization. This can be specified as any of the following.

- An IPv4 dotted-decimal address (such as 193.1.11.100).
- An IPv6 colon-hexadecimal address (such as 2001:0db8:0000:0000:0000:0000:1428:57ab or 2001:db8::1428:57ab).
- A name (such as newbox.this.co.uk.
- An alias (such as newbox).

If you use a name or alias, the Linux system must be able to resolve the name or alias to a fully-qualified name (either using the local TCP/IP configuration or using a Domain Name server). Fully-qualified names are not case-sensitive; for example, Newbox.THIS.CO.UK is equivalent to newbox.this.co.uk.

dcas_port

The TCP/IP port number used to access the DCAS server.

enabled Specifies whether the TN3270 Express Logon function is enabled. Possible values are:

AP_YES The function is enabled, so TN3270 clients can access the host without needing to specify a user ID and password.

AP_NO The function is not enabled, so TN3270 clients must specify a user ID and password.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_TN3270_SSL_LDAP

DEFINE_TN3270_SSL_LDAP defines how to access a certificate revocation list for use with the Secure Sockets Layer (SSL) client authentication feature. The revocation list is held on an external LDAP server, and contains details of individual Telnet clients that are no longer authorized to use TN Server or TN Redirector (for example because the user's security information has been discovered by an unauthorized party, or because the user no longer works for the authorized organization).

If this feature is in use, a TN3270 client connecting to CS Linux TN Server or TN Redirector must supply a certificate (information identifying it as a valid client authorized to use the server). The server then checks this certificate against the revocation list to ensure that it is still valid.

This verb can be used to define access to the LDAP server, to modify the access information (for example to change a user ID and password), or to specify that CS Linux does not use a revocation list on an external LDAP server.

The verb must be issued to an inactive node; you cannot modify the LDAP server access information while the node is running.

VCB Structure

```
typedef struct define_tn3270_ssl_ldap
{
   AP_UINT16           opcode;             /* verb operation code            */
   unsigned char       reserv2;            /* reserved                       */
   unsigned char       format;             /* reserved                       */
   AP_UINT16           primary_rc;         /* primary return code            */
   AP_UINT32           secondary_rc;       /* secondary return code          */
} DEFINE_TN3270_SSL_LDAP;
```

The `define_tn3270_ssl_ldap` structure must be followed immediately by a `tn3270_ssl_ldap_def_data` structure, concatenated to the end of the VCB, as follows.

```
typedef struct tn3270_ssl_ldap_def_data
{
   AP_UINT16           overlay_size;       /* reserved                       */
   unsigned char       auth_type;          /* type of authorization checking */
   unsigned char       reserv1;            /* reserved                       */
   unsigned char       ldap_addr[256];     /* address of LDAP server         */
   AP_UINT16           ldap_port;          /* port number to access server   */
   unsigned char       ldap_user[1024];    /* user ID on LDAP server         */
   unsigned char       ldap_password[128]; /* password on LDAP server        */
   unsigned char       reserv2[256];       /* reserved                       */
} TN3270_SSL_LDAP_DEF_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_TN3270_SSL_LDAP

def_data.auth_type
Specifies the type of authorization checking performed by the TN Server or TN Redirector. Possible values are:

AP_LOCAL_ONLY
The server checks client certificates locally, but does not use an external certificate revocation list. The parameters *ldap_addr*—*ldap_password* are reserved.

AP_LOCAL_X500
The server checks certificates locally, and also checks against an external certificate revocation list. The remaining parameters in this data structure specify the location of this list.

def_data.ldap_addr
The TCP/IP address of the LDAP server that holds the certificate revocation list. This can be specified as any of the following.

- An IPv4 dotted-decimal address (such as `193.1.11.100`).
- An IPv6 colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).
- A name (such as `newbox.this.co.uk`.
- An alias (such as `newbox`).

If you use a name or alias, the Linux system must be able to resolve the name or alias to a fully qualified name (either using the local TCP/IP configuration or using a Domain Name server). Fully-qualified names are not case-sensitive; for example, `Newbox.THIS.CO.UK` is equivalent to `newbox.this.co.uk`.

def_data.ldap_port
The TCP/IP port number used to access the LDAP server.

def_data.ldap_user
The user name used to access the certificate revocation list on the LDAP server. Check with the system administrator of the LDAP server to determine how to specify this parameter.

def_data.ldap_password
The password used to access the certificate revocation list on the LDAP server. Check with the system administrator of the LDAP server to determine how to specify this parameter.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
`AP_PARAMETER_CHECK`

secondary_rc

AP_INVALID_AUTH_TYPE
The *auth_type* parameter was not set to a valid value.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_TN_REDIRECT

DEFINE_TN_REDIRECT defines access details for a particular Telnet client (or default access details for all clients) using the TN Redirector feature of CS Linux. It can be used to define a new client, or to modify the existing definition. (To define access details for a client using TN3270 Server, use DEFINE_TN3270_ACCESS.)

VCB Structure

```
typedef struct define_tn_redirect
{
   AP_UINT16             opcode;           /* verb operation code           */
   unsigned char         reserv2;          /* reserved                      */
   unsigned char         format;           /* reserved                      */
   AP_UINT16             primary_rc;       /* primary return code           */
   AP_UINT32             secondary_rc;     /* secondary return code         */
   TN_REDIRECT_ADDRESS   addr;             /* Uniquely defines record       */
   TN_REDIRECT_DEF_DATA  def_data;         /* verb data                     */
} DEFINE_TN_REDIRECT;

typedef struct tn_redirect_address
{
   AP_UINT16      default_record;    /* Is this the default record ?        */
   unsigned char  address_format;    /* IP address or fully-qualified name  */
   unsigned char  client_address[256];  /* Client address                   */
   AP_UINT16      port_number;       /* Port number that client connects on */
   unsigned char  listen_local_address[46];
                                     /* Local addr client connects to       */
   unsigned char  reserved[34];      /* reserved                            */
} TN_REDIRECT_ADDRESS;

typedef struct tn_redirect_def_data
{
   unsigned char  description[32];       /* Description - null terminated   */
   unsigned char  reserve0[16];          /* Reserved                        */
   unsigned char  cli_conn_ssl_enabled;  /* Is the client session SSL?      */
   unsigned char  serv_conn_ssl_enabled; /* Is the host session SSL?        */
   unsigned char  host_address_format;   /* Type of IP address for the host */
   unsigned char  reserv1;               /* Reserved                        */
   unsigned char  host_address[256];     /* Host address                    */
   AP_UINT16      host_port_number;      /* Port number to connect to host  */
   unsigned char  cli_conn_security_level;      /* SSL encryption strength  */
   unsigned char  serv_conn_security_level;     /* SSL encryption strength  */
   unsigned char  cli_conn_cert_key_label[80];  /* Key label for certificate */
   unsigned char  serv_conn_cert_key_label[80]; /* Key label for certificate */
   unsigned char  reserved[46];                 /* Reserved                 */
} TN_REDIRECT_DEF_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_TN_REDIRECT

addr.default_record

Specifies whether this verb defines a default record, which will be used by any Telnet client not explicitly identified by a TCP/IP address. If a Telnet client attempts to contact the TN Redirector node, and the user's TCP/IP

address does not match any DEFINE_TN_REDIRECT record in the configuration but there is a default record defined for the port number used by the client, the parameters from this record will be used. Possible values are:

AP_YES This verb defines a default record. The *client_address* and *address_format* parameters are reserved.

AP_NO This verb defines a normal TN Redirector user record.

A default record provides access to the TN Redirector function for any Telnet client that can determine the TCP/IP address of the computer where the TN server is running. To restrict the use of TN Redirector to a specific group of users, either do not include the default record, or leave it with no host address configured so that it cannot be used.

You can also set up a default record for most users, but explicitly exclude one or more TCP/IP addresses. To do this, define the addresses to be excluded as TN Redirector users, and leave them with no host address configured.

addr.address_format

Specifies the format of the *client_address* parameter. Possible values are:

AP_ADDRESS_IP
IP address (either IPv4 or IPv6)

AP_ADDRESS_FQN
Alias or fully qualified name

addr.client_address

The TCP/IP address of the computer on which the Telnet client runs. This is a null-terminated ASCII string, which can be any of the following; the *address_format* parameter indicates whether it is an IP address or a name.

- An IPv4 dotted-decimal address (such as `193.1.11.100`).
- An IPv6 colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).
- A name (such as `newbox.this.co.uk`.
- An alias (such as `newbox`).

If you use a name or alias, the following restrictions apply:

- The Linux system must be able to resolve the name or alias to a fully qualified name (either using the local TCP/IP configuration or using a Domain Name server).
- Each name or alias must expand to a unique fully qualified name; you should not configure two names for users of the same TN Redirector node that will be resolved to the same fully qualified name.
- Fully-qualified names are not case-sensitive; for example, `Newbox.THIS.CO.UK` is equivalent to `newbox.this.co.uk`.

addr.port_number

The number of the server TCP/IP port that the Telnet client uses to access the TN Redirector node.

If the *default_record* parameter specifies that this is a default TN Redirector access record, this parameter must not match the port address used by a default TN3270 Server access record (defined using DEFINE_TN3270_ACCESS). You can define only one of the two types of default record for each port number.

If two or more tn_redirect_address structures use the same *port_number* (for the same *client_address* or a different one), the *listen_local_address* parameter must be specified on all of them or none of them; you cannot specify it on some sessions but leave it unspecified on others.

addr.listen_local_address
The address on the local TN Server computer to which TN3270 clients will connect.

- If TN3270 clients are to be able to connect on any local address, or if there is only one valid local address on the TN Server, set this parameter to all binary zeros. In this case, any tn_redirect_address structure that uses the same *port_number* as this one (for the same *client_address* or a different one) must also have this parameter set to all binary zeros.
- If you need to restrict TN3270 clients to a particular local address, specify it as a null-terminated ASCII string. The address can be either of the following:
  - An IPv4 dotted-decimal address (such as 193.1.11.100).
  - An IPv6 colon-hexadecimal address (such as 2001:0db8:0000:0000:0000:0000:1428:57ab or 2001:db8::1428:57ab).

  In this case, any tn_redirect_address structure that uses the same *port_number* as this one (for the same *client_address* or a different one) must also have a value specified for this parameter, although the address need not be the same for all sessions.

Note: If you specify a local address for one or more sessions, this client record will not be displayed in the Motif administration program, so you cannot use that program to view or manage it. You can still manage it using the command-line administration program, **snaadmin**, or a NOF application.

def_data.description
An optional text string (0–31 characters followed by a null character). The string is for information only; it is stored in the configuration file and returned on a QUERY_TN_REDIRECT_DEF verb, but CS Linux does not make use of it. You can use it to store additional information to help distinguish between users.

def_data.cli_conn_ssl_enabled
Indicates whether the client uses Secure Sockets Layer (SSL) to access the TN Redirector.

This parameter is reserved if you have not installed the additional software required to support SSL on the server. You can check this by using the NOF verb QUERY_NODE_LIMITS and checking the value of the *ssl_support* parameter.

Possible values are:

AP_NO The client does not use SSL.

AP_YES The client uses SSL.

AP_YES_WITH_CLI_AUTH
The client uses SSL, and the TN Redirector requires it to use client authentication. The client must send a valid certificate (information identifying it as a valid client authorized to use the TN Redirector).

As well as checking that the certificate is valid, the TN Redirector may also need to check the certificate against a certificate

revocation list on an external LDAP server, to ensure that the user's authorization has not been revoked. In this case, you also need to use DEFINE_TN3270_SSL_LDAP to specify how to access this server.

def_data.serv_conn_ssl_enabled
Indicates whether the TN Redirector uses Secure Sockets Layer (SSL) to access the host on behalf of this client.

This parameter is reserved if you have not installed the additional software required to support SSL on the server. You can check this by using the NOF verb QUERY_NODE_LIMITS and checking the value of the *ssl_support* parameter.

Possible values are:

AP_NO The host does not use SSL.

AP_YES The host uses SSL.

def_data.host_address_format
Specifies the format of the *host_address* parameter. Possible values are:

AP_ADDRESS_IP
IP address (either IPv4 or IPv6)

AP_ADDRESS_FQN
Alias or fully qualified name

def_data.host_address
The TCP/IP address of the host computer with which the client communicates. This is a null-terminated ASCII string, which can be any of the following; the *host_address_format* parameter indicates whether it is an IP address or a name.

- An IPv4 dotted-decimal address (such as `193.1.11.100`).
- An IPv6 colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).
- A name (such as `newbox.this.co.uk`.
- An alias (such as `newbox`).

If you use a name or alias, the Linux system must be able to resolve the name or alias to a fully qualified name (either using the local TCP/IP configuration or using a Domain Name server). Fully-qualified names are not case-sensitive; for example, `Newbox.THIS.CO.UK` is equivalent to `newbox.this.co.uk`.

def_data.host_port_number
The number of the TCP/IP port that the TN Redirector node uses to access the host.

def_data.cli_conn_security_level
Indicates the SSL security level required for the client connection on this session. The session will use the highest security level that both client and server can support; if the client cannot support the requested level of security or higher, the session will not be started.

If the *cli_conn_ssl_enabled* parameter is set to `AP_NO`, this parameter is reserved.

Possible values are:

AP_SSL_AUTHENTICATE_MIN
Certificates must be exchanged; encryption is not required (but can be used if the client requests it).

AP_SSL_AUTHENTICATE_ONLY
Certificates must be exchanged, but encryption will not be used. This option is typically used to avoid the overhead of encryption when the client is connecting across a secure intranet.

AP_SSL_40_BIT_MIN
Use at least 40-bit encryption.

AP_SSL_56_BIT_MIN
Use at least 56-bit encryption.

AP_SSL_128_BIT_MIN
Use at least 128-bit encryption.

AP_SSL_168_BIT_MIN
Use at least 168-bit encryption.

AP_SSL_256_BIT_MIN
Use at least 256-bit encryption.

Note: Using encryption requires additional software to be installed with CS Linux; see *IBM Communications Server for Data Center Deployment on Linux Quick Beginnings* for more information. Depending on your location, you may not be able to use all the encryption levels listed because the software required to support them is not available in your country.

def_data.serv_conn_security_level
Indicates the SSL security level required for the host connection on this session. The session will use the highest security level that both the host and CS Linux can support; if the host cannot support the requested level of security or higher, the session will not be started.

If the *serv_conn_ssl_enabled* parameter is set to AP_NO, this parameter is reserved.

Possible values are:

AP_SSL_AUTHENTICATE_MIN
Certificates must be exchanged; encryption is not required (but can be used if the host requests it).

AP_SSL_AUTHENTICATE_ONLY
Certificates must be exchanged, but encryption will not be used. This option is typically used to avoid the overhead of encryption when the host connection is across a secure intranet.

AP_SSL_40_BIT_MIN
Use at least 40-bit encryption.

AP_SSL_56_BIT_MIN
Use at least 56-bit encryption.

AP_SSL_128_BIT_MIN
Use at least 128-bit encryption.

AP_SSL_168_BIT_MIN
Use at least 168-bit encryption.

AP_SSL_256_BIT_MIN
Use at least 256-bit encryption.

Note: Using encryption requires additional software to be installed with CS Linux; see *IBM Communications Server for Data Center Deployment on Linux Quick Beginnings* for more information. Depending on your location, you may not be able to use all the encryption levels listed because the software required to support them is not available in your country.

def_data.cli_conn_cert_key_label
The label identifying a certificate and key pair for use with SSL on the client session. This must match a label specified when the SSL keyring database was set up; see *IBM Communications Server for Data Center Deployment on Linux Quick Beginnings* for more information.

If the *cli_conn_ssl_enabled* parameter is set to AP_NO, this parameter is reserved.

The label is a null-terminated ASCII character string. To use the default SSL certificate and key pair, specified when the SSL keyring database was set up, set this parameter to a null string.

def_data.serv_conn_cert_key_label
The label identifying a certificate and key pair for use with SSL on the host session. This must match a label specified when the SSL keyring database was set up; see *IBM Communications Server for Data Center Deployment on Linux Quick Beginnings* for more information.

If the *serv_conn_ssl_enabled* parameter is set to AP_NO, this parameter is reserved.

The label is a null-terminated ASCII character string. To use the default SSL certificate and key pair, specified when the SSL keyring database was set up, set this parameter to a null string.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_UNKNOWN_CLIENT_ADDRESS
The specified name or alias could not be mapped to a fully qualified name.

AP_CLIENT_CLASH
The combination of port number and fully qualified name (resolved from the *client_address* parameter) clashes with one that has already been defined.

AP_DUPLICATE_PORT_NUMBER
Another TN Redirector record uses the same *port_number* parameter as this one, but the *listen_local_address* parameters are set inconsistently. The *listen_local_address* must be specified on all records with the same port number, or on none of them; it cannot be specified on one but not specified on another.

AP_TCPIP_PORT_IN_USE
The TCP/IP port number cannot be used by TN Redirector because it is already in use by a different program.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_TP

The DEFINE_TP verb provides information that CS Linux needs to start a TP as a result of an incoming attach from a partner LU. This verb can also be used to modify one or more fields on a previously defined TP.

The standard parameters for invoked TPs are defined in the invokable TP information file (for more information, see the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*). DEFINE_TP is required only if you need to specify additional parameters that cannot be set in the file: to restrict the TP to use particular options for conversation security, confirm synchronization, or conversation type (mapped or basic), or to restrict the number of instances of the TP that can be running at any time.

VCB Structure

```
typedef struct define_tp
{
   AP_UINT16        opcode;                 /* verb operation code           */
   unsigned char    reserv2;                /* reserved                      */
   unsigned char    format;                 /* reserved                      */
   AP_UINT16        primary_rc;             /* primary return code           */
   AP_UINT32        secondary_rc;           /* secondary return code         */
   unsigned char    tp_name[64];            /* TP name                       */
   TP_CHARS         tp_chars;               /* TP characteristics            */
} DEFINE_TP;

typedef struct tp_chars
{
   unsigned char    description[32];         /* resource description          */
   unsigned char    security_list_name[14]; /* security access list name     */
   unsigned char    reserv1[2];             /* reserved                      */
   unsigned char    conv_type;              /* conversation type             */
   unsigned char    security_rqd;           /* security support              */
   unsigned char    sync_level;             /* synchronisation level support */
   unsigned char    dynamic_load;           /* dynamic load (AP_YES)         */
   unsigned char    enabled;                /* is the TP enabled?            */
   unsigned char    pip_allowed;            /* program initialization        */
                                            /*  parameters supported         */
   unsigned char    reserv3[10];            /* reserved                      */
   AP_UINT16        tp_instance_limit;      /* limit on currently active TP  */
                                            /*  instances                    */
   AP_UINT16        incoming_alloc_timeout; /* incoming allocation timeout   */
```

```
   AP_UINT16        rcv_alloc_timeout;      /* receive allocation timeout    */
   AP_UINT16        tp_data_len;            /* reserved                      */
   unsigned char    tp_data[120];           /* reserved                      */
} TP_CHARS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_TP

tp_name
Name of the TP being defined.

tp_chars.description
A null-terminated text string (0–31 characters followed by a null character) describing the TP. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_TP_DEFINITION and QUERY_TP verbs, but CS Linux does not make any other use of it.

tp_chars.security_list_name
Name of the security access list used by this TP (defined using the DEFINE_SECURITY_ACCESS_LIST verb). This parameter restricts the TP so that only the users named in the specified list can allocate conversations with it. If you specify a security access list, the *tp_chars.security_rqd* parameter must be set to AP_YES.

To specify that the TP is available for use by any user, set this parameter to 14 binary zeros.

tp_chars.conv_type
Specifies the type(s) of conversation supported by this TP. Possible values are:

AP_BASIC
The TP supports only basic conversations.

AP_MAPPED
The TP supports only mapped conversations.

AP_EITHER
The TP supports either basic or mapped conversations.

tp_chars.security_rqd
Specifies whether conversation security information is required to start the TP. Possible values are:

AP_YES A user ID and password are required to start the TP.

AP_NO No security information is required.

tp_chars.sync_level
Specifies the values of synchronization level supported by the TP. Possible values are:

AP_NONE
The TP supports only *sync_level* NONE.

AP_CONFIRM_SYNC_LEVEL
The TP supports only *sync_level* CONFIRM.

AP_EITHER
The TP supports either *sync_level* NONE or CONFIRM.

AP_SYNCPT_REQUIRED
The TP supports only *sync_level* SYNCPT (syncpoint is required).

AP_SYNCPT_NEGOTIABLE
The TP supports any of the three *sync_level* values NONE, CONFIRM, and SYNCPT.

tp_chars.dynamic_load
This parameter must be set to AP_YES.

tp_chars.enabled
Specifies whether the TP can be attached successfully. Possible values are:

AP_YES TP can be attached.

AP_NO TP cannot be attached.

tp_chars.pip_allowed
Specifies whether the TP can receive Program Initialization Parameters (PIP). Possible values are:

AP_YES TP can receive PIP.

AP_NO TP cannot receive PIP.

tp_chars.tp_instance_limit
Limit on the number of instances of this TP that can be active at any one time. A value of zero means no limit.

tp_chars.incoming_alloc_timeout
Specifies the number of seconds that an incoming Attach will be queued waiting for a RECEIVE_ALLOCATE. The value 0 (zero) implies that there is no timeout; the incoming Attach will be queued indefinitely.

tp_chars.rcv_alloc_timeout
Number of seconds that a RECEIVE_ALLOCATE verb is queued waiting for an incoming Attach. The value 0 (zero) implies that there is no timeout; the RECEIVE_ALLOCATE verb will be queued indefinitely.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_SYSTEM_TP_CANT_BE_CHANGED
The specified TP name is the name of a TP used internally by CS Linux you cannot define or modify a TP with this name.

AP_INVALID_CONV_TYPE
The *conv_type* parameter was not set to a valid value.

AP_INVALID_SYNC_LEVEL
The *sync_level* parameter was not set to a valid value.

AP_INVALID_DYNAMIC_LOAD
The *dynamic_load* parameter was not set to a valid value.

AP_INVALID_ENABLED
The *enabled* parameter was not set to a valid value.

AP_INVALID_PIP_ALLOWED
The *pip_allowed* parameter was not set to a valid value.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_SECURITY_LIST_NOT_DEFINED
The *security_list_name* parameter did not match any defined security list name.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_TP_LOAD_INFO

DEFINE_TP_LOAD_INFO defines or changes an entry that describes information to be used when a transaction program is loaded. An application must issue OPEN_FILE with a requested role of AP_TP_LOAD_INFO before issuing the DEFINE_TP_LOAD_INFO verb.

VCB Structure

```
typedef struct define_tp_load_info
{
      AP_UINT16              opcode;             /* verb operation code         */
      unsigned char          reserv2;            /* reserved                    */
      unsigned char          format;             /* reserved                    */
      AP_UINT16              primary_rc;         /* primary return code         */
      AP_UINT32              secondary_rc;       /* secondary return code       */
      unsigned char          tp_name[64];        /* TP name                     */
      unsigned char          lu_alias[8];        /* LU alias                    */
      TP_LOAD_INFO_DEF_DATA  def_data;           /* defined data                */
} DEFINE_TP_LOAD_INFO;

typedef struct tp_load_info_def_data
{
      unsigned char          description[32];     /* Description                */
      unsigned char          reserv1[16];        /* reserved                    */
      unsigned char          user_id[64];        /* User ID                     */
      unsigned char          group_id[64];       /* Group ID                    */
      AP_UINT32              timeout;            /* Timeout value               */
      unsigned char          type;               /* TP type                     */
      unsigned char          style;              /* reserved                    */
AP_UINT16              ltv_length;          /* Length of LTV data          */
} TP_LOAD_INFO_DEF_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_TP_LOAD_INFO

tp_name
The TP name of the TP load info entry to be defined. This is a 64-byte EBCDIC string, padded on the right with spaces if the name is shorter than 64 characters.

lu_alias
The LU alias of the TP load info entry to be defined. This is an 8-byte ASCII character string.

Note: This parameter can be used only if the TP is an APPC TP. If the TP is a CPI-C application, this parameter is reserved and must be set to all zeros. CPI-C does not support accepting incoming Attaches from a particular local LU; specifying an LU alias (even a blank LU alias) for a CPI-C application will cause errors in routing the incoming Attach to the TP.

def_data.description
A null-terminated text string (0–32 characters followed by a null character) describing the TP load info. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_TP verb, but CS Linux does not make any other use of it.

def_data.user_id
User ID required to access and run the TP.

def_data.group_id
Group ID required to access and run the TP.

def_data.timeout
Timeout in seconds after the TP is loaded.

def_data.type
Specifies the TP type. Possible values are:

AP_TP_TYPE_QUEUED

AP_TP_TYPE_QUEUED_BROADCAST

AP_TP_TYPE_NON_QUEUED

def_data.ltv_length
Length of the block of LTV data that is appended to this verb. Each LTV structure is specified in TP_LOAD_INFO_LTV.

TP_LOAD_INFO_LTV
The LTV data is specified as a series of non-byte-aligned LTVs each of which consists of the following:

- A 2-byte length field with a maximum value of 258 bytes. This field is in line format and is read or written using NB_PUT_SHORT or NB_GET_SHORT.
- A 1-byte type field set to one of the following possible values:

  AP_TYPE_TP_PATH
  Path. The value string specifies the full path name of the TP executable.

  AP_TYPE_TP_ARGUMENTS
  Arguments. The value string specifies a command-line argument required by the TP.

AP_TYPE_TP_STDIN
Standard input. The value string specifies the full path name of the standard input file or device. If this LTV is not specified, the default is **/dev/null**.

AP_TYPE_TP_STDOUT
Standard output. The value string specifies the full path name of the standard output file or device. If this LTV is not specified, the default is **/dev/null**.

AP_TYPE_TP_STDERR
Standard error. The value string specifies the full path name of the standard error file or device. If this LTV is not specified, the default is **/dev/null**.

AP_TYPE_TP_ENV
Environment. The value string specifies an environment variables required by the TP, in the form *VARIABLE* = *VALUE*.

If the TP is a CPI-C application, note that you cannot set the environment variable APPCLLU using this LTV. The local LU cannot be specified in the TP load information for an automatically-loaded CPI-C application.

- A value field consisting of up to 255 bytes of ASCII data.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_TP_TYPE
The *type* parameter was not set to a valid value.

AP_INVALID_LTV_LENGTH
An LTV *length* parameter was not set to a valid value.

AP_INVALID_LTV_TYPE
The LTV *type* parameter was not set to a valid value.

AP_INVALID_LTV_VALUE
An LTV *value* parameter contained data that was not valid.

AP_INVALID_TP_STYLE
The TP *style* parameter contains a value that is not valid.

AP_INVALID_TP_NAME
The TP *name* parameter contains EBCDIC spaces.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DEFINE_USERID_PASSWORD

DEFINE_USERID_PASSWORD defines a user ID / password pair for use with APPC and CPI-C conversation security, or adds profiles for a defined user ID and password.

VCB Structure

```
typedef struct define_userid_password
{
    AP_UINT16              opcode;            /* verb operation code        */
    unsigned char          reserv2;           /* reserved                   */
    unsigned char          format;            /* reserved                   */
    AP_UINT16              primary_rc;        /* primary return code        */
    AP_UINT32              secondary_rc;      /* secondary return code      */
    AP_UINT16              define_type;       /* what the define type is    */
    unsigned char          user_id[10];       /* user id                    */
    unsigned char          reserv3[8];        /* reserved                   */
    USERID_PASSWORD_CHARS  password_chars;    /* password characteristics   */
} DEFINE_USERID_PASSWORD;

typedef struct userid_password_chars
{
    unsigned char          description[32];   /* resource description       */
    unsigned char          reserv2[16];       /* reserved                   */
    AP_UINT16              profile_count;     /* number of profiles         */
    AP_UINT16              reserv1;           /* reserved                   */
    unsigned char          password[10];      /* password                   */
    unsigned char          profiles[10][10];  /* profiles                   */
} USERID_PASSWORD_CHARS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DEFINE_USERID_PASSWORD

define_type
Specifies how this verb is being used. Possible values are:

AP_ADD_USER
Add a new user, or change the password for an existing user.

AP_ADD_PROFILES
Add to the profiles for an existing user.

user_id User identifier. This is a 10-byte type-AE EBCDIC character string, padded on the right with EBCDIC spaces.

Some CPI-C implementations have a maximum user ID length of 8 characters. If you specify a user ID of 9 or 10 characters, CPI-C applications running on other systems may not be able to access applications on the CS Linux system using this user ID and password.

password_chars.description
A null-terminated text string (0–31 characters followed by a null character) describing the user ID and password. This string is for information only; it is stored in the node's configuration file and returned on the QUERY_USERID_PASSWORD verb, but CS Linux does not make any other use of it.

password_chars.profile_count
Number of profiles. This parameter is normally set to zero; see *password_chars.profiles* below for more information.

password_chars.password
User's password. This is a 10-byte type-AE EBCDIC character string, padded on the right with EBCDIC spaces.

Some CPI-C implementations have a maximum password length of 8 characters. If you specify a password of 9 or 10 characters, CPI-C applications running on other systems may not be able to access applications on the CS Linux system using this user ID and password.

Whatever value the application supplies for this parameter is immediately replaced by the encrypted version of the password. Therefore, the value supplied for the *password_chars.password* parameter is never written out.

password_chars.profiles
Profile names associated with the user ID and password. Each of these is a 10-byte type-AE EBCDIC character string, padded on the right with EBCDIC spaces.

If a remote TP uses this user ID and password to contact the local TP, and specifies a profile on the Attach, this must match one of the profile names defined here. Check with the remote System Administrator to determine if a profile will be used; for each profile that will be used, specify the profile name as one of the *profiles* parameters on this verb. In most cases, profile names are not used, and so there is no need to specify them on this verb; set *password_chars.profile_count* to zero and do not specify any profiles.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_PASSWORD
The *password* parameter contained a character that was not valid.

AP_INVALID_PROFILE
One or more of the specified profiles was not valid.

AP_INVALID_UPDATE_TYPE
The *define_type* parameter was not set to a valid value.

AP_INVALID_USERID
The *user_id* parameter contained a character that was not valid.

AP_NO_PROFILES
The verb was used to add profiles to an existing user, but no profiles were specified.

AP_TOO_MANY_PROFILES
The *profile_count* parameter was not set to a valid value.

AP_UNKNOWN_USER
The verb was used to add profiles to an existing user, but the *user_id* parameter did not match an existing user ID.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_ADJACENT_LEN_NODE

DELETE_ADJACENT_LEN_NODE removes entries in the node directory database for an adjacent LEN node and its associated LUs, or removes LU entries for the LEN node without removing the LEN node itself. It is equivalent to issuing a series of DELETE_DIRECTORY_ENTRY verbs for the LEN node and its associated LUs.

VCB Structure

```
typedef struct delete_adjacent_len_node
{
     AP_UINT16         opcode;              /* verb operation code          */
     unsigned char     reserv2;             /* reserved                     */
     unsigned char     format;              /* reserved                     */
     AP_UINT16         primary_rc;          /* primary return code          */
     AP_UINT32         secondary_rc;        /* secondary return code        */
     unsigned char     cp_name[17];         /* CP name                      */
     unsigned char     num_of_lus;          /* number of LUs                */
     unsigned char     lu_names[10][8];     /* LU names                     */
     unsigned char     wildcard_lus;        /* wildcard LUs                 */
} DELETE_ADJACENT_LEN_NODE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_ADJACENT_LEN_NODE

cp_name
The fully qualified name of the CP in the adjacent LEN node. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

num_of_lus
The number of LUs to be deleted, in the range 1 to 10. To delete the entire LEN node definition, specify zero.

lu_names
The names of the LUs on the LEN node to be deleted. Each name is an 8-byte type-A EBCDIC character string, right-padded with EBCDIC spaces. Do not specify any LU names if you are deleting the entire LEN node definition (if *num_of_lus* is zero).

You can specify a "wildcard" LU name to match multiple LU names, by specifying only the initial characters of the name. For example, the

wildcard LU name APPN.LU will match APPN.LUNAME or APPN.LU01 (but will not match APPN.NAMELU). However, all the LU names specified on a single verb must be of the same type (wildcard or explicit), as defined by the *wildcard_lus* parameter below. To remove both types of LU names from the same LEN node, use multiple DELETE_ADJACENT_LEN_NODE verbs.

wildcard_lus
Indicates whether the specified LU names are wildcard entries or explicit LU names. Possible values are:

AP_YES The specified LU names are wildcard entries.

AP_NO The specified LU names are explicit entries.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_CP_NAME
The *cp_name* parameter contained a character that was not valid.

AP_INVALID_LU_NAME
One or more of the specified LU names contained a character that was not valid.

AP_INVALID_NUM_LUS
The *num_of_lus* parameter was not in the valid range.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_INVALID_CP_NAME
The specified CP name does not exist.

AP_INVALID_LU_NAME
One or more of the specified LU names does not exist.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_BACKUP

An application uses this verb to delete a server from the list of backup master servers in the **sna.net** file, so that this server can no longer act as the master configuration file server.

You can use this verb to delete any server in the list, including the master server, whether or not the SNA software is running on the server you are deleting. The only restriction is that the list must always contain at least one server on which the SNA software is running (so that this server can take over as the master server); you cannot delete a server if it is the only server in the list or if it is the only server listed on which the SNA software is running.

This verb must be issued to the **sna.net** file.

VCB Structure

```
typedef struct delete_backup
{
     AP_UINT16          opcode;              /* verb operation code         */
     unsigned char      reserv2;             /* reserved                    */
     unsigned char      format;              /* reserved                    */
     AP_UINT16          primary_rc;          /* primary return code         */
     AP_UINT32          secondary_rc;        /* secondary return code       */
     unsigned char      backup_name[128];    /* name of server to delete    */
     unsigned char      reserv3[4];          /* reserved                    */
} DELETE_BACKUP;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_BACKUP

backup_name
The name of the server being deleted from the list of backup servers.

If the server name includes a . (period) character, CS Linux assumes that it is a fully-qualified name; otherwise it performs a DNS lookup to determine the server name.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: State Check

If the verb does not execute because of a state check, CS Linux returns the following parameters:

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_RECORD_NOT_FOUND
The server name specified is not listed in the file.

AP_CANT_DELETE_LAST_BACKUP
The server name cannot be deleted from the list, because it is the only server listed on which the SNA software is running (and hence the only server that can currently act as the master). Before attempting to delete it, either start the SNA software on one or more of the other servers listed, or add one or more new backup servers (using ADD_BACKUP) and ensure that the SNA software is started on these servers.

AP_INVALID_TARGET
The target handle on the NOF API call specified a configuration file or a node. This verb must be issued to the **sna.net** file.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_CN

DELETE_CN deletes a connection network, or deletes selected ports from a connection network.

This verb is valid only at a network node or an end node, and not at a LEN node.

VCB Structure

```
typedef struct delete_cn
{
     AP_UINT16         opcode;             /* verb operation code           */
     unsigned char     reserv2;            /* reserved                      */
     unsigned char     format;             /* reserved                      */
     AP_UINT16         primary_rc;         /* primary return code           */
     AP_UINT32         secondary_rc;       /* secondary return code         */
     unsigned char     fqcn_name[17];      /* name of Connection Network    */
     unsigned char     reserv1;            /* reserved                      */
     AP_UINT16         num_ports;          /* number of ports to delete     */
     unsigned char     port_name[8][8];    /* names of ports to delete      */
} DELETE_CN;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_CN

fqcn_name
Fully qualified name of the connection network. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

num_ports
Specify zero to delete the connection network, or the number of ports to be deleted if you are removing ports instead of deleting the connection network.

port_name
If you are removing ports (if *num_ports* is nonzero), specify the names of the ports to be deleted. Each port name is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. If you are deleting the connection network (if *num_ports* is zero), these names must be set to binary zeros.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_CN_NAME
The fully-qualified CN name specified did not match any defined CN name.

AP_INVALID_NUM_PORTS_SPECIFIED
The *num_ports* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node is a LEN node, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node is a LEN node. This verb is valid only at a network node or an end node.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_COS

DELETE_COS deletes a class of service entry. Only locally defined classes of service can be deleted; the default classes of service defined by SNA cannot be deleted.

If the node supports mode to COS mapping (as defined by the *mode_to_cos_map_supp* parameter on DEFINE_NODE) and the configuration includes modes that are mapped to the COS that you are deleting, CS Linux will

remap these modes to the default COS (specified by a DEFINE_MODE verb with a null mode name) or to the SNA-defined COS #CONNECT if no default COS is specified.

VCB Structure

```
typedef struct delete_cos
{
     AP_UINT16          opcode;             /* verb operation code          */
     unsigned char      reserv2;            /* reserved                     */
     unsigned char      format;             /* reserved                     */
     AP_UINT16          primary_rc;         /* primary return code          */
     AP_UINT32          secondary_rc;       /* secondary return code        */
     unsigned char      cos_name[8];        /* class of service name        */
} DELETE_COS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_COS

cos_name
Class of service name. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_COS_NAME_NOT_DEFD
The supplied name is not the name of a COS defined on the CS Linux system.

AP_SNA_DEFD_COS_CANT_BE_DELETED
The supplied name is the name of one of the SNA-defined classes of service, which cannot be deleted.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_CPIC_SIDE_INFO

This verb deletes an entry from the side information table.

Note the difference between this verb and the CPI-C function Delete_CPIC_Side_Information. This verb modifies a configuration file, so that it affects all CS Linux CPI-C applications. The CPI-C function modifies the application's own copy in memory of the side information table, and does not affect any other CPI-C applications.

This verb must be issued to the domain configuration file.

VCB Structure

```
typedef struct delete_cpic_side_info
{
     AP_UINT16          opcode;             /* verb operation code          */
     unsigned char      reserv2;            /* reserved                     */
     unsigned char      format;             /* reserved                     */
     AP_UINT16          primary_rc;         /* primary return code          */
     AP_UINT32          secondary_rc;       /* secondary return code        */
     unsigned char      reserv2a[8];        /* reserved                     */
     unsigned char      sym_dest_name[8];   /* Symbolic destination name    */
} DELETE_CPIC_SIDE_INFO;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_CPIC_SIDE_INFO

sym_dest_name
: Symbolic destination name which identifies the side information entry. This is an 8-byte ASCII string, consisting of uppercase A–Z and digits 0–9, padded on the right with spaces if necessary.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
: AP_OK

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters:

primary_rc
: AP_STATE_CHECK

secondary_rc

AP_INVALID_SYM_DEST_NAME
: The *sym_dest_name* parameter was not the name of a defined CPI-C side information entry.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_DIRECTORY_ENTRY

DELETE_DIRECTORY_ENTRY deletes an entry in the Network Directory. You cannot delete the entry for an end node CP from the directory of its network node server.

If the entry for a parent resource is deleted, then all entries for child resources associated with it are also deleted. For example, if you delete the entry for a network node that is the parent of an end node, then the entries for the end node and all LUs associated with both nodes (including wildcard LU entries) are deleted as well as the entry for the network node.

VCB Structure

```
typedef struct delete_directory_entry
{
   AP_UINT16          opcode;              /* verb operation code            */
   unsigned char      reserv2;             /* reserved                       */
   unsigned char      format;              /* reserved                       */
   AP_UINT16          primary_rc;          /* primary return code            */
   AP_UINT32          secondary_rc;        /* secondary return code          */
   unsigned char      resource_name[17];   /* fully qualified resource name  */
   unsigned char      reserv3;             /* reserved                       */
   AP_UINT16          resource_type;       /* resource type                  */
} DELETE_DIRECTORY_ENTRY;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_DIRECTORY_ENTRY

resource_name
Fully qualified name of the resource to be deleted. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

resource_type
Specifies the type of the resource to be deleted. Possible values are:

AP_ENCP_RESOURCE
End node or LEN node

AP_NNCP_RESOURCE
Network node

AP_LU_RESOURCE
LU

AP_WILDCARD_LU_RESOURCE
Wildcard LU name.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_FQ_LU_NAME
The *resource_name* parameter was not the name of a defined directory entry.

AP_INVALID_RESOURCE_TYPE
The *resource_type* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_CANT_DELETE_ADJ_ENDNODE
The specified entry is for an end node, and the node to which this verb was issued is its network node server. You cannot delete this end node entry.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_DLC

DELETE_DLC deletes a DLC. This verb also deletes the following:

- All ports, link stations and connection network TGs associated with the DLC
- All PUs associated with LSs on the DLC, all LUs owned by these PUs, and all LU-LU passwords associated with these LUs.

VCB Structure

```
typedef struct delete_dlc
{
     AP_UINT16          opcode;             /* verb operation code        */
     unsigned char      reserv2;            /* reserved                   */
     unsigned char      format;             /* reserved                   */
     AP_UINT16          primary_rc;         /* primary return code        */
     AP_UINT32          secondary_rc;       /* secondary return code      */
     unsigned char      dlc_name[8];        /* name of DLC                */
} DELETE_DLC;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_DLC

dlc_name
Name of DLC to be deleted. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_DLC_NAME
The supplied DLC name was not the name of a DLC defined on the CS Linux system.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_DLC_ACTIVE
The DLC cannot be deleted because it is currently active. Use the STOP_DLC verb to stop it before attempting to delete it.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_DOWNSTREAM_LU

This verb is used to delete a downstream LU.

VCB Structure

```
typedef struct delete_downstream_lu
{
     AP_UINT16          opcode;               /* verb operation code        */
     unsigned char      reserv2;              /* reserved                   */
     unsigned char      format;               /* reserved                   */
```

```
    AP_UINT16          primary_rc;          /* primary return code       */
    AP_UINT32          secondary_rc;        /* secondary return code     */
    unsigned char      dslu_name[8];        /* Downstream LU name        */
} DELETE_DOWNSTREAM_LU;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_DOWNSTREAM_LU

dslu_name
Name of the downstream LU that is being deleted. This is an 8-byte type A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_LU_NAME
The *dslu_name* parameter contained a character that was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
The *dslu_name* parameter did not match any defined downstream LU name.

AP_DSLU_ACTIVE
The LU cannot be deleted because it is currently active.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute because the node's configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support SNA gateway; this is defined by the *pu_conc_support* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_DOWNSTREAM_LU_RANGE

This verb is used to delete a range of downstream LUs.

The supplied parameters to this verb include a base name for the LUs and the range of NAU addresses. The LU names to be deleted are determined by combining the base name with the NAU addresses. For example, a base name of LUNME combined with a NAU range of 11 to 14 would delete the LUs LUNME011, LUNME012, LUNME013, and LUNME014.

All LUs with names in the specified range are deleted; CS Linux does not return an error if one or more names in the range do not exist.

VCB Structure

```
typedef struct delete_downstream_lu_range
{
    AP_UINT16         opcode;              /* verb operation code            */
    unsigned char     reserv2;             /* reserved                       */
    unsigned char     format;              /* reserved                       */
    AP_UINT16         primary_rc;          /* primary return code            */
    AP_UINT32         secondary_rc;        /* secondary return code          */
    unsigned char     dslu_base_name[5];   /* LU base name                   */
    unsigned char     min_nau;             /* Minimum NAU address in range   */
    unsigned char     max_nau;             /* Maximum NAU address in range   */
} DELETE_DOWNSTREAM_LU_RANGE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_DOWNSTREAM_LU_RANGE

dslu_base_name
Base name for the names of the LUs. This is a 5-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the base name is less than 5 characters. CS Linux determines the names of the LUs to be deleted by appending the 3-digit decimal value of each NAU address to this name.

min_nau
NAU address of the first LU, in the range 1–255.

max_nau
NAU address of the last LU, in the range 1–255.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_NAU_ADDRESS
The *min_nau* or *max_nau* parameter was not valid.

AP_INVALID_LU_NAME
The *dslu_base_name* parameter contained a character that was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
There were no LUs defined with names in the specified range.

AP_DSLU_ACTIVE
One or more of the LUs in the range cannot be deleted because it is currently active.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute because the node's configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support SNA gateway; this is defined by the *pu_conc_support* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_DSPU_TEMPLATE

The DELETE_DSPU_TEMPLATE verb deletes a specific downstream physical unit (DSPU) template that was previously defined using a DEFINE_DSPU_TEMPLATE verb, or deletes one or more downstream LU (DSLU) templates from a DSPU template.

VCB Structure

```
typedef struct delete_dspu_template
{
    AP_UINT16         opcode;                /* verb operation code          */
    unsigned char     reserv2;               /* reserved                     */
    unsigned char     format;                /* reserved                     */
    AP_UINT16         primary_rc;            /* primary return code          */
    AP_UINT32         secondary_rc;          /* secondary return code        */
    unsigned char     template_name[8];      /* name of template             */
    AP_UINT16         num_of_dslu_templates; /* number of dslu templates     */
    unsigned char     reserv1[10];           /* reserved                     */
} DELETE_DSPU_TEMPLATE;

typedef struct dslu_template
}
    unsigned char     min_nau;               /* Minimum NAU address in range */
    unsigned char     max_nau;               /* Maximum NAU address in range */
    unsigned char     allow_timeout;         /* Allow timeout of host LU?    */
    unsigned char     delayed_logon;         /* Allow delayed logon to host  */
                                             /*  LU                          */
    unsigned char     reserv1[8];            /* reserved                     */
    unsigned char     host_lu[8];            /* Host LU or Pool name         */
} DSLU_TEMPLATE;
```

Supplied Parameters

Supplied parameters are:

opcode AP_DELETE_DSPU_TEMPLATE

template_name
: Name of the DSPU template to be deleted, or the DSPU template containing the DSLU templates to be deleted. Specify 1–8 locally displayable characters.

num_of_dslu_templates
: Number of DSLU templates to be deleted. Specify a value in the range 1–255, or specify 0 (zero) to delete the entire DSPU template.

For each DSLU template to be deleted, up to the number specified in *num_of_dslu_templates*, append a DSLU_TEMPLATE structure to the end of the DELETE_DSPU_TEMPLATE structure, containing the following parameters:

min_nau
: Minimum NAU address in the range of DSLU templates to be deleted. Specify a value in the range 1–255.

max_nau
: Maximum NAU address in the range of DSLU templates to be deleted. Specify a value in the range 1–255.

allow_timeout
: Specifies whether CS Linux is allowed to timeout host LUs used by this downstream LU if the session is left inactive for the timeout period specified on the host LU definition. Possible values are:

AP_YES CS Linux is allowed to timeout host LUs used by this downstream LU.

AP_NO CS Linux is not allowed to timeout host LUs used by this downstream LU.

delayed_logon
Specifies whether CS Linux delays connecting the downstream LU to the host LU until the first data is received from the downstream LU. Instead, a simulated logon screen is sent to the downstream LU. Possible values are:

AP_YES CS Linux delays connecting the downstream LU to the host LU until the first data is received from the downstream LU.

AP_NO CS Linux does not delay connecting the downstream LU to the host LU until the first data is received from the downstream LU.

host_lu Name of the host LU or host LU pool onto which all the downstream LUs within the range will be mapped.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_TEMPLATE_NAME
The template specified by the *template_name* parameter was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_FOCAL_POINT

The DELETE_FOCAL_POINT verb removes the definition of a focal point for a specified MS category (either the main focal point for that category or a backup focal point). If the defined focal point application is active and acting as the current focal point for that category, CS Linux sends an MS_CAPABILITIES message to the focal point to revoke it so that it no longer acts as the focal point.

VCB Structure

```
typedef struct delete_focal_point
{
     AP_UINT16         opcode;           /* verb operation code            */
```

```
    unsigned char     reserv2;          /* reserved                        */
    unsigned char     format;           /* reserved                        */
    AP_UINT16         primary_rc;       /* primary return code             */
    AP_UINT32         secondary_rc;     /* secondary return code           */
    unsigned char     reserved;         /* reserved                        */
    unsigned char     ms_category[8];   /* management services category    */
    unsigned char     type;             /* type of focal point             */
} DELETE_FOCAL_POINT;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_FOCAL_POINT

ms_category
Management Services category. This may be either one of the category names specified in the MS Discipline-Specific Application Programs table of *Systems Network Architecture: Management Services Reference* (see the Bibliography), padded with EBCDIC spaces (0x40), or a user-defined category. A user-defined category name is an 8-byte type-1134 EBCDIC string, padded with EBCDIC spaces (0x40) if necessary.

type Specifies the type of the focal point that is being deleted. Possible values are:

AP_ACTIVE
The currently active focal point (which may be of any type) is revoked.

AP_IMPLICIT
The implicit definition (defined using DEFINE_FOCAL_POINT with backup set to AP_NO) is removed. If this focal point is currently active, then it is revoked.

AP_BACKUP
The backup definition (defined using DEFINE_FOCAL_POINT with backup set to AP_YES) is removed. If this focal point is currently active, then it is revoked.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_CATEGORY_NAME
The supplied category name contained a character that was not valid.

AP_INVALID_TYPE
The *type* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support MS network management functions; this is defined by the *mds_supported* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_INTERNAL_PU

DELETE_INTERNAL_PU deletes a DLUR-served local PU. The PU can be deleted only if it does not have an active SSCP-PU session.

VCB Structure

```
typedef struct delete_internal_pu
{
     AP_UINT16          opcode;          /* verb operation code            */
     unsigned char      reserv2;         /* reserved                       */
     unsigned char      format;          /* reserved                       */
     AP_UINT16          primary_rc;      /* primary return code            */
     AP_UINT32          secondary_rc;    /* secondary return code          */
     unsigned char      pu_name[8];      /* internal PU name               */
} DELETE_INTERNAL_PU;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_INTERNAL_PU

pu_name
Name of the internal PU that is being deleted. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_PU_NAME
The *pu_name* parameter was not the name of a defined internal PU.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_PU_NOT_RESET
The PU cannot be deleted because it still has an active PU-SSCP session.

AP_INVALID_PU_TYPE
The specified PU is a remote PU and not an internal PU.

Returned Parameters: Function Not Supported

If the verb does not execute because the node's configuration does not support it, CS Linux returns the following parameter:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The node does not support DLUR; this is defined by the *dlur_support* parameter on DEFINE_NODE.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_LOCAL_LU

The DELETE_LOCAL_LU verb deletes a local LU, and also deletes any LU-LU passwords associated with the local LU.

VCB Structure

```
typedef struct delete_local_lu
{
     AP_UINT16           opcode;             /* verb operation code         */
     unsigned char       reserv2;            /* reserved                    */
     unsigned char       format;             /* reserved                    */
     AP_UINT16           primary_rc;         /* primary return code         */
     AP_UINT32           secondary_rc;       /* secondary return code       */
     unsigned char       lu_name[8];         /* local LU name               */
} DELETE_LOCAL_LU;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_LOCAL_LU

lu_name
Name of the local LU to be deleted. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_CANT_DELETE_CP_LU
The supplied LU name was blank (indicating the LU associated with the CP); this LU cannot be deleted.

AP_INVALID_LU_NAME
The supplied LU name is not the name of a local LU defined on the CS Linux system.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_LS

DELETE_LS deletes a defined Link Station (LS). This verb also deletes the PU associated with the LS, all LUs owned by this PU, and all LU-LU passwords associated with these LUs. The LS cannot be deleted if it is active.

VCB Structure

```
typedef struct delete_ls
{
     AP_UINT16          opcode;           /* verb operation code           */
     unsigned char      reserv2;          /* reserved                      */
     unsigned char      format;           /* reserved                      */
     AP_UINT16          primary_rc;       /* primary return code           */
     AP_UINT32          secondary_rc;     /* secondary return code         */
     unsigned char      ls_name[8];       /* name of link station          */
} DELETE_LS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_LS

ls_name
Name of link station being deleted. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_LINK_NAME
The supplied LS name contains a character that was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_LS_ACTIVE
The LS cannot be deleted because it is currently active.

AP_INVALID_LINK_NAME
The supplied LS name is not the name of an LS defined on the CS Linux system.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_LS_ROUTING

The DELETE_LS_ROUTING verb deletes the association of a partner LU to a link station that was previously defined using the DEFINE_LS_ROUTING verb.

VCB Structure

```
typedef struct delete_ls_routing
{
    AP_UINT16         opcode;              /* verb operation code         */
    unsigned char     reserv2;             /* reserved                    */
    unsigned char     format;              /* reserved                    */
    AP_UINT16         primary_rc;          /* primary return code         */
    AP_UINT32         secondary_rc;        /* secondary return code       */
    unsigned char     lu_name[8];          /* LU Name                     */
```

```
    unsigned char     lu_alias[8];          /* reserved                    */
    unsigned char     fq_partner_lu[17];    /* partner lu name             */
    unsigned char     wildcard_fqplu;       /* wildcard partner LU flag    */
    unsigned char     reserv3[2];           /* reserved                    */
} DELETE_LS_ROUTING;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_LS_ROUTING

lu_name
Name of the local LU that communicated with the partner LU (specified by the *fq_partner_lu* parameter). Specify 1–8 locally displayable characters.

fq_partner_lu
Fully qualified name of the partner LU to be removed from the local LU's LS routing data. Specify 3–17 locally displayable characters that consist of a 1–8 character network name, followed by a period, followed by a 1–8 character partner LU name.

To delete a wildcard entry, specify the same wildcard LU name that you used to define the entry. You cannot use wildcards to delete more than one explicitly-defined entry.

wildcard_fqplu
Wildcard partner LU flag indicating whether the *fq_partner_lu* parameter contains a full or partial wildcard. This flag is used to delete a wildcard entry; you cannot use wildcards to delete more than one explicitly-defined entry. Possible values are:

AP_YES The *fq_partner_lu* parameter contains a wildcard entry.

AP_NO The *fq_partner_lu* parameter does not contain a wildcard entry.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LOCAL_LU
The *lu_name* parameter contained a character that was not valid.

AP_INVALID_PARTNER_LU
The *fq_partner_lu* parameter contained a character that was not valid.

AP_INVALID_WILDCARD_NAME
The *wildcard_fqplu* parameter was set to AP_YES, but the *fq_partner_lu* parameter was not a valid wildcard name.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_INVALID_LOCAL_LU
The *lu_name* parameter did not match an existing LS routing record.

AP_INVALID_PARTNER_LU
The *fq_partner_lu* parameter did not match an existing LS routing record for the specified local LU.

AP_INVALID_WILDCARD_NAME
The *wildcard_fqplu* parameter was set to YES, but no matching entry was found.

AP_INVALID_RESOURCE_NAME
No LS routing entry that matched the supplied parameters was found.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_LU62_TIMEOUT

The DELETE_LU62_TIMEOUT verb deletes a definition of an LU type 6.2 session timeout that was defined previously with a DEFINE_LU62_TIMEOUT verb.

VCB Structure

```
typedef struct delete_lu62_timeout
{
    AP_UINT16         opcode;                /* verb operation code        */
    unsigned char     reserv2;               /* reserved                   */
    unsigned char     format;                /* reserved                   */
    AP_UINT16         primary_rc;            /* primary return code        */
    AP_UINT32         secondary_rc;          /* secondary return code      */
    unsigned char     resource_type;         /* resource type              */
    unsigned char     resource_name[17];     /* resource name              */
} DELETE_LU62_TIMEOUT;
```

Supplied Parameters

Supplied parameters are:

opcode AP_DELETE_LU62_TIMEOUT

resource_type
Specifies the type of timeout being deleted. Possible values are:

AP_GLOBAL_TIMEOUT
Delete timeouts that apply to all LU 6.2 sessions for the local node.

AP_LOCAL_LU_TIMEOUT
Delete timeouts that apply to all LU 6.2 sessions for the local LU specified in the *resource_name* parameter.

AP_PARTNER_LU_TIMEOUT
Delete timeouts that apply to all LU 6.2 sessions to the partner LU specified in the *resource_name* parameter.

AP_MODE_TIMEOUT
Delete timeouts that apply to all LU 6.2 sessions on the mode specified in the *resource_name* parameter.

resource_name
Name of the resource whose timeout is being deleted. This value can be one of the following:

- If *resource_type* is set to AP_GLOBAL_TIMEOUT, do not specify this parameter.
- If *resource_type* is set to AP_LOCAL_LU_TIMEOUT, specify 1–8 locally displayable type-A characters as a local LU name.
- If *resource_type* is set to AP_PARTNER_LU_TIMEOUT, specify the fully qualified name of the partner LU as follows: 17 locally displayable type-A characters consisting of a 1–8 character network name, followed by a period, followed by a 1–8 character partner LU name.
- If *resource_type* is set to AP_MODE_TIMEOUT, specify 1–8 locally displayable type-A characters as a mode name.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_RESOURCE_TYPE
The value specified in the *resource_type* parameter was not valid.

AP_INVALID_LU_NAME
The LU name specified in the *resource_name* parameter was not valid.

AP_INVALID_PARTNER_LU
The partner LU name specified in the *resource_name* parameter was not valid.

AP_INVALID_MODE_NAME
The mode name specified in the *resource_name* parameter was not valid.

AP_GLOBAL_TIMEOUT_NOT_DEFINED
The value AP_GLOBAL_TIMEOUT was specified for the *resource_type* parameter but there is no defined global timeout.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_LU_0_TO_3

This verb is used to delete an LU used for 3270 emulation or LUA (an LU of type 0–3).

VCB Structure

```
typedef struct delete_lu_0_to_3
{
     AP_UINT16           opcode;          /* verb operation code          */
     unsigned char       reserv2;         /* reserved                     */
     unsigned char       format;          /* reserved                     */
     AP_UINT16           primary_rc;      /* primary return code          */
     AP_UINT32           secondary_rc;    /* secondary return code        */
     unsigned char       lu_name[8];      /* LU name                      */
} DELETE_LU_0_TO_3;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_LU_0_TO_3

lu_name
Name of the local LU to be deleted. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_LU_NAME
The supplied LU name contained a character that was not valid.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_INVALID_LU_NAME
The supplied LU name is not the name of an LU defined on the CS Linux system.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_LU_0_TO_3_RANGE

This verb is used to delete a range of LUs used for 3270 emulation or LUA (type 0–3 LUs).

The supplied parameters to this verb include a base name for the LUs and the range of NAU addresses. The LU names to be deleted are determined by combining the base name with the NAU addresses. For example, a base name of LUNME combined with a NAU range of 11–14 would delete the LUs LUNME011, LUNME012, LUNME013, and LUNME014.

All LUs with names in the specified range are deleted; CS Linux does not return an error if one or more names in the range do not exist.

VCB Structure

```
typedef struct delete_lu_0_to_3_range
{
    AP_UINT16         opcode;            /* verb operation code             */
    unsigned char     reserv2;           /* reserved                        */
    unsigned char     format;            /* reserved                        */
    AP_UINT16         primary_rc;        /* primary return code             */
    AP_UINT32         secondary_rc;      /* secondary return code           */
    unsigned char     base_name[6];      /* Base name                       */
    unsigned char     min_nau;           /* Minimum NAU address in range    */
    unsigned char     max_nau;           /* Maximum NAU address in range    */
    unsigned char     name_attributes;   /* Extension type                  */
    unsigned char     base_number;       /* First extension number          */
    unsigned char     reserv5[16];       /* reserved                        */
} DELETE_LU_0_TO_3_RANGE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_LU_0_TO_3_RANGE

base_name
Base name for the names of the LUs. This is a type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the base name is less than 6 characters. It may be either 5 bytes or 6 bytes long, as determined by the *name_attributes* parameter. CS Linux determines the names of the LUs to be deleted by appending the decimal value of each NAU address (or a number in the range starting from the *base_number* parameter) to this name.

min_nau
NAU address of the first LU, in the range 1–255.

max_nau
NAU address of the last LU, in the range 1–255.

name_attributes
Specifies the extension type of the LUs. Possible values are:

AP_NONE
LU names have numbers that correspond to the NAU numbers. The numbers are specified in decimal and the *base_name* parameter can contain only five characters.

AP_USE_BASE_NUMBER
Start deleting the LUs in the range from the value specified in the *base_number* parameter.

AP_USE_HEX_IN_NAME
The extension to the LU name is in hex rather than decimal. The *base_name* parameter can contain 6 characters if this value is specified.

base_number
If AP_USE_BASE_NUMBER is specified in the *name_attributes* parameter, specify a number from which to start deleting the LUs in the range. This value will be used instead of the value of the *min_nau* parameter.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_NAU_ADDRESS
The *min_nau* or *max_nau* parameter was not valid.

AP_INVALID_LU_NAME
The *base_name* parameter contained a character that was not valid.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_INVALID_LU_NAME
There were no LUs defined with names in the specified range.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_LU_LU_PASSWORD

DELETE_LU_LU_PASSWORD deletes an LU-LU password associated with a local LU. LU-LU passwords are deleted automatically when the local LU is deleted; you need only use this verb if you need to remove the password but leave the LU configured.

VCB Structure

```
typedef struct delete_lu_lu_password
{
    AP_UINT16        opcode;            /* verb operation code             */
    unsigned char    reserv2;           /* reserved                        */
    unsigned char    format;            /* reserved                        */
    AP_UINT16        primary_rc;        /* primary return code             */
    AP_UINT32        secondary_rc;      /* secondary return code           */
    unsigned char    lu_name[8];        /* LU name                         */
    unsigned char    lu_alias[8];       /* local LU alias                  */
    unsigned char    fqplu_name[17];    /* fully qualified partner LU name */
    unsigned char    reserv3;           /* reserved                        */
} DELETE_LU_LU_PASSWORD;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_LU_LU_PASSWORD

lu_name
LU name of the local LU, as defined to CS Linux. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 bytes. To indicate that the LU is defined by its LU alias instead of its LU name, set this parameter to 8 binary zeros.

lu_alias
LU alias of the local LU, as defined to CS Linux. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes. It is used only if *lu_name* is set to zeros.

To indicate the LU associated with the CP (the default LU), set both *lu_name* and *lu_alias* to 8 binary zeros.

fqplu_name
Fully qualified LU name for the partner LU, as defined to CS Linux. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_PLU_NAME
The *fqplu_name* parameter was not valid.

AP_INVALID_LU_NAME
The *lu_name* parameter was not valid.

AP_INVALID_LU_ALIAS
The *lu_alias* parameter was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_LU_POOL

DELETE_LU_POOL is used to do one of the following:

- Remove one or more LUs from a pool
- Remove all LUs from a pool and delete the pool

This verb does not delete the LUs; they remain defined, but are not associated with any pool.

VCB Structure

```
typedef struct delete_lu_pool
{
     AP_UINT16          opcode;             /* verb operation code          */
     unsigned char      reserv2;            /* reserved                     */
     unsigned char      format;             /* reserved                     */
     AP_UINT16          primary_rc;         /* primary return code          */
     AP_UINT32          secondary_rc;       /* secondary return code        */
     unsigned char      pool_name[8];       /* LU pool name                 */
     AP_UINT16          num_lus;            /* Number of specified LUs      */
     unsigned char      lu_names[10][8];    /* LU names                     */
} DELETE_LU_POOL;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_LU_POOL

pool_name
Name of the LU pool. This is an 8-byte EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

num_lus
The number of LUs to be removed (the number of LU names in the *lu_names* list). The range is 1–10 when removing LUs from a pool without deleting it. To remove all LUs from the pool and delete the pool, specify zero.

lu_names
To remove one or more LUs from the pool without deleting the pool, specify the names of the LUs to be removed. The number of names specified must match the *num_lus* parameter. Each name is an 8-byte type A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

If *num_lus* is set to zero, to remove all LUs from the pool and delete the pool, this parameter is not used.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_POOL_NAME
The supplied pool name was not valid.

AP_INVALID_LU_NAME
One or more of the specified LU names did not match the name of an LU in the pool.

AP_INVALID_NUM_LUS
The supplied *num_lus* parameter was not in the valid range.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_MODE

DELETE_MODE deletes the definition of a mode. You cannot delete SNA-defined modes such as SNASVCMG and CPSVCMG.

VCB Structure

```
typedef struct delete_mode
{
     AP_UINT16           opcode;           /* verb operation code          */
     unsigned char       reserv2;          /* reserved                     */
     unsigned char       format;           /* reserved                     */
     AP_UINT16           primary_rc;       /* primary return code          */
     AP_UINT32           secondary_rc;     /* secondary return code        */
     unsigned char       mode_name[8];     /* mode name                    */
} DELETE_MODE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_MODE

mode_name

Name of the mode. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc

AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc

AP_PARAMETER_CHECK

secondary_rc

Possible values are:

AP_CP_OR_SNA_SVCMG_UNDELETABLE

The specified mode name is one of the SNA-defined mode names, and cannot be deleted.

AP_MODE_NAME_NOT_DEFD

The specified mode name is not the name of a mode defined on the CS Linux system.

AP_DEL_MODE_DEFAULT_SPCD

The specified mode was defined as the default mode using the DEFINE_DEFAULTS verb, so it cannot be deleted.

AP_MODE_UNDELETABLE

The specified mode name is one of the SNA-defined mode names, and cannot be deleted.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_PARTNER_LU

The DELETE_PARTNER_LU verb deletes a partner LU definition.

VCB Structure

```
typedef struct delete_partner_lu
{
    AP_UINT16         opcode;            /* verb operation code             */
    unsigned char     reserv2;           /* reserved                        */
    unsigned char     format;            /* reserved                        */
    AP_UINT16         primary_rc;        /* primary return code             */
    AP_UINT32         secondary_rc;      /* secondary return code           */
    unsigned char     fqplu_name[17];    /* fully qualified partner LU name */
} DELETE_PARTNER_LU;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_PARTNER_LU

fqplu_name
Fully qualified LU name for the partner LU to be deleted. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_PLU_NAME
The supplied *fqplu_name* parameter did not match any defined partner LU name.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_PORT

DELETE_PORT deletes a port. This verb also deletes the following:

- All link stations and connection network TGs associated with the port.

- All PUs associated with LSs on the port, all LUs owned by these PUs, and all LU-LU passwords associated with these LUs.

The port must be inactive when the verb is issued.

VCB Structure

```
typedef struct delete_port
{
     AP_UINT16           opcode;           /* verb operation code          */
     unsigned char       reserv2;          /* reserved                     */
     unsigned char       format;           /* reserved                     */
     AP_UINT16           primary_rc;       /* primary return code          */
     AP_UINT32           secondary_rc;     /* secondary return code        */
     unsigned char       port_name[8];     /* name of port                 */
} DELETE_PORT;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_PORT

port_name
Name of port being deleted. This is an 8-byte ASCII string, right-padded with spaces if the name is shorter than 8 characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_PORT_NAME
The specified port name was not the name of a port defined on the CS Linux system.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_PORT_ACTIVE
The specified port cannot be deleted because it is currently active.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_RCF_ACCESS

DELETE_RCF_ACCESS prevents access to the CS Linux Remote Command Facility (RCF), which was previously specified using DEFINE_RCF_ACCESS. For more information about RCF, see the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

This verb prevents access to both SPCF and UCF. To allow access to one of them but prevent access to the other, use DEFINE_RCF_ACCESS.

This verb must be issued to the domain configuration file. CS Linux acts on the RCF access parameters during node startup; if RCF access is deleted while a node is running, the change does not take effect on the server where the node is running until the node is stopped and restarted.

VCB Structure

```
typedef struct delete_rcf_access
{
     AP_UINT16           opcode;           /* Verb operation code          */
     unsigned char       reserv2;          /* reserved                     */
     unsigned char       format;           /* reserved                     */
     AP_UINT16           primary_rc;       /* primary return code          */
     AP_UINT32           secondary_rc;     /* secondary return code        */
} DELETE_RCF_ACCESS;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_DELETE_RCF_ACCESS

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_SECURITY_ACCESS_LIST

DELETE_SECURITY_ACCESS_LIST is used to do one of the following:

- Delete a security access list.
- Delete one or more users from a security access list but leave the list configured.

You can delete a user name from the security access list regardless of whether there are active conversations that were set up using that user name. Deleting the

user name does not affect the active conversations, but the invoking program will not be able to set up any further conversations using the deleted user name.

VCB Structure

The DELETE_SECURITY_ACCESS_LIST verb contains a variable number of `security_user_name` structures; these define the user names to be deleted from the security access list. The user name structures are included at the end of the `delete_security_access_list` structure; the number of these structures is specified by the *num_users* parameter.

```
typedef struct delete_security_access_list
{
  AP_UINT16         opcode;                 /* verb operation code          */
  unsigned char     reserv2;                /* reserved                     */
  unsigned char     format;                 /* reserved                     */
  AP_UINT16         primary_rc;             /* primary return code          */
  AP_UINT32         secondary_rc;           /* secondary return code        */
  unsigned char     list_name[14];          /* name of this list            */
  unsigned char     reserv3[2];             /* reserved                     */
  AP_UINT32         num_users;              /* number of users to delete    */
} DELETE_SECURITY_ACCESS_LIST;

typedef struct security_user_name
{
  unsigned char     user_name[10];          /* user name to delete          */
} SECURITY_USER_NAME;
```

Supplied Parameters

The application supplies the following parameters:

opcode `AP_DELETE_SECURITY_ACCESS_LIST`

list_name
: The name of the security access list being deleted, or the list from which user names are being deleted. This is an ASCII string of 1–14 characters, padded on the right with spaces if the name is shorter than 14 characters, which must match a previously-defined security access list name.

num_users
: The number of user names to be deleted from the security access list, as follows:

- To delete one or more user names from the list but leave other user names configured, specify the number of user names that are being deleted. Each of these must be defined by a user name structure, as described below.
- To delete the entire security access list, specify zero in this parameter and do not include any user names.

For each user name to be deleted, up to the number specified in *num_users*, append a SECURITY_USER_NAME structure to the end of the DELETE_SECURITY_ACCESS_LIST structure, containing the following parameter:

user_name
: The user name being deleted. This must match a user name that is currently defined for this security access list.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LIST_NAME
The specified security access list name was not defined as a security access list name.

AP_INVALID_USER_NAME
One or more of the specified user names did not match the name of a user defined for this security access list.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_TN3270_ACCESS

DELETE_TN3270_ACCESS is used to do one of the following:

- Delete a TN3270 Server user, so that this user can no longer use TN server to access a host.
- Delete one or more of the user's sessions but leave the user configured.

VCB Structure

```
typedef struct delete_tn3270_access
{
   AP_UINT16        opcode;               /* verb operation code            */
   unsigned char    reserv2;              /* reserved                       */
   unsigned char    format;               /* reserved                       */
   AP_UINT16        primary_rc;           /* primary return code            */
   AP_UINT32        secondary_rc;         /* secondary return code          */
   AP_UINT16        default_record;       /* is this the DEFAULT record?    */
   unsigned char    client_address[256];  /* address of TN3270 user         */
   AP_UINT32        num_sessions;         /* number of sessions to delete   */
   unsigned char    delete_options;       /* delete all sessions / delete   */
                                          /*  user?                         */
} DELETE_TN3270_ACCESS;

typedef struct tn3270_session_name
{
   AP_UINT16         port_number;         /* TCP/IP port num of session     */
                                          /*  to delete                     */
   unsigned char     listen_local_address[46];
                                          /* Local addr client connects to  */
} TN3270_SESSION_NAME;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_TN3270_ACCESS

default_record
Specifies whether this verb refers to the default TN3270 user record that is used by any TN3270 user not explicitly identified by a TCP/IP address (deleting this record means that such users cannot access TN server). Possible values are:

AP_YES This verb refers to the default TN3270 user record. The *client_address* parameter is reserved.

AP_NO This verb refers to a normal TN3270 user record.

client_address
The TCP/IP address of the TN3270 user to be deleted, as specified on the DEFINE_TN3270_ACCESS verb. This is a null-terminated ASCII string, which can be any of the following.

- An IPv4 dotted-decimal address (such as `193.1.11.100`).
- An IPv6 colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).
- A name (such as `newbox.this.co.uk`.
- An alias (such as `newbox`).

num_sessions
The number of sessions to be deleted, as follows:

- To delete one or more of the user's sessions but leave other sessions configured, specify the number of sessions that are being deleted. Each of these must be defined by its TCP/IP port number, as described below.
- To delete all sessions, or to delete the user, specify zero in this parameter and do not include any TCP/IP port numbers. Specify the type of deletion required in the *delete_options* parameter below.

delete_options
If the *num_sessions* parameter (see above) is nonzero, this parameter is ignored. If *num_sessions* is zero, specify one of the following values:

AP_ALL_SESSIONS
Delete all sessions but leave the TN3270 user configured.

AP_DELETE_USER
Delete the user and all the user's sessions.

For each session to be deleted, up to the number specified in *num_sessions*, append a TN3270_SESSION_NAME structure to the end of the DELETE_TN3270_ACCESS structure, containing the following parameters:

tn3270_session_name.port_number
The TCP/IP port number used for the session. This must match a port number defined for this TN3270 user.

tn3270_session_name.listen_local_address
The address on the local TN Server computer to which TN3270 clients connect.

- If this parameter was not specified when configuring the session, specify it as all binary zeros.
- If the address was specified when configuring the session, specify the same address in this parameter.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_CLIENT_ADDRESS
The specified client address did not match the TCP/IP address defined for any TN3270 user.

AP_INVALID_PORT_NUMBER
The specified TCP/IP port number did not match any TCP/IP port number defined for this user.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_TN3270_ASSOCIATION

DELETE_TN3270_ASSOCIATION deletes an association between a display LU and a printer LU, given the display LU name.

VCB Structure

```
typedef struct delete_tn3270_association
{
   AP_UINT16        opcode;               /* verb operation code          */
   unsigned char    reserv2;              /* reserved                     */
   unsigned char    format;               /* reserved                     */
   AP_UINT16        primary_rc;           /* primary return code          */
   AP_UINT32        secondary_rc;         /* secondary return code        */
   unsigned char    display_lu_name[8];   /* Display LU name              */
} DELETE_TN3270_ASSOCIATION;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_TN3270_ASSOCIATION

display_lu_name
Specifies the name of the display LU whose association is to be deleted. This is an EBCDIC string padded on the right with EBCDIC spaces.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_LU_NAME
The display LU name was not a valid EBCDIC string.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_INVALID_LU_NAME
No association is defined for the specified display LU.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_TN_REDIRECT

DELETE_TN_REDIRECT is used to delete a TN Redirector user, so that this user can no longer use TN Redirector to access a host.

VCB Structure

```
typedef struct delete_tn_redirect
{
   AP_UINT16           opcode;              /* verb operation code            */
   unsigned char       reserv2;             /* reserved                       */
   unsigned char       format;              /* reserved                       */
   AP_UINT16           primary_rc;          /* primary return code            */
   AP_UINT32           secondary_rc;        /* secondary return code          */
   TN_REDIRECT_ADDRESS addr;                /* Uniquely defines record        */
} DELETE_TN_REDIRECT;

typedef struct tn_redirect_address
{
   AP_UINT16      default_record;      /* Is this the default record ?        */
   unsigned char  address_format;      /* IP address or fully-qualified name  */
   unsigned char  client_address[256]; /* Client address                      */
   AP_UINT16      port_number;         /* Port number that client connects on */
   unsigned char  listen_local_address[46];  /* Local addr client connects to */
   unsigned char  reserved[34];        /* reserved                            */
} TN_REDIRECT_ADDRESS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_TN_REDIRECT

addr.default_record
Specifies whether this verb refers to the default TN Redirector user record that is used by any TN Redirector user not explicitly identified by a TCP/IP address (deleting this record means that such users cannot access TN Redirector). Possible values are:

AP_YES This verb refers to a default record. The *client_address* and *address_format* parameters are reserved.

AP_NO This verb refers to a normal TN Redirector user record.

addr.address_format
Specifies the format of the *client_address* parameter. Possible values are:

AP_ADDRESS_IP
IP address (either IPv4 or IPv6)

AP_ADDRESS_FQN
Alias or fully qualified name

addr.client_address
The TCP/IP address of the computer on which the Telnet client runs. This is a null-terminated ASCII string, which can be any of the following; the *address_format* parameter indicates whether it is an IP address or a name.

- An IPv4 dotted-decimal address (such as 193.1.11.100).
- An IPv6 colon-hexadecimal address (such as 2001:0db8:0000:0000:0000:0000:1428:57ab or 2001:db8::1428:57ab).
- A name (such as newbox.this.co.uk.
- An alias (such as newbox).

If you use a name or alias, the Linux system must be able to resolve the name or alias to a fully qualified name (either using the local TCP/IP configuration or using a Domain Name server).

addr.port_number
The number of the server TCP/IP port that the Telnet client uses to access the TN server node.

addr.listen_local_address
The address on the local TN Server computer to which TN3270 clients connect.

- If this parameter was not specified when configuring the TN redirection record, specify it as all binary zeros.
- If the address was specified when configuring the TN redirection record, specify the same address in this parameter.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_CLIENT_ADDRESS
The specified addressing information did not match any defined TN Redirector user.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_TP

DELETE_TP deletes a TP definition.

VCB Structure

```
typedef struct delete_tp
{
   AP_UINT16        opcode;                 /* verb operation code         */
   unsigned char    reserv2;                /* reserved                    */
   unsigned char    format;                 /* reserved                    */
   AP_UINT16        primary_rc;             /* primary return code         */
   AP_UINT32        secondary_rc;           /* secondary return code       */
   unsigned char    tp_name[64];            /* TP name                     */
} DELETE_TP;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_TP

tp_name
Name of the TP to be deleted.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_TP_NAME
The *tp_name* parameter did not match the name of a defined TP.

AP_SYSTEM_TP_CANT_BE_DELETED
The specified TP name is the name of a TP used internally by CS Linux you cannot delete it.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_TP_LOAD_INFO

The DELETE_TP_LOAD_INFO verb deletes a TP load information entry.

VCB Structure

```
typedef struct delete_tp_load_info
{
   AP_UINT16          opcode;                /* verb operation code       */
   unsigned char      reserv2;               /* reserved                  */
   unsigned char      format;                /* reserved                  */
   AP_UINT16          primary_rc;            /* primary return code       */
   AP_UINT32          secondary_rc;          /* secondary return code     */
   unsigned char      tp_name[64];           /* TP name                   */
   unsigned char      lu_alias[8];           /* LU alias                  */
} DELETE_TP_LOAD_INFO;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_TP_LOAD_INFO

tp_name
The TP name of the TP load info entry to be deleted. This is a 64-byte EBCDIC string, padded on the right with spaces if the name is shorter than 64 characters.

lu_alias
The LU alias of the TP load info entry to be deleted. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

This parameter can be used only if the TP is an APPC application; it is reserved if the TP is a CPI-C application.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_TP_NAME
The *tp_name* parameter did not match the name of a defined TP.

AP_INVALID_LU_ALIAS
The *lu_alias* parameter did not match any defined LU alias specified for a TP load info entry for the TP name specified.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DELETE_USERID_PASSWORD

DELETE_USERID_PASSWORD deletes a password associated with a user ID, or removes profiles for a user ID and password.

VCB Structure

```
typedef struct delete_userid_password
{
   AP_UINT16               opcode;             /* verb operation code        */
   unsigned char           reserv2;            /* reserved                   */
   unsigned char           format;             /* reserved                   */
   AP_UINT16               primary_rc;         /* primary return code        */
   AP_UINT32               secondary_rc;       /* secondary return code      */
   AP_UINT16               delete_type;        /* type of delete             */
   unsigned char           user_id[10];        /* user id                    */
   USERID_PASSWORD_CHARS   password_chars;     /* password characteristics   */
} DELETE_USERID_PASSWORD;

typedef struct userid_password_chars
{
   unsigned char           description[32];    /* resource description       */
   unsigned char           reserv2[16];        /* reserved                   */
   AP_UINT16               profile_count;      /* number of profiles         */
   AP_UINT16               reserv1;            /* reserved                   */
   unsigned char           password[10];       /* password                   */
   unsigned char           profiles[10][10];   /* profiles                   */
} USERID_PASSWORD_CHARS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_DELETE_USERID_PASSWORD

delete_type
Specifies how this verb is being used. Possible values are:

AP_REMOVE_USER
Delete the user, password, and all associated profiles.

AP_REMOVE_PROFILES
Delete the specified profiles.

user_id User identifier. This is a 10-byte type-AE EBCDIC character string, padded on the right with EBCDIC spaces if the name is shorter than 10 characters.

password_chars.description
This parameter is ignored.

password_chars.profile_count
Number of profiles to be deleted. If *delete_type* is set to AP_REMOVE_USER, this parameter is reserved.

password_chars.password
This parameter is ignored.

password_chars.profiles
Profiles associated with user. Each of these is a 10-byte type-AE EBCDIC character string, padded on the right with EBCDIC spaces if the profile name is shorter than 10 characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_NO_PROFILES
The *delete_type* parameter was set to AP_REMOVE_PROFILES, but no profiles were specified.

AP_UNKNOWN_USER
The *user_id* parameter did not match a defined user ID.

AP_INVALID_UPDATE_TYPE
The *delete_type* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

DISCONNECT_NODE

An application uses this verb to release its handle to a CS Linux node when it has finished issuing NOF verbs to the node. The node from which the application wishes to disconnect is identified by the *target_handle* parameter on the call. After the verb completes successfully, the target handle identifying the node is no longer valid.

The application should always issue DISCONNECT_NODE for any open node handles before it exits, to allow CS Linux to free the resources associated with the application.

This verb may be issued to release a target handle for a running node, or for a server where the node is not running.

VCB Structure

```
typedef struct disconnect_node
{
     AP_UINT16           opcode;           /* Verb operation code          */
     unsigned char       reserv2;          /* reserved                     */
     unsigned char       format;           /* reserved                     */
     AP_UINT16           primary_rc;       /* Primary return code          */
     AP_UINT32           secondary_rc;     /* Secondary return code        */
} DISCONNECT_NODE;
```

Supplied Parameters

opcode AP_DISCONNECT_NODE

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: State Check

If the verb does not execute because of a state check, CS Linux returns the following parameters:

primary_rc
AP_STATE_CHECK

secondary_rc

AP_VERB_IN_PROGRESS
The specified target handle cannot be released because a previous verb issued for this handle is still outstanding. All verbs for the target handle must be completed before attempting to disconnect from the node.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

INIT_NODE

This verb starts a previously-defined node. The application must first issue CONNECT_NODE to obtain a target handle for the node; it then uses this target handle on the INIT_NODE call to identify the node to start.

This verb must be issued to a server where the node is not running.

VCB Structure

```
typedef struct init_node
{
     AP_UINT16           opcode;           /* verb operation code          */
     unsigned char       reserv2;          /* reserved                     */
     unsigned char       format;           /* reserved                     */
     AP_UINT16           primary_rc;       /* primary return code          */
     AP_UINT32           secondary_rc;     /* secondary return code        */
} INIT_NODE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_INIT_NODE

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter check, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_NODE_NAME
The node name specified in the configuration file does not match the name of the CS Linux computer to which the verb was issued.

AP_NOT_SERVER
The node name specified in the configuration file matches the name of the CS Linux computer, but the specified computer is a client (not a server) and cannot run the node.

AP_DLUR_NOT_SUPPORTED
The configuration of the node specifies that DLUR is supported, but the node is defined as a LEN node. DLUR cannot be supported on a LEN node.

Returned Parameters: State Check

If the verb does not execute because of a state check, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_NODE_ALREADY_STARTED
The specified node has already been started.

AP_RESOURCE_NOT_LOADED
The node was not started because CS Linux detected one or more errors while attempting to load its configuration. Check the error log file for messages giving more details of the errors.

AP_INVALID_VERSION
The node was not started because there was a version mismatch between components of the CS Linux software. If you have upgraded your CS Linux license to include additional functions or users, check that you are using the correct version of the licensing software.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

INITIALIZE_SESSION_LIMIT

The INITIALIZE_SESSION_LIMIT verb initializes the session limits for a combination of local LU, partner LU, and mode.

You must issue this verb before you issue an ACTIVATE_SESSION verb.

This verb can be issued from a NOF application running on a client. If it runs on an AIX or Linux client, the NOF application must run with the userid root, or with a userid that is a member of the sys group (AIX) or sna group (Linux).

VCB Structure

```
typedef struct initialize_session_limit
{
   AP_UINT16        opcode;                 /* verb operation code         */
   unsigned char    reserv2;                /* reserved                    */
   unsigned char    format;                 /* reserved                    */
   AP_UINT16        primary_rc;             /* primary return code         */
   AP_UINT32        secondary_rc;           /* secondary return code       */
   unsigned char    lu_name[8];             /* local LU name               */
   unsigned char    lu_alias[8];            /* local LU alias              */
   unsigned char    plu_alias[8];           /* partner                     */
   unsigned char    fqplu_name[17];         /* fully qualified partner     */
                                            /*  LU name                    */
   unsigned char    reserv3;                /* reserved                    */
   unsigned char    mode_name[8];           /* mode name                   */
   unsigned char    reserv3a;               /* reserved                    */
   unsigned char    set_negotiable;         /* set max negotiable limit?   */
   AP_UINT16        plu_mode_session_limit; /* session limit               */
   AP_UINT16        min_conwinners_source;  /* minimum source contention   */
                                            /*  winner sessions            */
   AP_UINT16        min_conwinners_target;  /* minimum target contention   */
```

```
                                        /*  winner sessions           */
   AP_UINT16        auto_act;           /* auto activation limit      */
   unsigned char    reserv4[4];         /* reserved                   */
   AP_UINT32        sense_data;         /* sense data                 */
} INITIALIZE_SESSION_LIMIT;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_INITIALIZE_SESSION_LIMIT

lu_name
LU name of the local LU, as defined to CS Linux. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 bytes. To indicate that the LU is defined by its LU alias instead of its LU name, set this parameter to 8 binary zeros.

lu_alias
LU alias of the local LU, as defined to CS Linux. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes. It is used only if *lu_name* is set to zeros.

To indicate the LU associated with the CP (the default LU), set both *lu_name* and *lu_alias* to 8 binary zeros.

plu_alias
LU alias of the partner LU. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes. To indicate that the partner LU is defined by its fully qualified LU name instead of its LU alias, set this parameter to 8 binary zeros.

fqplu_name
Fully qualified LU name for the partner LU, as defined to CS Linux. This parameter is used only if the *plu_alias* field is set to zeros; it is ignored if *plu_alias* is specified.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

mode_name
Name of the mode to be used by the LUs. This is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 bytes.

set_negotiable
Specifies whether the maximum negotiable session limit for this mode, as defined by DEFINE_MODE, should be modified. Possible values are:

AP_YES Use the value specified by *plu_mode_session_limit* as the maximum negotiable session limit for this LU-LU-mode combination.

AP_NO Leave the maximum negotiable session limit as the value specified for the mode.

plu_mode_session_limit
Requested total session limit for this LU-LU-mode combination: the maximum number of parallel sessions permitted between these two LUs using this mode. Specify a value in the range 1–32,767 (which must not

exceed the session limit specified for the local LU on the DEFINE_LOCAL_LU verb). This value may be negotiated with the partner LU.

min_conwinners_source
Minimum number of sessions using this mode for which the local LU is the contention winner. Specify a value in the range `0–32,767`. The sum of the *min_conwinners_source* and *min_conwinners_target* parameters must not exceed the *plu_mode_session_limit* parameter.

min_conwinners_target
Minimum number of sessions using this mode for which the partner LU is the contention winner. Specify a value in the range `0–32,767`. The sum of the *min_conwinners_source* and *min_conwinners_target* parameters must not exceed the *plu_mode_session_limit* parameter.

auto_act
Number of sessions to activate automatically. Specify a value in the range `0–32,767` (which must not exceed the *plu_mode_session_limit* parameter or the session limit specified for the local LU on the DEFINE_LOCAL_LU verb). The actual number of automatically activated sessions is the minimum of this value and the negotiated minimum number of contention winner sessions for the local LU.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

secondary_rc
Possible values are:

AP_AS_NEGOTIATED
The session limits were initialized, but one or more values were negotiated by the partner LU.

AP_AS_SPECIFIED
The session limits were initialized as requested, without being negotiated by the partner LU.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
`AP_PARAMETER_CHECK`

secondary_rc
Possible values are:

AP_EXCEEDS_MAX_ALLOWED
The *plu_mode_session_limit*, *min_conwinners_source*, *min_conwinners_target*, or *auto_act* parameter was set to a value outside the valid range.

AP_CANT_CHANGE_TO_ZERO
The *plu_mode_session_limit* parameter cannot be set to zero using this verb; use RESET_SESSION_LIMIT instead.

AP_INVALID_LU_ALIAS
The *lu_alias* parameter did not match any defined local LU alias.

AP_INVALID_LU_NAME
The *lu_name* parameter did not match any defined local LU name.

AP_INVALID_MODE_NAME
The *mode_name* parameter did not match any defined mode name.

AP_INVALID_PLU_NAME
The *fqplu_name* parameter did not match any defined partner LU name.

AP_INVALID_SET_NEGOTIABLE
The *set_negotiable* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_MODE_NOT_RESET
One or more sessions are currently active for this LU-LU-mode combination. Use CHANGE_SESSION_LIMIT instead of INITIALIZE_SESSION_LIMIT to specify the limits.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Session Allocation Error

If the verb does not execute because of a session allocation error, CS Linux returns the following parameters:

primary_rc
AP_ALLOCATION_ERROR

secondary_rc

AP_ALLOCATION_FAILURE_NO_RETRY
A session could not be allocated because of a condition that requires corrective action. Check the *sense_data* parameter and any logged messages to determine the reason for the failure, and take any action required. Do not attempt to retry the verb until the condition has been corrected.

sense_data
The SNA sense data associated with the allocation failure.

Returned Parameters: CNOS Processing Errors

If the verb does not execute because of an error, CS Linux returns the following parameters.

primary_rc

AP_CONV_FAILURE_NO_RETRY
The session limits could not be initialized because of a condition that requires action (such as a configuration mismatch or a session protocol error). Check the CS Linux log file for information about the error condition, and correct it before retrying this verb.

primary_rc
AP_CNOS_PARTNER_LU_REJECT

secondary_rc

AP_CNOS_COMMAND_RACE_REJECT
The verb failed because the specified mode was being accessed by another administration program (or internally by the CS Linux software) for session activation or deactivation, or for session limit processing. The application should retry the verb, preferably after a timeout to allow the race condition to be cleared.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

OPEN_FILE

An application uses this verb to access the CS Linux domain configuration file in order to manage domain resources, or to access the **sna.net** file in order to manage backup master servers on the CS Linux LAN.

This verb must be issued with a null target handle. If it completes successfully, CS Linux returns a handle identifying the file, which the application can then use on other NOF verbs to indicate the target for the verb.

VCB Structure

```
typedef struct open_file
{
    AP_UINT16        opcode;              /* verb operation code            */
    unsigned char    reserv2;             /* reserved                       */
    unsigned char    format;              /* reserved                       */
    AP_UINT16        primary_rc;          /* primary return code            */
    AP_UINT32        secondary_rc;        /* secondary return code          */
    CONFIG_FILE      file_info;           /* definition of file requested   */
    AP_UINT32        target_handle;       /* handle for subsequent verbs    */
    unsigned char    reserv3[4];          /* reserved                       */
} OPEN_FILE;

typedef struct config_file
{
    unsigned char    requested_role;      /* config file requested          */
    unsigned char    role_supplied;       /* config file returned           */
    unsigned char    system_name[128];    /* computer name where file       */
                                          /*  located                       */
    unsigned char    file_name[81];       /* file name                      */
} CONFIG_FILE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_OPEN_FILE

file_info.requested_role
The type of file to be opened. Possible values are:

AP_MASTER
Open the master copy of the domain configuration file. This value must be used if the application intends to issue verbs that modify the configuration of domain resources.

AP_BACKUP
Open the master copy of the domain configuration file if available, otherwise a backup copy. This value may be used if the application intends to issue only QUERY_* verbs; if it needs to modify the configuration, it must use AP_MASTER, because it will not be able to obtain write access to a backup configuration file.

AP_SNA_NET
Open the **sna.net** file on the master server.

AP_TP_LOAD_INFO
Open a connection to the file on the local machine that contains information about how to load transaction programs (TPs).

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

target_handle
Returned value for use on subsequent verbs directed to this file.

file_info.role_supplied
If *requested_role* was set to AP_BACKUP, this parameter indicates whether the file handle returned is for the master configuration file or a backup file. Possible values are:

AP_MASTER
Master configuration file.

AP_BACKUP
Backup configuration file.

For all other values of *requested_role*, this parameter is undefined.

file_info.system_name
Name of the CS Linux computer where the file is located.

file_info.file_name
Name of the file. This parameter is an ASCII string of 1–80 characters, followed by a null (0x00) character.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_FILE_NAME
The *file_name* parameter did not specify a valid configuration file name.

AP_INVALID_FILE_INFO
One of the parameters in the file_info structure was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_CONNECTION_NOT_MADE
CS Linux could not set up the local communications path to the file.

AP_FILE_BAD_RECORD
CS Linux detected an error in the configuration file. Check the error log file for a message giving more details of the error.

AP_FILE_ROLE_UNAVAILABLE
The application requested a master or backup configuration file, or the **sna.net** file, but no master or backup server was available. This is normally a temporary condition, occurring when a new server is taking over as master.

If the application is registered to receive server indications, it can check the *flags* parameter on these indications to determine when a new server has successfully taken over as master, and then retry the OPEN_FILE verb. For more information, see "SERVER_INDICATION" on page 725. Alternatively, it can simply retry OPEN_FILE at intervals until it succeeds.

AP_INVALID_VERSION
The CS Linux version number in the configuration file header does not match the version of the CS Linux software you are using. Check that you have the correct file.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

PATH_SWITCH

PATH_SWITCH requests that CS Linux switch a currently active Rapid Transport Protocol (RTP) connection to another path. If CS Linux cannot find a better path, it leaves the connection unchanged.

VCB Structure

```
typedef struct path_switch
{
    AP_UINT16        opcode;                /* verb operation code         */
    unsigned char    reserv2;               /* reserved                    */
    unsigned char    format;                /* reserved                    */
    AP_UINT16        primary_rc;            /* primary return code         */
    AP_UINT32        secondary_rc;          /* secondary return code       */
    unsigned char    rtp_connection_name[8]; /* RTP connection name        */
} PATH_SWITCH;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_PATH_SWITCH

rtp_connection_name
The RTP connection for which a change in path is requested. This is an 8-byte string in a locally displayable character set. All eight bytes are significant and must be set.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_RTP_CONNECTION
The value specified for the *rtp_connection_name* parameter did not match the name of an existing RTP connection.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_PATH_SWITCH_IN_PROGRESS
CS Linux is currently changing the path for the RTP connection specified by the *rtp_connection_name* parameter.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Path Switch Disabled

If the verb does not execute because the RTP partner node has disabled path switch by setting the path switch timer to zero, CS Linux returns the following parameter:

primary_rc
AP_PATH_SWITCH_DISABLED

secondary_rc
(No secondary return code is returned.)

Returned Parameters: Path Switch Failure

If the verb does not execute because the path switch attempt fails, CS Linux returns the following parameter:

primary_rc
AP_UNSUCCESSFUL

secondary_rc
(No secondary return code is returned.)

Returned Parameters: Node Check

If the verb does not execute because the system has not been built with RTP support, CS Linux returns the following parameter:

primary_rc
AP_INVALID_VERB

secondary_rc
(No secondary return code is returned.)

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_ACTIVE_TRANSACTION

QUERY_ACTIVE_TRANSACTION returns information about active Multiple Domain Support (MDS) transactions known to the CS Linux Management Services component. An active transaction is an MDS request for which a reply has not yet been received.

This verb may be used to obtain information about a single transaction, or on multiple transactions, depending on the options used.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_active_transaction
{
   AP_UINT16       opcode;                 /* verb operation code          */
   unsigned char   reserv2;                /* reserved                     */
   unsigned char   format;                 /* reserved                     */
   AP_UINT16       primary_rc;             /* primary return code          */
   AP_UINT32       secondary_rc;           /* secondary return code        */
   unsigned char   *buf_ptr;               /* pointer to buffer            */
   AP_UINT32       buf_size;               /* buffer size                  */
   AP_UINT32       total_buf_size;         /* total buffer size required   */
```

```
   AP_UINT16       num_entries;            /* number of entries            */
   AP_UINT16       total_num_entries;      /* total number of entries      */
   unsigned char   list_options;           /* listing options              */
   unsigned char   reserv3;                /* reserved                     */
   unsigned char   fq_req_loc_cp_name[17]; /* fq cp name of transaction    */
                                           /*  requestor                   */
   unsigned char   req_agent_appl_name[8]; /* appl name of transaction     */
                                           /*  requestor                   */
   unsigned char   seq_num_dt[17];         /* sequence number date/time    */
} QUERY_ACTIVE_TRANSACTION;

typedef struct active_transaction_data
{
   AP_UINT16       overlay_size;           /* size of returned entry       */
   unsigned char   fq_origin_cp_name[17];  /* cp name of transaction origin */
   unsigned char   origin_ms_appl_name[8]; /* appl name of transaction     */
                                           /*  origin                      */
   unsigned char   fq_dest_cp_name[17];    /* cp name of transaction       */
                                           /*  destination                 */
   unsigned char   dest_ms_appl_name[8];   /* appl name of transaction dest */
   unsigned char   fq_req_loc_cp_name[17]; /* fq cp name of transaction    */
                                           /*  requestor                   */
   unsigned char   req_agent_appl_name[8]; /* appl name of transaction     */
                                           /*  requestor                   */
   unsigned char   seq_num_dt[17];         /* sequence number date/time    */
   unsigned char   reserva[20];            /* reserved                     */
} ACTIVE_TRANSACTION_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_ACTIVE_TRANSACTION

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of transactions for which data should be returned. To request data for a specific transaction rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *fq_req_loc_cp_name*, *req_agent_appl_name*, and *seq_num_dt* parameters.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *fq_req_loc_cp_name*, *req_agent_appl_name*, and *seq_num_dt* parameters.

The list is ordered by *fq_req_loc_cp_name*, then by *req_agent_appl_name*, and finally in numerical order of *seq_num_dt*. For more information about how

the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

fq_req_loc_cp_name
Fully qualified control point name of the transaction requestor. This parameter is ignored if *list_options* is set to `AP_FIRST_IN_LIST`. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

req_agent_appl_name
Application name of the transaction requestor. This parameter is ignored if *list_options* is set to `AP_FIRST_IN_LIST`.

This name is normally an EBCDIC string, using type-1134 characters (uppercase A–Z and numerals `0`–`9`); alternatively, it can be one of the MS Discipline-Specific Application Programs specified in *SNA Management Services Reference*. The string must be 8 characters long; pad on the right with EBCDIC space characters (`0x40`) if necessary.

seq_num_dt
Sequence number date/time correlator (17 bytes long) of the original transaction, as defined in the IBM SNA Formats manual. This parameter is ignored if *list_options* is set to `AP_FIRST_IN_LIST`.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

active_transaction_data.overlay_size
The size of the returned `active_transaction_data` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `active_transaction_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

active_transaction_data.fq_origin_cp_name
Fully qualified control point name of the origin for the transaction. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It

consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

active_transaction_data.origin_ms_appl_name
Application name of the origin for the transaction. This name is normally an 8-character EBCDIC string, using type-1134 characters (uppercase A–Z and numerals 0–9); alternatively, it can be one of the MS Discipline-Specific Application Programs specified in *Systems Network Architecture: Management Services Reference* (see the Bibliography).

active_transaction_data.fq_dest_cp_name
Fully qualified control point name of the destination for the transaction. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

active_transaction_data.dest_ms_appl_name
Application name of the destination application for the transaction. This name is normally an 8-character EBCDIC string, using type-1134 characters (uppercase A–Z and numerals 0–9); alternatively, it can be one of the MS Discipline-Specific Application Programs specified in *Systems Network Architecture: Management Services Reference* (see the Bibliography).

active_transaction_data.fq_req_loc_cp_name
Fully qualified control point name of the transaction requestor. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

active_transaction_data.req_agent_appl_name
Application name of the transaction requestor. This name is normally an 8-character EBCDIC string, using type-1134 characters (uppercase A–Z and numerals 0–9); alternatively, it can be one of the MS Discipline-Specific Application Programs specified in *Systems Network Architecture: Management Services Reference* (see the Bibliography).

active_transaction_data.seq_num_dt
Sequence number date/time correlator (17 bytes long) of the original transaction, as defined in the IBM SNA Formats manual.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_ACTIVE_TRANSACTION
The control point name, application name, or sequence number correlator did not match that of an active transaction.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support MS network management functions; this is defined by the *mds_supported* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_ADJACENT_NN

The QUERY_ADJACENT_NN verb returns information about adjacent network nodes (the network nodes to which CP-CP sessions are active or have been active at some time). It can be used only if the CS Linux node is a network node, and is not valid if it is an end node or LEN node.

This verb can be used to obtain information about a specific adjacent network node, or about multiple adjacent network nodes, depending on the options used.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_adjacent_nn
{
   AP_UINT16        opcode;              /* verb operation code              */
   unsigned char    reserv2;             /* reserved                         */
   unsigned char    format;              /* reserved                         */
   AP_UINT16        primary_rc;          /* primary return code              */
   AP_UINT32        secondary_rc;        /* secondary return code            */
   unsigned char    *buf_ptr;            /* pointer to buffer                */
   AP_UINT32        buf_size;            /* buffer size                      */
   AP_UINT32        total_buf_size;      /* total buffer size required       */
   AP_UINT16        num_entries;         /* number of entries                */
   AP_UINT16        total_num_entries;   /* total number of entries          */
   unsigned char    list_options;        /* listing options                  */
   unsigned char    reserv3;             /* reserved                         */
   unsigned char    adj_nncp_name[17];   /* CP name of adjacent Network Node */
} QUERY_ADJACENT_NN;

typedef struct adj_nncp_data
{
   AP_UINT16        overlay_size;        /* size of returned entry           */
   unsigned char    adj_nncp_name[17];   /* CP name of adjacent network node */
   unsigned char    cp_cp_sess_status;   /* CP-CP session status             */
   AP_UINT32        out_of_seq_tdus;     /* out of sequence TDUs             */
   AP_UINT32        last_frsn_sent;      /* last FRSN sent                   */
   AP_UINT32        last_frsn_rcvd;      /* last FRSN received               */
   unsigned char    reserva[20];         /* reserved                         */
} ADJ_NNCP_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_ADJACENT_NN

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of adjacent NNs for which data should be returned. To request data for a specific adjacent NN rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of adjacent NNs from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *adj_nncp_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *adj_nncp_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

adj_nncp_name
Fully qualified name of the adjacent NN for which information is required, or the name to be used as an index into the list of adjacent NNs. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

adj_nncp_data.overlay_size
The size of the returned adj_nncp_data structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each adj_nncp_data structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C sizeof() operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

adj_nncp_data.adj_nncp_name
Fully qualified name of the adjacent NN. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

adj_nncp_data.cp_cp_sess_status
Status of the CP-CP session to the adjacent NN. Possible values are:

AP_ACTIVE
The session is active.

AP_CONWINNER_ACTIVE
The session (a contention-winner session) is active.

AP_CONLOSER_ACTIVE
The session (a contention-loser session) is active.

AP_INACTIVE
The session is inactive.

adj_nncp_data.out_of_seq_tdus
Number of out-of-sequence TDUs received from this node.

adj_nncp_data.last_frsn_sent
The last Flow Reduction Sequence Number (FRSN) sent to this node.

adj_nncp_data.last_frsn_rcvd
The last Flow Reduction Sequence Number (FRSN) received from this node.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_ADJ_NNCP_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, to list all entries starting from the supplied name, but the *adj_nncp_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node is not a network node, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node is an end node or LEN node. This verb is valid only at a network node.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_AVAILABLE_TP

QUERY_AVAILABLE_TP returns information about active invokable TPs (APPC applications that have issued the RECEIVE_ALLOCATE verb, or CPI-C applications that have issued the Accept_Conversation or Accept_Incoming call). This verb can be used to obtain information about a specific TP or about multiple TPs, depending on the options used. This verb returns information about all such TPs that are running, whether or not they currently have an APPC verb or CPI-C call outstanding to accept a new incoming conversation.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_available_tp
{
    AP_UINT16         opcode;              /* Verb operation code           */
    unsigned char     reserv2;             /* reserved                      */
    unsigned char     format;              /* reserved                      */
    AP_UINT16         primary_rc;          /* Primary return code           */
    AP_UINT32         secondary_rc;        /* Secondary return code         */
    unsigned char     *buf_ptr;            /* pointer to buffer             */
    AP_UINT32         buf_size;            /* buffer size                   */
    AP_UINT32         total_buf_size;      /* total buffer size required    */
    AP_UINT16         num_entries;         /* number of entries             */
    AP_UINT16         total_num_entries;   /* total number of entries       */
    unsigned char     list_options;        /* listing options               */
    unsigned char     reserv3[3];          /* reserved                      */
    unsigned char     tp_name[64];         /* TP name                       */
    unsigned char     system_name[128];    /* computer name where TP is     */
                                           /*  running                      */
} QUERY_AVAILABLE_TP;

typedef struct available_tp_data
{
    AP_UINT16         overlay_size;        /* size of returned entry        */
    unsigned char     tp_name[64];         /* TP name                       */
    unsigned char     reserv4[4];          /* reserved                      */
    unsigned char     system_name[128];    /* computer name where TP is     */
                                           /*  running                      */
} AVAILABLE_TP_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_AVAILABLE_TP

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of TPs for which data should be returned. To request data for a specific TP rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of TPs from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of TP name and system name.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of TP name and system name.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

tp_name
TP name. This is a 64-byte string, padded on the right with spaces if the name is shorter than 64 characters. This value is ignored if *list_options* is set to `AP_FIRST_IN_LIST`.

system_name
The computer name for which TP information is required. The system name is an ASCII string of 1–128 characters, which must match a CS Linux computer name. This value is ignored if *list_options* is set to `AP_FIRST_IN_LIST`.

If the computer name includes a `.` (period) character, CS Linux assumes that it is a fully-qualified name; otherwise it performs a DNS lookup to determine the computer name.

If CS Linux is running with all programs on a single computer, there is no need to specify the computer name (it can be left as all binary zeros). For a client/server system, specify the computer name to list only TPs on the specified computer, or leave it as all binary zeros to list TPs on all computers.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

available_tp_data.overlay_size
The size of the returned `available_tp_data` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `available_tp_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

available_tp_data.tp_name
TP name. This is a 64-byte string, padded on the right with spaces if the name is shorter than 64 characters.

available_tp_data.system_name
Name of the computer where the TP is running.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
`AP_PARAMETER_CHECK`

secondary_rc
Possible values are:

`AP_INVALID_LIST_OPTION`
The *list_options* parameter was not set to a valid value.

`AP_UNKNOWN_TP`
The *list_options* parameter was set to `AP_LIST_INCLUSIVE`, to list all entries starting from the supplied name, but the *tp_name* parameter was not valid.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with `AP_PARAMETER_CHECK`, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_BUFFER_AVAILABILITY

This verb returns information about the amount of STREAMS buffers that CS Linux is currently using, the maximum amount it has used, and the maximum amount available (specified using the SET_BUFFER_AVAILABILITY verb). This allows you to check STREAMS buffer usage and set the limit appropriately, to ensure that sufficient buffers are available for CS Linux components and for other programs on the Linux computer. The verb also returns additional internal values relating to buffer usage, for use by CS Linux support personnel.

VCB Structure

```
typedef struct query_buffer_availability
{
   AP_UINT16        opcode;                /* verb operation code           */
   unsigned char    reserv2;               /* reserved                      */
   unsigned char    format;                /* reserved                      */
   AP_UINT16        primary_rc;            /* primary return code           */
   AP_UINT32        secondary_rc;          /* secondary return code         */
   AP_UINT32        reset_max_values;      /* set stored max values to      */
                                           /*  current                      */
   AP_UINT32        buf_avail;             /* maximum buffer space          */
                                           /*  available                    */
   AP_UINT32        buf_total_count;       /* current buffer usage - count  */
   AP_UINT32        buf_total_bytes;       /* current buffer usage - bytes  */
   AP_UINT32        buf_rsrv_count;        /* buffers reserved - count      */
   AP_UINT32        buf_rsrv_bytes[2];     /* buffers reserved - bytes      */
   AP_UINT32        buf_res_use_count;     /* usage of reserved buffers     */
                                           /*  - count                      */
   AP_UINT32        buf_res_use_bytes;     /* usage of reserved buffers     */
                                           /*  - bytes                      */
   AP_UINT32        peak_usage;            /* peak usage                    */
   AP_UINT32        peak_decay;            /* peak decay                    */
   unsigned char    throttle_status;       /* throttle status               */
   unsigned char    buf_use_status;        /* congestion status             */
   AP_UINT32        max_buf_total_count;   /* maximum buffer usage - count  */
   AP_UINT32        max_buf_total_bytes;   /* maximum buffer usage - bytes  */
   AP_UINT32        max_buf_rsrv_count;    /* max buffers reserved - count  */
   AP_UINT32        max_buf_rsrv_bytes[2]; /* max buffers reserved - bytes  */
   AP_UINT32        max_buf_res_use_count; /* max rsrv buffer usage - count */
   AP_UINT32        max_buf_res_use_bytes; /* max rsrv buffer usage - bytes */
   AP_UINT32        max_peak_usage;        /* maximum peak usage            */
   unsigned char    max_throttle_status;   /* maximum throttle status       */
   unsigned char    max_buf_use_status;    /* maximum congestion status     */
   unsigned char    debug_param[32];       /* reserved                      */
   unsigned char    reserv3[8];            /* reserved                      */
} QUERY_BUFFER_AVAILABILITY;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_BUFFER_AVAILABILITY

reset_max_values

Specify whether CS Linux should reset the values for the *max_** parameters (after returning them on this verb) to match the current values of these parameters. This ensures that a subsequent QUERY_BUFFER_AVAILABILITY verb will return the maximum values reached since this verb, rather than the maximum values reached since the system was started (or since the values for the *max_** parameters were last reset). Possible values are:

AP_YES Reset the values for the *max_** parameters to match the current values.

AP_NO Do not reset the values for the *max_** parameters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters. Values returned in other fields are for use by CS Linux support personnel.

primary_rc
AP_OK

secondary_rc
Not used.

buf_avail
The maximum amount of STREAMS buffer space available to CS Linux, in bytes, as defined by a SET_BUFFER_AVAILABILITY verb.

buf_total_count
The number of buffers currently allocated to CS Linux components.

buf_total_bytes
The total amount of storage in buffers currently allocated to CS Linux components.

buf_rsrv_count
The total number of buffers reserved.

buf_rsrv_bytes
The total amount of storage in buffers reserved, in bytes.

buf_res_use_count
The number of reserved buffers in use.

buf_res_use_bytes
The number of bytes in the reserved buffers currently in use.

peak_usage
Peak buffer usage—smoothed percentage of buffers that are actually used.

peak_decay
Smoothing parameter.

throttle_status
Adaptive pacing status.

buf_use_status
Congestion status. Possible values are:
AP_CONGESTED
AP_UNCONGESTED

max_buf_total_count
The maximum number of buffers that have been allocated to CS Linux components at any time.

max_buf_total_bytes
The maximum amount of buffer storage that has been allocated to CS Linux components at any time.

max_buf_rsrv_count
The maximum number of buffers that can be reserved.

max_buf_rsrv_bytes
The maximum amount of buffer storage that can be reserved, in bytes.

max_buf_res_use_count
The maximum number of reserved buffers that can be in use.

max_buf_res_use_bytes
The maximum number of bytes of reserved buffers that can be in use at any time.

max_peak_usage
Maximum peak buffer usage—smoothed percentage of buffers actually used.

max_throttle_status
Maximum adaptive pacing status.

max_buf_use_status
Maximum congestion status. Possible values are:
AP_CONGESTED
AP_UNCONGESTED

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_CENTRAL_LOGGER

This verb returns the name of the node currently defined as the central logger (the node holding the central log file to which CS Linux log messages from all servers are sent). This verb does not return information about whether central logging is active; use QUERY_CENTRAL_LOGGING to determine this.

This verb must be issued with a null target handle.

VCB Structure

```
typedef struct query_central_logger
{
     AP_UINT16          opcode;             /* verb operation code          */
     unsigned char      reserv2;            /* reserved                     */
     unsigned char      format;             /* reserved                     */
     AP_UINT16          primary_rc;         /* primary return code          */
     AP_UINT32          secondary_rc;       /* secondary return code        */
     unsigned char      reserv3[4];         /* reserved                     */
     unsigned char      node_name[128];     /* name of central logger       */
} QUERY_CENTRAL_LOGGER;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_CENTRAL_LOGGER

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

node_name
The name of the node defined as the central logger.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters:

primary_rc
AP_STATE_CHECK

secondary_rc

AP_NO_CENTRAL_LOG
No master server is currently active.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_CENTRAL_LOGGING

This verb returns information about whether CS Linux log messages are sent to a central file from all servers, or to a separate file on each server. For more information, see "SET_LOG_FILE" on page 642.

This verb must be issued to the node that is currently acting as the central logger; for information about accessing this node, see "CONNECT_NODE" on page 61.

VCB Structure

```
typedef struct query_central_logging
{
     AP_UINT16          opcode;          /* verb operation code            */
     unsigned char      reserv2;         /* reserved                       */
     unsigned char      format;          /* reserved                       */
     AP_UINT16          primary_rc;      /* primary return code            */
     AP_UINT32          secondary_rc;    /* secondary return code          */
     unsigned char      enabled;         /* is central logging enabled?    */
     unsigned char      reserv3[3];      /* reserved                       */
} QUERY_CENTRAL_LOGGING;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_CENTRAL_LOGGING

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

enabled Specifies whether central logging is enabled or disabled. Possible values are:

AP_YES Central logging is enabled. All log messages are sent to a single file on the node currently acting as the central logger.

AP_NO Central logging is disabled. Log messages from each server are sent to a file on that server (specified using the SET_LOG_FILE verb).

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_NOT_CENTRAL_LOGGER
The verb was issued to a node that is not the central logger.

State Check

If the command does not execute because of a state error, CS Linux returns the following parameters:

primary_rc
AP_STATE_CHECK

secondary_rc

AP_NO_CENTRAL_LOG
No master server is currently active.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_CN

QUERY_CN returns information about adjacent Connection Networks. This information is structured as "determined data" (data gathered dynamically during execution) and "defined data" (the data supplied by the application on DEFINE_CN).

This verb can be used to obtain information about a specific connection network, or about multiple connection networks, depending on the options used. It can be issued only at a network node or an end node; it is not valid at a LEN node.

VCB Structure

```
typedef struct query_cn
{
   AP_UINT16         opcode;             /* Verb operation code            */
   unsigned char     reserv2;            /* reserved                       */
   unsigned char     format;             /* reserved                       */
   AP_UINT16         primary_rc;         /* Primary return code            */
   AP_UINT32         secondary_rc;       /* Secondary return code          */
   unsigned char     *buf_ptr;           /* pointer to buffer              */
   AP_UINT32         buf_size;           /* buffer size                    */
   AP_UINT32         total_buf_size;     /* total buffer size required     */
   AP_UINT16         num_entries;        /* number of entries              */
   AP_UINT16         total_num_entries;  /* total number of entries        */
```

```
   unsigned char     list_options;       /* listing options                */
   unsigned char     reserv3;            /* reserved                       */
   unsigned char     fqcn_name[17];      /* Name of Connection Network     */
} QUERY_CN;

typedef struct cn_data
{
   AP_UINT16         overlay_size;       /* size of returned entry         */
   unsigned char     fqcn_name[17];      /* Name of Connection Network     */
   unsigned char     reserv1;            /* reserved                       */
   CN_DET_DATA       det_data;           /* Determined data                */
   CN_DEF_DATA       def_data;           /* Defined data                   */
} CN_DATA;

typedef struct cn_det_data
{
   AP_UINT16         num_act_ports;      /* number of active ports         */
   unsigned char     reserva[20];        /* reserved                       */
} CN_DET_DATA;

typedef struct cn_def_data
{
   unsigned char     description[32];    /* resource description           */
   unsigned char     reserve0[16];       /* reserved                       */
   unsigned char     num_ports;          /* number of ports on CN          */
   unsigned char     cn_type;            /* reserved                       */
   unsigned char     reserve1[15];       /* reserved                       */
   TG_DEFINED_CHARS  tg_chars;           /* TG characteristics             */
} CN_DEF_DATA;

typedef struct tg_defined_chars
{
   unsigned char     effect_cap;         /* effective capacity             */
   unsigned char     reserve1[5];        /* reserved                       */
   unsigned char     connect_cost;       /* connection cost                */
   unsigned char     byte_cost;          /* byte cost                      */
   unsigned char     reserve2;           /* reserved                       */
   unsigned char     security;           /* security                       */
   unsigned char     prop_delay;         /* propagation delay              */
   unsigned char     modem_class;        /* reserved                       */
   unsigned char     user_def_parm_1;    /* user-defined parameter 1       */
   unsigned char     user_def_parm_2;    /* user-defined parameter 2       */
   unsigned char     user_def_parm_3;    /* user-defined parameter 3       */
} TG_DEFINED_CHARS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_CN

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of CNs for which data should be returned. To request data for a specific CN rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of CNs from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *fqcn_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *fqcn_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

fqcn_name
Fully qualified name of the CN for which information is required, or the name to be used as an index into the list of CNs. This value is ignored if *list_options* is set to `AP_FIRST_IN_LIST`.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

cn_data.overlay_size
The size of the returned `cn_data` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `cn_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

cn_data.fqcn_name
Fully qualified name of the CN. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

cn_data.det_data.num_act_ports
The number of active ports on the connection network.

cn_data.def_data.description
A null-terminated text string describing the CN, as specified in the definition of the CN.

cn_data.def_data.num_ports
The total number of ports on the connection network.

cn_data.def_data.tg_chars.effect_cap
Actual bits per second rate (line speed). The value is encoded as a 1-byte floating point number, represented by the formula 0.1 mmm * 2^{eeeee} where the bit representation of the byte is eeeeemmm. Each unit of effective capacity is equal to 300 bits per second.

cn_data.def_data.tg_chars.connect_cost
Cost per connect time. Valid values are integer values in the range `0`–`255`, where `0` is the lowest cost per connect time and `255` is the highest.

cn_data.def_data.tg_chars.byte_cost
Cost per byte. Values are integers in the range `0`–`255`, where zero is the lowest cost per byte and `255` is the highest.

cn_data.def_data.tg_chars.security
Security level of the network. Possible values are:

AP_SEC_NONSECURE
No security.

AP_SEC_PUBLIC_SWITCHED_NETWORK
Data is transmitted over a public switched network.

AP_SEC_UNDERGROUND_CABLE
Data is transmitted over secure underground cable.

AP_SEC_SECURE_CONDUIT
Data is transmitted over a line in a secure conduit that is not guarded.

AP_SEC_GUARDED_CONDUIT
Data is transmitted over a line in a conduit that is protected against physical tapping.

AP_SEC_ENCRYPTED
Data is encrypted before transmission over the line.

AP_SEC_GUARDED_RADIATION
Data is transmitted over a line that is protected against physical and radiation tapping.

AP_SEC_MAXIMUM
Maximum security.

cn_data.def_data.tg_chars.prop_delay
Propagation delay: the time that a signal takes to travel the length of the link. Possible values are:

AP_PROP_DELAY_MINIMUM
Minimum propagation delay.

AP_PROP_DELAY_LAN
Delay is less than 480 microseconds (typical for a LAN).

AP_PROP_DELAY_TELEPHONE
Delay is in the range 480–49,512 microseconds (typical for a telephone network).

AP_PROP_DELAY_PKT_SWITCHED_NET
Delay is in the range 49,512–245,760 microseconds (typical for a packet-switched network).

AP_PROP_DELAY_SATELLITE
Delay is greater than 245,760 microseconds (typical for a satellite link).

AP_PROP_DELAY_MAXIMUM
Maximum propagation delay.

cn_data.def_data.tg_chars.user_def_parm_1 **through** *def_data.tg_chars.user_def_parm_3*
User-defined parameters, which include other TG characteristics not covered by the above parameters. Each of these parameters is set to a value in the range 0–255.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_CN_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, to list all entries starting from the supplied name, but the *fqcn_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node is a LEN node, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node is a LEN node. This verb is valid only at a network node or an end node.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_CN_PORT

QUERY_CN_PORT returns information about ports defined on an adjacent Connection Network.

This verb can be used to obtain information about a specific port, or about multiple ports, depending on the options used. It can be issued only at a network node or an end node; it is not valid at a LEN node.

VCB Structure

```
typedef struct query_cn_port
{
     AP_UINT16          opcode;             /* Verb operation code          */
     unsigned char      reserv2;            /* reserved                     */
     unsigned char      format;             /* reserved                     */
     AP_UINT16          primary_rc;         /* Primary return code          */
     AP_UINT32          secondary_rc;       /* Secondary return code        */
     unsigned char     *buf_ptr;            /* pointer to buffer            */
     AP_UINT32          buf_size;           /* buffer size                  */
     AP_UINT32          total_buf_size;     /* total buffer size required   */
     AP_UINT16          num_entries;        /* number of entries            */
     AP_UINT16          total_num_entries;  /* total number of entries      */
     unsigned char      list_options;       /* listing options              */
     unsigned char      reserv3;            /* reserved                     */
     unsigned char      fqcn_name[17];      /* Name of Connection Network   */
     unsigned char      port_name[8];       /* port name                    */
} QUERY_CN_PORT;

typedef struct cn_port_data
{
     AP_UINT16          overlay_size;       /* size of returned entry       */
     unsigned char      fqcn_name[17];      /* Name of Connection Network   */
     unsigned char      port_name[8];       /* name of port                 */
     unsigned char      tg_num;             /* transmission group number    */
     unsigned char      reserva[20];        /* reserved                     */
} CN_PORT_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_CN_PORT

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of ports for which data should be returned. To request data for a specific port rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of ports from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *port_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *port_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

fqcn_name
Fully qualified name of the CN on which the required port is defined, or the CN for which a list of ports is required.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

port_name
Name of the port for which information is required, or the name to be used as an index into the list of ports. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

cn_port_data.overlay_size
The size of the returned `cn_port_data` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `cn_port_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

cn_port_data.fqcn_name
Fully qualified name of the CN. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

cn_port_data.port_name
Name of the port. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters.

cn_port_data.tg_num
Transmission group number for the specified port.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_CN_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, to list all entries starting from the supplied name, but the *fqcn_name* parameter was not valid.

AP_INVALID_PORT_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, to list all entries starting from the supplied name, but the *port_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node is a LEN node, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node is a LEN node. This verb is valid only at a network node or an end node.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_CONVERSATION

QUERY_CONVERSATION returns information about conversations using a particular local LU.

This verb can be used to obtain information about a specific conversation or a range of conversations, depending on the options used.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_conversation
{
  AP_UINT16      opcode;                    /* verb operation code       */
  unsigned char  reserv2;                   /* reserved                  */
```

```
  unsigned char  format;                  /* reserved                  */
  AP_UINT16      primary_rc;              /* primary return code       */
  AP_UINT32      secondary_rc;            /* secondary return code     */
  unsigned char *buf_ptr;                 /* pointer to buffer         */
  AP_UINT32      buf_size;                /* buffer size               */
  AP_UINT32      total_buf_size;          /* total buffer size required */
  AP_UINT16      num_entries;             /* number of entries         */
  AP_UINT16      total_num_entries;       /* total number of entries   */
  unsigned char  list_options;            /* listing options           */
  unsigned char  reserv3;                 /* reserved                  */
  unsigned char  lu_name[8];              /* LU Name                   */
  unsigned char  lu_alias[8];             /* LU Alias                  */
  AP_UINT32      conv_id;                 /* Conversation ID           */
  unsigned char  session_id[8];           /* Session ID                */
  unsigned char  reserv4[12];             /* reserved                  */
} QUERY_CONVERSATION;

typedef struct conv_summary
{
  AP_UINT16      overlay_size;            /* overlay size              */
  AP_UINT32      conv_id;                 /* conversation ID           */
  unsigned char  local_tp_name[64];       /* local TP name             */
  unsigned char  partner_tp_name[64];     /* partner TP name           */
  unsigned char  tp_id[8];                /* TP ID                     */
  unsigned char  sess_id[8];              /* Session ID                */
  AP_UINT32      conv_start_time;         /* Conversation start time   */
  AP_UINT32      bytes_sent;              /* Number of bytes sent      */
  AP_UINT32      bytes_received;          /* Number of bytes received  */
  unsigned char  conv_state;              /* conversation state        */
  unsigned char  duplex_type;             /* full- or half-duplex conv? */
} CONV_SUMMARY;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_CONVERSATION

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of conversations for which data should be returned. To request data for a specific conversation rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data. Specify one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of local LU and conversation ID.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of local LU and conversation ID.

The combination of the local LU (*lu_name* or *lu_alias*) and conversation ID (*conv_id*) specified is used as an index into the list of sessions if the *list_options* parameter is set to AP_LIST_INCLUSIVE or AP_LIST_FROM_NEXT.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

lu_name
LU name. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters. To specify that the LU is identified by its alias rather than its LU name, set this parameter to 8 binary zeros and specify the LU alias in the following parameter. To specify the LU associated with the local CP (the default LU), set both *lu_name* and *lu_alias* to binary zeros.

lu_alias
Locally defined LU alias. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. This parameter is used only if *lu_name* is set to 8 binary zeros; it is ignored otherwise. To specify the LU associated with the local CP (the default LU), set both *lu_name* and *lu_alias* to binary zeros.

conv_id
Identifier of the conversation for which information is required, or the conversation ID to be used as an index into the list of conversations. The conversation ID was returned by the ALLOCATE verb in the invoking TP, or by the RECEIVE_ALLOCATE verb in the invoked TP.

This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST.

session_id
8-byte identifier of the session. To list only information about conversations associated with a specific session, specify the session identifier. To obtain a complete list for all sessions, set this field to binary zeros.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

conv_summary.overlay_size
The size of the returned conv_summary structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `conv_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

conv_summary.conv_id
Conversation identifier. The conversation ID was returned by the ALLOCATE verb in the invoking TP, or by the RECEIVE_ALLOCATE verb in the invoked TP.

conv_summary.local_tp_name
The name of the local TP in the conversation.

conv_summary.partner_tp_name
The name of the partner TP in the conversation. This parameter is returned only if the conversation was started by the local TP; it is reserved if the conversation was started by the remote TP.

conv_summary.tp_id
The TP identifier of the conversation.

conv_summary.session_id
The session identifier of the session allocated to the conversation.

conv_summary.conv_start_time
The elapsed time in hundredths of seconds between the time when the CS Linux node was started and the time when the conversation was started.

conv_summary.bytes_sent
The number of bytes that have been sent from the local TP to the partner TP since the start of the conversation.

conv_summary.bytes_received
The number of bytes that have been received from the partner TP by the local TP since the start of the conversation.

conv_summary.conv_state
The current state of the conversation. Values for a half-duplex conversation:
AP_CONFIRM_STATE
AP_CONFIRM_DEALL_STATE
AP_CONFIRM_SEND_STATE
AP_END_CONV_STATE
AP_PEND_DEALL_STATE
AP_PEND_POST_STATE
AP_POST_ON_RECEIPT_STATE
AP_RECEIVE_STATE
AP_RESET_STATE
AP_SEND_STATE
AP_SEND_PENDING_STATE

Values for a full-duplex conversation:
AP_RESET_STATE
AP_SEND_ONLY_STATE
AP_SEND_RECEIVE_STATE
AP_RECEIVE_ONLY_STATE

conv_summary.duplex_type
The duplex type of the conversation. Values:

AP_HALF_DUPLEX
AP_FULL_DUPLEX

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_BAD_CONV_ID
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied value, but the *conv_id* parameter was not valid.

AP_INVALID_LU_ALIAS
The specified *lu_alias* parameter was not valid.

AP_INVALID_LU_NAME
The specified *lu_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_COS

QUERY_COS returns route calculation information for a specific class of service (COS).

This verb can be used to obtain information about a specific COS or about multiple COSs, depending on the options used.

VCB Structure

```
typedef struct query_cos
{
   AP_UINT16        opcode;              /* verb operation code          */
   unsigned char    reserv2;             /* reserved                     */
   unsigned char    format;              /* reserved                     */
   AP_UINT16        primary_rc;          /* primary return code          */
   AP_UINT32        secondary_rc;        /* secondary return code        */
   unsigned char    *buf_ptr;            /* pointer to buffer            */
   AP_UINT32        buf_size;            /* buffer size                  */
   AP_UINT32        total_buf_size;      /* total buffer size required   */
   AP_UINT16        num_entries;         /* number of entries            */
   AP_UINT16        total_num_entries;   /* total number of entries      */
   unsigned char    list_options;        /* listing options              */
   unsigned char    reserv3;             /* reserved                     */
   unsigned char    cos_name[8];         /* cos name                     */
} QUERY_COS;
```

```
typedef struct cos_data
{
   AP_UINT16        overlay_size;           /* size of returned entry        */
   unsigned char    cos_name[8];            /* cos name                      */
   unsigned char    description[32];        /* resource description          */
   unsigned char    reserv1[16];            /* reserved                      */
   unsigned char    transmission_priority;  /* transmission priority         */
   AP_UINT16        num_of_node_rows;       /* number of node rows           */
   AP_UINT16        num_of_tg_rows;         /* number of tg rows             */
   AP_UINT32        trees;                  /* number of tree caches for COS */
   AP_UINT32        calcs;                  /* number of route calculations  */
                                            /*  for this COS                 */
   AP_UINT32        rejs;                   /* number of route rejects for   */
                                            /*  COS                          */
   unsigned char    reserva[20];            /* reserved                      */
} COS_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_COS

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of COSs for which data should be returned. To request data for a specific COS rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of COSs from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *cos_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *cos_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

cos_name
Class of service name for which data is required, or the name to be used as an index into the list. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. The name is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

cos_data.overlay_size
The size of the returned cos_data structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each cos_data structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C sizeof() operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

cos_data.cos_name
Class of service name. This is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

cos_data.description
A null-terminated text string describing the COS, as specified in the definition of the COS.

cos_data.transmission_priority
Transmission priority. Possible values are:

AP_LOW

AP_MEDIUM

AP_HIGH

AP_NETWORK (the highest priority)

cos_data.num_of_node_rows
Number of node rows defined for this COS.

cos_data.num_of_tg_rows
Number of TG rows defined for this COS.

cos_data.trees
Number of route tree caches built for this COS since the last initialization.

cos_data.calcs
Number of session activation requests (and therefore route calculations) specifying this class of service.

cos_data.rejs
Number of session activation requests that failed because there was no

acceptable route from this node to the named destination through the network. A route is only acceptable if it is made up entirely of active TGs and nodes that can provide the specified class of service.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_COS_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, to list all entries starting from the supplied name, but the *cos_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_COS_NODE_ROW

QUERY_COS_NODE_ROW returns node row information for a specified class of service as previously defined by DEFINE_COS (or implicitly by the node for the SNA-defined COSs).

This verb can be used to obtain information about a specific COS node row, or about multiple COS node rows, depending on the options used.

VCB Structure

```
typedef struct query_cos_node_row
{
    AP_UINT16          opcode;              /* verb operation code          */
    unsigned char      reserv2;             /* reserved                     */
    unsigned char      format;              /* reserved                     */
    AP_UINT16          primary_rc;          /* primary return code          */
    AP_UINT32          secondary_rc;        /* secondary return code        */
    unsigned char      *buf_ptr;            /* pointer to buffer            */
    AP_UINT32          buf_size;            /* buffer size                  */
    AP_UINT32          total_buf_size;      /* total buffer size required   */
    AP_UINT16          num_entries;         /* number of entries            */
    AP_UINT16          total_num_entries;   /* total number of entries      */
    unsigned char      list_options;        /* listing options              */
    unsigned char      reserv3;             /* reserved                     */
    unsigned char      cos_name[8];         /* cos name                     */
    AP_UINT16          node_row_index;      /* node row index               */
} QUERY_COS_NODE_ROW;

typedef struct cos_node_row_data
{
    AP_UINT16          overlay_size;        /* size of returned entry       */
```

```
    unsigned char      cos_name[8];          /* cos name                    */
    AP_UINT16          node_row_index;       /* node row index              */
    COS_NODE_ROW       node_row;             /* cos node row information    */
} COS_NODE_ROW_DATA;

typedef struct cos_node_row
{
    COS_NODE_STATUS    minimum;              /* minimum                     */
    COS_NODE_STATUS    maximum;              /* maximum                     */
    unsigned char      weight;               /* weight                      */
    unsigned char      reserv1;              /* reserved                    */
} COS_NODE_ROW;

typedef struct cos_node_status
{
    unsigned char      rar;                  /* route additional resistance */
    unsigned char      status;               /* node status                 */
    unsigned char      reserv1[2];           /* reserved                    */
} COS_NODE_STATUS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_COS_NODE_ROW

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of COS node rows for which data should be returned. To request data for a specific COS node row rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of COS node rows from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of the *cos_name* and *node_row_index* parameters.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of the *cos_name* and *node_row_index* parameters.

The list is ordered by *cos_name*, and then by *node_row_index* for each COS. For more information about how the application can obtain specific entries from the list, see "List Options For QUERY_* Verbs" on page 39.

cos_name
Class of service name for which node row information is required, or the name to be used as an index into the list. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. The name is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

node_row_index
Node row number for which information is required, or the number to be used as an index into the list. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. Use QUERY_COS to determine the number of node rows associated with this COS.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

cos_node_row_data.overlay_size
The size of the returned cos_node_row_data structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each cos_node_row_data structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C sizeof() operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

cos_node_row_data.cos_name
Class of service name. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

cos_node_row_data.node_row_index
Node row index.

cos_node_row_data.node_row.minimum.rar
Route additional resistance minimum, in the range 0–255.

cos_node_row_data.node_row.minimum.status
Specifies the minimum congestion status of the node. This parameter may be set to AP_UNCONGESTED, to any one of the other values listed, or to two or more of the other values combined using a logical OR. Possible values are:

AP_UNCONGESTED
The number of ISR sessions is below the *isr_sessions_upper_threshold* value in the node's configuration.

AP_CONGESTED
The number of ISR sessions exceeds the threshold value.

AP_IRR_DEPLETED
The number of ISR sessions has reached the maximum specified for the node.

AP_ERR_DEPLETED
The number of endpoint sessions has reached the maximum specified.

AP_QUIESCING
A STOP_NODE of type AP_QUIESCE or AP_QUIESCE_ISR has been issued.

cos_node_row_data.node_row.maximum.rar
Route additional resistance maximum, in the range 0–255.

cos_node_row_data.node_row.maximum.status
Specifies the maximum congestion status of the node. This parameter may be set to AP_UNCONGESTED, to any one of the other values listed, or to two or more of the other values combined using a logical OR. Possible values are:

AP_UNCONGESTED
The number of ISR sessions is below the *isr_sessions_upper_threshold* value in the node's configuration.

AP_CONGESTED
The number of ISR sessions exceeds the threshold value.

AP_IRR_DEPLETED
The number of ISR sessions has reached the maximum specified for the node.

AP_ERR_DEPLETED
The number of endpoint sessions has reached the maximum specified.

AP_QUIESCING
A STOP_NODE of type AP_QUIESCE or AP_QUIESCE_ISR has been issued.

cos_node_row_data.node_row.weight
Weight associated with this node row.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_COS_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, to list all entries starting from the supplied name, but the *cos_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_COS_TG_ROW

QUERY_COS_TG_ROW returns TG row information for a specified class of service as previously defined by DEFINE_COS (or implicitly by the node for the SNA-defined COSs).

This verb can be used to obtain information about a specific COS TG row, or about multiple COS TG rows, depending on the options used.

VCB Structure

```
typedef struct query_cos_tg_row
{
    AP_UINT16           opcode;             /* verb operation code         */
    unsigned char       reserv2;            /* reserved                    */
    unsigned char       format;             /* reserved                    */
    AP_UINT16           primary_rc;         /* primary return code         */
    AP_UINT32           secondary_rc;       /* secondary return code       */
    unsigned char       *buf_ptr;           /* pointer to buffer           */
    AP_UINT32           buf_size;           /* buffer size                 */
    AP_UINT32           total_buf_size;     /* total buffer size required  */
    AP_UINT16           num_entries;        /* number of entries           */
    AP_UINT16           total_num_entries;  /* total number of entries     */
    unsigned char       list_options;       /* listing options             */
    unsigned char       reserv3;            /* reserved                    */
    unsigned char       cos_name[8];        /* cos name                    */
    AP_UINT16           tg_row_index;       /* TG row index                */
} QUERY_COS_TG_ROW;

typedef struct cos_tg_row_data
{
    AP_UINT16           overlay_size;       /* size of returned entry      */
    unsigned char       cos_name[8];        /* cos name                    */
    AP_UINT16           tg_row_index;       /* TG row index                */
    COS_TG_ROW          tg_row;             /* TG row information          */
} COS_TG_ROW_DATA;

typedef struct cos_tg_row
{
    TG_DEFINED_CHARS    minimum;            /* minimum                     */
    TG_DEFINED_CHARS    maximum;            /* maximum                     */
    unsigned char       weight;             /* weight                      */
    unsigned char       reserv1;            /* reserved                    */
} COS_TG_ROW;

typedef struct tg_defined_chars
{
    unsigned char       effect_cap;         /* Effective capacity          */
    unsigned char       reserve1[5];        /* Reserved                    */
    unsigned char       connect_cost;       /* Connection Cost             */
    unsigned char       byte_cost;          /* Byte cost                   */
    unsigned char       reserve2;           /* Reserved                    */
    unsigned char       security;           /* Security                    */
    unsigned char       prop_delay;         /* Propagation delay           */
    unsigned char       modem_class;        /* reserved                    */
    unsigned char       user_def_parm_1;    /* User-defined parameter 1    */
    unsigned char       user_def_parm_2;    /* User-defined parameter 2    */
    unsigned char       user_def_parm_3;    /* User-defined parameter 3    */
} TG_DEFINED_CHARS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_COS_TG_ROW

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of COS TG rows for which data should be returned. To request data for a specific COS TG row rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of COS TG rows from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of the *cos_name* and *tg_row_index* parameters.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of the *cos_name* and *tg_row_index* parameters.

The list is ordered by *cos_name*, and then by *tg_row_index* for each COS. For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

cos_name
Class of service name for which data is required, or the name to be used as an index into the list. The name is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters. This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST.

tg_row_index
TG row number for which data is required, or the number to be used as an index into the list (the first row has an index of zero). This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required

to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

cos_tg_row_data.overlay_size
The size of the returned `cos_tg_row_data` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `cos_tg_row_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

cos_tg_row_data.cos_name
Class of service name. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

cos_tg_row_data.tg_row_index
TG row index (the first row has an index of zero).

cos_tg_row_data.tg_row.minimum.effect_cap
Minimum limit for actual bits per second rate (line speed). The value is encoded as a 1-byte floating point number, represented by the formula 0.1 mmm * 2 ^{eeeee} where the bit representation of the byte is b'eeeeemmm'. Each unit of effective capacity is equal to 300 bits per second.

cos_tg_row_data.tg_row.minimum.connect_cost
Minimum limit for cost per connect time; an integer value in the range `0`–`255`, where `0` is the lowest cost per connect time and `255` is the highest.

cos_tg_row_data.tg_row.minimum.byte_cost
Minimum limit for cost per byte; an integer value in the range `0`–`255`, where zero is the lowest cost per byte and `255` is the highest.

cos_tg_row_data.tg_row.minimum.security
Minimum level of security. Possible values are:

AP_SEC_NONSECURE
No security.

AP_SEC_PUBLIC_SWITCHED_NETWORK
Data is transmitted over a public switched network.

AP_SEC_UNDERGROUND_CABLE
Data is transmitted over secure underground cable.

AP_SEC_SECURE_CONDUIT
Data is transmitted over a line in a secure conduit that is not guarded.

AP_SEC_GUARDED_CONDUIT
Data is transmitted over a line in a conduit that is protected against physical tapping.

AP_SEC_ENCRYPTED
Data is encrypted before transmission over the line.

AP_SEC_GUARDED_RADIATION
Data is transmitted over a line that is protected against physical and radiation tapping.

cos_tg_row_data.tg_row.minimum.prop_delay
Minimum limits for propagation delay: the time that a signal takes to travel the length of the link. Possible values are:

AP_PROP_DELAY_MINIMUM
Minimum propagation delay.

AP_PROP_DELAY_LAN
Delay is less than 480 microseconds (typical for a LAN). If the verb was issued to a running node, this value will be returned if the DEFINE_COS specified either AP_PROP_DELAY_LAN or AP_PROP_DELAY_MINIMUM.

AP_PROP_DELAY_TELEPHONE
Delay is in the range 480–49,512 microseconds (typical for a telephone network).

AP_PROP_DELAY_PKT_SWITCHED_NET
Delay is in the range 49,512–245,760 microseconds (typical for a packet-switched network).

AP_PROP_DELAY_SATELLITE
Delay is greater than 245,760 microseconds (typical for a satellite link).

AP_PROP_DELAY_MAXIMUM
Maximum propagation delay.

cos_tg_row_data.tg_row.minimum.user_def_parm_1 **through** *cos_tg_row_data.tg_row.minimum.user_def_parm_3*
Minimum values for user-defined parameters, which include other TG characteristics not covered by the above parameters. Each of these parameters is set to a value in the range 0–255.

cos_tg_row_data.tg_row.maximum.effect_cap
Maximum limit for actual bits per second rate (line speed). The value is encoded as a 1-byte floating point number, represented by the formula 0.1 mmm * 2 ^{eeeee} where the bit representation of the byte is eeeeemmm. Each unit of effective capacity is equal to 300 bits per second.

cos_tg_row_data.tg_row.maximum.connect_cost
Maximum limit for cost per connect time; an integer value in the range 0–255, where 0 is the lowest cost per connect time and 255 is the highest.

cos_tg_row_data.tg_row.maximum.byte_cost
Maximum limit for cost per byte; an integer value in the range 0–255, where 0 is the lowest cost per byte and 255 is the highest.

cos_tg_row_data.tg_row.maximum.security
Maximum level of security. Possible values are:

AP_SEC_NONSECURE
No security.

AP_SEC_PUBLIC_SWITCHED_NETWORK
Data is transmitted over a public switched network.

AP_SEC_UNDERGROUND_CABLE
Data is transmitted over secure underground cable.

AP_SEC_SECURE_CONDUIT
Data is transmitted over a line in a secure conduit that is not guarded.

AP_SEC_GUARDED_CONDUIT
Data is transmitted over a line in a conduit that is protected against physical tapping.

AP_SEC_ENCRYPTED
Data is encrypted before transmission over the line.

AP_SEC_GUARDED_RADIATION
Data is transmitted over a line that is protected against physical and radiation tapping.

AP_SEC_MAXIMUM
Maximum security.

cos_tg_row_data.tg_row.maximum.prop_delay
Maximum limits for propagation delay: the time that a signal takes to travel the length of the link. Possible values are:

AP_PROP_DELAY_MINIMUM
Minimum propagation delay.

AP_PROP_DELAY_LAN
Delay is less than 480 microseconds (typical for a LAN).

AP_PROP_DELAY_TELEPHONE
Delay is in the range 480–49,512 microseconds (typical for a telephone network).

AP_PROP_DELAY_PKT_SWITCHED_NET
Delay is in the range 49,512–245,760 microseconds (typical for a packet-switched network).

AP_PROP_DELAY_SATELLITE
Delay is greater than 245,760 microseconds (typical for a satellite link). If the verb was issued to a running node, this value will be returned if the DEFINE_COS specified either AP_PROP_DELAY_SATELLITE or AP_PROP_DELAY_MAXIMUM.

AP_PROP_DELAY_MAXIMUM
Maximum propagation delay.

cos_tg_row_data.tg_row.maximum.user_def_parm_1 **through** *cos_tg_row_data.tg_row.maximum.user_def_parm_3*
Maximum values for user-defined parameters, which include other TG characteristics not covered by the above parameters. Each of these parameters is set to a value in the range 0–255.

cos_tg_row_data.tg_row.weight
Weight associated with this TG row.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_COS_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, to list all entries starting from the supplied name, but the *cos_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_CPIC_SIDE_INFO

This verb returns the side information entry for a given symbolic destination name, or for multiple symbolic destination names, depending on the options used.

Note the difference between this verb and the CPI-C function Extract_CPIC_Side_Information. This verb queries a configuration file, so that it returns the default information used by all CS Linux CPI-C applications. The CPI-C function queries the application's own copy in memory of the side information table, which the application may have modified using the other CPI-C side information functions.

This verb must be issued to the domain configuration file.

VCB Structure

```
typedef struct query_cpic_side_info
{
   AP_UINT16            opcode;              /* verb operation code         */
   unsigned char        reserv2;             /* reserved                    */
   unsigned char        format;              /* reserved                    */
   AP_UINT16            primary_rc;          /* primary return code         */
   AP_UINT32            secondary_rc;        /* secondary return code       */
   unsigned char        *buf_ptr;            /* pointer to buffer           */
   AP_UINT32            buf_size;            /* buffer size                 */
   AP_UINT32            total_buf_size;      /* total buffer size required  */
   AP_UINT16            num_entries;         /* number of entries           */
   AP_UINT16            total_num_entries;   /* total number of entries     */
   unsigned char        list_options;        /* listing options             */
   unsigned char        reserv3;             /* reserved                    */
   unsigned char        sym_dest_name[8];    /* Symbolic destination name   */
} QUERY_CPIC_SIDE_INFO;

typedef struct cpic_side_info_data
{
   AP_UINT16                overlay_size;     /* size of returned entry     */
   unsigned char            sym_dest_name[8]; /* Symbolic destination name  */
   unsigned char            reserv1[2];       /* reserved                   */
   CPIC_SIDE_INFO_DEF_DATA  def_data;
} CPIC_SIDE_INFO_DATA;

typedef struct cpic_side_info_def_data
{
   unsigned char            description[32];  /* resource description       */
```

```
   unsigned char             reserv1[16];      /* reserved                  */
   CPIC_SIDE_INFO            side_info;        /* CPIC side info            */
   unsigned char             user_data[24];    /* reserved                  */
} CPIC_SIDE_INFO_DEF_DATA;

typedef struct cpic_side_info
{
   unsigned char   partner_lu_name[17];        /* Fully qualified partner   */
                                               /*  LU name                  */
   unsigned char   reserved[3];                /* Reserved                  */
   AP_UINT32       tp_name_type;               /* TP name type              */
   unsigned char   tp_name[64];                /* TP name                   */
   unsigned char   mode_name[8];               /* Mode name                 */
   AP_UINT32       conversation_security_type; /* Conversation security     */
                                               /*  type                     */
   unsigned char   security_user_id[10];       /* User ID                   */
   unsigned char   security_password[10];      /* Password                  */
   unsigned char   lu_alias[8];                /* LU alias                  */
} CPIC_SIDE_INFO;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_CPIC_SIDE_INFO

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of symbolic destination names for which data should be returned. To request data for a specific symbolic destination name rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of symbolic destination names from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *sym_dest_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *sym_dest_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

sym_dest_name
Symbolic destination name for which data is required, or the name to be used as an index into the list. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. The name is an ASCII string, consisting of uppercase A–Z and numerals 0–9, padded on the right with spaces if the name is shorter than 8 characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
: `AP_OK`

buf_size
: Length of the information returned in the supplied buffer.

total_buf_size
: Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
: Number of entries returned in the data buffer.

total_num_entries
: Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

  Each entry in the data buffer consists of the following parameters:

cpic_side_info_data.overlay_size
: The size of the returned `cpic_side_info_data` structure, and therefore the offset to the start of the next entry in the data buffer.

  When your application needs to go through the returned buffer to find each `cpic_side_info_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

cpic_side_info_data.sym_dest_name
: Symbolic destination name for the returned side information entry.

cpic_side_info_data.def_data.description
: A null-terminated text string describing the side information entry, as specified in the definition of the side information entry.

cpic_side_info_data.def_data.side_info.partner_lu_name
: Fully qualified name of the partner LU. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

cpic_side_info_data.def_data.side_info.tp_name_type
: The type of the target TP (the valid characters for a TP name are determined by the TP type). Possible values are:

  XC_APPLICATION_TP
  : Application TP. All characters in the TP name must be valid ASCII characters.

  XC_SNA_SERVICE_TP
  : Service TP. The TP name must be specified as an 8–character ASCII string representing the hexadecimal digits of a 4-character name. For example, if the hexadecimal representation of the name is 0x21F0F0F8, set the *def_data.side_info.tp_name* parameter to the 8–character string “21F0F0F8”.

The first character (represented by two bytes) must be a hexadecimal value in the range 0x0–0x3F, excluding 0x0E and 0x0F; the remaining characters (each represented by two bytes) must be valid EBCDIC characters.

cpic_side_info_data.def_data.side_info.tp_name
TP name of the target TP. This is a 64-byte ASCII character string, right-padded with spaces.

cpic_side_info_data.def_data.side_info.mode_name
Name of the mode used to access the target TP. This is an 8-byte ASCII character string, right-padded with spaces.

cpic_side_info_data.def_data.side_info.conversation_security_type
Specifies whether the target TP uses conversation security. Possible values are:

XC_SECURITY_NONE
The target TP does not use conversation security.

XC_SECURITY_PROGRAM
The target TP uses conversation security. The *security_user_id* and *security_password* parameters specified below will be used to access the target TP.

XC_SECURITY_PROGRAM_STRONG
As for XC_SECURITY_PROGRAM, except that the local node must not send the password across the network in clear text format. This value can be used only if the remote system supports password substitution.

XC_SECURITY_SAME
The target TP uses conversation security, and can accept an "already verified" indicator from the local TP. (This indicates that the local TP was itself invoked by another TP, and has verified the security user ID and password supplied by this TP.) The *security_user_id* parameter specified below will be used to access the target TP; no password is required.

cpic_side_info_data.def_data.side_info.security_user_id
User ID used to access the partner TP. This parameter is not used if the *conversation_security_type* parameter is set to XC_SECURITY_NONE.

cpic_side_info_data.def_data.side_info.security_password
Password used to access the partner TP. This parameter is used only if the *conversation_security_type* parameter is set to XC_SECURITY_PROGRAM or XC_SECURITY_PROGRAM_STRONG.

cpic_side_info_data.def_data.side_info.lu_alias
The alias of the local LU used to communicate with the target TP. This alias is a character string using any locally displayable characters.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_INVALID_SYM_DEST_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, to list all entries starting from the supplied name, but the *sym_dest_name* parameter was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_CS_TRACE

This verb returns information about the current tracing options for data sent between computers on the CS Linux LAN. For more information about tracing options, see the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_cs_trace
{
   AP_UINT16        opcode;            /* verb operation code               */
   unsigned char    reserv2;           /* reserved                          */
   unsigned char    format;            /* reserved                          */
   AP_UINT16        primary_rc;        /* primary return code               */
   AP_UINT32        secondary_rc;      /* secondary return code             */
   unsigned char    dest_sys[128];     /* node to which messages are traced */
   unsigned char    reserv4[4];        /* reserved                          */
   AP_UINT16        trace_flags;       /* trace flags                       */
   AP_UINT16        trace_direction;   /* direction (send/rcv/both) to trace */
   unsigned char    reserv3[8];        /* Reserved                          */
} QUERY_CS_TRACE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_CS_TRACE

dest_sys
The server name for which tracing options are being queried. This is an ASCII string, padded on the right with spaces if the name is shorter than 128 characters.

To query tracing options on messages flowing between the computer to which this verb is issued (identified by the *target_handle* parameter on the NOF API call) and one other server on the LAN, specify the name of the other server here.

If the computer name includes a **.** (period) character, CS Linux assumes that it is a fully-qualified name; otherwise it performs a DNS lookup to determine the computer name.

To query the default tracing options (set by a SET_CS_TRACE verb with no destination system name specified), set this parameter to all ASCII space characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

trace_flags
The types of tracing currently active. For more information about these trace types, see "SET_CS_TRACE" on page 637.

If no tracing is active, or if tracing of all types is active, this is one of the following values:

AP_NO_TRACE
No tracing.

AP_ALL_TRACE
Tracing of all types.

If tracing is being used on specific interfaces, this parameter is set to one or more values from the list below, combined using a logical OR operation.

AP_CS_ADMIN_MSG
Internal messages relating to client/server topology

AP_CS_DATAGRAM
Datagram messages

AP_CS_DATA
Data messages

trace_direction
Specifies the direction or directions in which tracing is active. This parameter is not used if *trace_flags* is set to AP_NO_TRACE. Possible values are:

AP_CS_SEND
Messages flowing from the target computer to the computer defined by *dest_sys* are traced.

AP_CS_RECEIVE
Messages flowing from the computer defined by *dest_sys* to the target computer are traced.

AP_CS_BOTH
Messages flowing in both directions are traced.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_NAME_NOT_FOUND
The server specified by the *dest_sys* parameter did not exist or was not started.

AP_LOCAL_SYSTEM
The server specified by the *dest_sys* parameter is the same as the target node to which this verb was issued.

AP_INVALID_TARGET
The verb was issued on a standalone server. This verb can only be issued on a client/server system.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_DEFAULT_PU

QUERY_DEFAULT_PU allows the user to query the default PU (defined using DEFINE_DEFAULT_PU).

VCB Structure

```
typedef struct query_default_pu
{
   AP_UINT16        opcode;            /* verb operation code               */
   unsigned char    reserv2;           /* reserved                          */
   unsigned char    format;            /* reserved                          */
   AP_UINT16        primary_rc;        /* primary return code               */
   AP_UINT32        secondary_rc;      /* secondary return code             */
   unsigned char    def_pu_name[8];    /* default PU name                   */
   unsigned char    description[32];   /* resource description              */
   unsigned char    reserv1[16];       /* reserved                          */
   unsigned char    def_pu_sess[8];    /* PU name of active default session */
   unsigned char    reserv3[16];       /* reserved                          */
} QUERY_DEFAULT_PU;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_DEFAULT_PU

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

def_pu_name
Name of the PU specified on the most recent DEFINE_DEFAULT_PU verb. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces. If this field is set to all binary zeros, this indicates that no DEFINE_DEFAULT_PU verb has been issued or that the default PU has been deleted by issuing a DEFINE_DEFAULT_PU verb with the *pu_name* parameter specified as all zeros.

description
A null-terminated text string describing the default PU, as specified in the definition of the default PU.

def_pu_sess
Name of the PU associated with the currently active default PU session.

This parameter normally contains the same value as the *def_pu_name* field. However, if a default PU has been defined, but the session associated with it is not active, CS Linux continues to use the session associated with the previous default PU until the session associated with the defined default PU becomes active. In this case, this parameter specifies the name of the previous default PU, and is different from the *def_pu_name* field.

If there are no active PU sessions, this field will be set to all binary zeros.

Returned Parameters: Node Not Started

If the verb does not execute because the node has not yet been started, CS Linux returns the following parameters:

primary_rc
AP_NODE_NOT_STARTED

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_DEFAULTS

QUERY_DEFAULTS allows the user to query the default parameters defined for the node (defined using DEFINE_DEFAULTS).

VCB Structure

```
typedef struct query_defaults
{
     AP_UINT16         opcode;           /* verb operation code          */
     unsigned char     reserv2;          /* reserved                     */
     unsigned char     format;           /* reserved                     */
     AP_UINT16         primary_rc;       /* primary return code          */
     AP_UINT32         secondary_rc;     /* secondary return code        */
     DEFAULT_CHARS     default_chars;    /* default parameters           */
} QUERY_DEFAULTS;
```

```
typedef struct default_chars
{
     unsigned char     description[32];    /* resource description          */
     unsigned char     reserv2[16];        /* reserved                      */
     unsigned char     mode_name[8];       /* default mode name             */
     unsigned char     implicit_plu_forbidden; /* disallow implicit PLUs?   */
     unsigned char     specific_security_codes;/*generic security sensecodes?*/
     AP_UINT16         limited_timeout;    /* timeout for limited sessions  */
     unsigned char     reserv[244];        /* reserved                      */
} DEFAULT_CHARS;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_DEFAULTS

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

default_chars.description
A null-terminated text string describing the default parameters, as specified in DEFINE_DEFAULTS.

default_chars.mode_name
Name of the default mode. If an application specifies an unrecognized mode name when attempting to start a session, the parameters from this mode will be used as a default definition for the unrecognized mode.

The mode name is an 8-byte type-A EBCDIC string. If no default mode name has been specified using the DEFINE_DEFAULTS verb, this parameter is set to 8 binary zeros.

default_chars.implicit_plu_forbidden
Indicates whether CS Linux puts implicit definitions in place for unknown partner LUs. Possible values are:

AP_YES CS Linux does not put implicit definitions in place for unknown partner LUs. All partner LUs must be defined explicitly.

AP_NO CS Linux puts implicit definitions in place for unknown partner LUs.

default_chars.specific_security_codes
Indicates whether CS Linux uses specific sense codes on a security authentication or authorization failure. Specific sense codes are only returned to those partner LUs which have reported support for them on the session. Possible values are:

AP_YES CS Linux uses specific sense codes.

AP_NO CS Linux does not use specific sense codes.

default_chars.limited_timeout
Specifies the timeout after which free limited-resource conwinner sessions are deactivated. The range is 0–65,535 seconds.

Returned Parameters: Node Not Started

If the verb does not execute because the node has not yet been started, CS Linux returns the following parameter:

primary_rc
AP_NODE_NOT_STARTED

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_DIRECTORY_ENTRY

QUERY_DIRECTORY_ENTRY returns information about resources in the directory database. It can return either summary or detailed information, about a specific resource or multiple resources, depending on the options used.

If the verb is issued to a running node, it returns information both on resources that have been defined explicitly (using DEFINE_DIRECTORY_ENTRY, or DEFINE_ADJACENT_LEN_NODE) and on resources that have been located dynamically. If the node is not running, only explicitly defined entries are returned.

When the verb is issued to an end node, the directory contains only information about the end node and its resources, and not about other nodes. The first entry returned is for the end node itself, followed by its LUs. (No entry is returned for the end node's network node server.)

When the verb is issued to a network node, the directory may contain information about multiple network nodes and their associated end nodes and LUs. For each network node, the information returned is in the following order:

1. The network node.
2. The LUs owned by this node.
3. The first end node associated with the network node.
4. The LUs owned by this end node.
5. Any other end nodes associated with the network node, each followed by its LUs.

VCB Structure

```
typedef struct query_directory_entry
{
   AP_UINT16         opcode;              /* verb operation code           */
   unsigned char     reserv2;             /* reserved                      */
   unsigned char     format;              /* reserved                      */
   AP_UINT16         primary_rc;          /* primary return code           */
   AP_UINT32         secondary_rc;        /* secondary return code         */
   unsigned char     *buf_ptr;            /* pointer to buffer             */
   AP_UINT32         buf_size;            /* buffer size                   */
   AP_UINT32         total_buf_size;      /* total buffer size required    */
   AP_UINT16         num_entries;         /* number of entries             */
   AP_UINT16         total_num_entries;   /* total number of entries       */
   unsigned char     list_options;        /* listing options               */
   unsigned char     reserv3;             /* reserved                      */
   unsigned char     resource_name[17];   /* network qualified resource    */
                                          /* name                          */
   unsigned char     reserv4;             /* reserved                      */
   AP_UINT16         resource_type;       /* Resource type                 */
   unsigned char     parent_name[17];     /* parent name filter            */
   unsigned char     reserv5;             /* reserved                      */
   AP_UINT16         parent_type;         /* parent type                   */
   unsigned char     reserv6[24];         /* reserved                      */
} QUERY_DIRECTORY_ENTRY;
```

```
typedef struct directory_entry_summary
{
   AP_UINT16         overlay_size;          /* size of this entry           */
   unsigned char     resource_name[17];     /* network qualified resource   */
                                            /* name                         */
   unsigned char     reserve1;              /* reserved                     */
   AP_UINT16         resource_type;         /* Resource type                */
   unsigned char     description[32];       /* resource description         */
   unsigned char     reserv1[16];           /* reserved                     */
   AP_UINT16         real_owning_cp_type;     /* CP type of real owner      */
   unsigned char     real_owning_cp_name[17]; /* CP name of real owner      */
   unsigned char     reserve2;                /* reserved                   */
} DIRECTORY_ENTRY_SUMMARY;

typedef struct directory_entry_detail
{
   AP_UINT16         overlay_size;          /* size of this entry           */
   unsigned char     resource_name[17];     /* network qualified res name   */
   unsigned char     reserv1a;              /* reserved                     */
   AP_UINT16         resource_type;         /* Resource type                */
   unsigned char     description[32];       /* resource description         */
   unsigned char     reserv2[16];           /* reserved                     */
   unsigned char     parent_name[17];       /* Network qualified parent name */
   unsigned char     reserv1b;              /* reserved                     */
   AP_UINT16         parent_type;           /* Parent resource type         */
   unsigned char     entry_type;            /* Type of the directory entry  */
   unsigned char     location;              /* Resource location            */
   AP_UINT16         real_owning_cp_type;     /* CP type of real owner      */
   unsigned char     real_owning_cp_name[17]; /* CP name of real owner      */
   unsigned char     reserv1c;              /* reserved                     */
   AP_UINT16         supplier_cp_type;        /* CP type of supplier       */
   unsigned char     supplier_cp_name[17];    /* CP name of supplier       */
   unsigned char     reserva;               /* reserved                     */
} DIRECTORY_ENTRY_DETAIL;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_DIRECTORY_ENTRY

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of resources for which data should be returned. To request data for a specific resource rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of the *parent_name*, *resource_name*, and *resource_type* parameters.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of the *parent_name*, *resource_name*, and *resource_type* parameters.

The list is ordered by *parent_name*, then by *resource_name*, and lastly by *resource_type*. For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

resource_name
Fully qualified name of the resource for which information is required, or the name to be used as an index into the list of resources. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

resource_type
Type of resource for which information is required. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. Possible values are:

AP_ENCP_RESOURCE
End node or LEN node

AP_NNCP_RESOURCE
Network node

AP_LU_RESOURCE
LU

parent_name
Fully qualified resource name of the parent resource; for an LU the parent resource is the owning Control Point, and for an end node or LEN node it is the network node server. To return only entries belonging to the specified parent, set this parameter to the name of the parent resource and *parent_type* to the parent's resource type; to return all entries, set both parameters to binary zeros.

The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

parent_type
Resource type of the parent resource. To return only entries belonging to the specified parent, set this parameter to the type of the parent resource; to return all entries, set this parameter to zero. Possible values are:

AP_ENCP_RESOURCE
End node (for an LU resource owned by an end node)

AP_NNCP_RESOURCE
Network node (for an LU resource owned by a network node, or for an EN or LEN resource)

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

directory_entry_summary.overlay_size
The size of the returned directory_entry_summary structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each directory_entry_summary structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C sizeof() operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

directory_entry_summary.resource_name
Fully qualified name of the resource. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters

directory_entry_summary.resource_type
Type of the resource. This is one of the following:

AP_ENCP_RESOURCE
End node or LEN node

AP_NNCP_RESOURCE
Network node

AP_LU_RESOURCE
LU

directory_entry_summary.description
A null-terminated text string describing the directory entry, as specified in the definition of the directory entry.

directory_entry_summary.real_owning_cp_type
This parameter applies only if the local node is a Network Node or a Branch Network Node; it is reserved otherwise.

Specifies whether the real CP that owns the resource identified by this directory entry is the parent resource or another node. This is one of the following:

AP_NONE
The real owner is the parent resource.

AP_ENCP_RESOURCE
The real owner is an end node that is not the parent resource. For example, if the resource is owned by an End Node in the domain of a Branch Network Node (BrNN), the directory of this BrNN's Network Node Server includes the BrNN as the parent resource, but the real owning CP is the End Node.

directory_entry_summary.real_owning_cp_name
This parameter applies only if the local node is a Network Node or a Branch Network Node; it is reserved otherwise.

If the *real_owning_cp_type* parameter indicates that the real owner of the resource is not the parent, this parameter specifies the fully qualified name of the CP that owns the resource; otherwise it is reserved.

The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

directory_entry_detail.overlay_size
The size of the returned `directory_entry_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `directory_entry_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

directory_entry_detail.resource_name
Fully qualified name of the resource. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

directory_entry_detail.resource_type
Type of the resource. This is one of the following:

AP_ENCP_RESOURCE
End node or LEN node

AP_NNCP_RESOURCE
Network node

AP_LU_RESOURCE
LU

directory_entry_detail.description
A null-terminated text string describing the directory entry, as specified in the definition of the directory entry.

directory_entry_detail.parent_name
Fully qualified resource name of the parent resource; for an LU the parent resource is the owning Control Point, and for an end node or LEN node it is the network node server. This parameter is not used for a network node resource.

The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

directory_entry_detail.parent_type
Resource type of the parent resource. For a network node resource, this parameter is not used. Otherwise, it is one of the following:

AP_ENCP_RESOURCE
End node (for an LU resource owned by an end node)

AP_NNCP_RESOURCE
Network node (for an LU resource owned by a network node, or for an EN or LEN resource)

directory_entry_detail.entry_type
Specifies the type of the directory entry. This is one of the following:

AP_HOME
Local resource.

AP_CACHE
Cached entry.

AP_REGISTER
Registered resource (NN only).

directory_entry_detail.location
Specifies the location of the resource. This is one of the following.

AP_LOCAL
The resource is at the local node.

AP_DOMAIN
The resource belongs to an attached end node.

AP_CROSS_DOMAIN
The resource is not within the domain of the local node.

directory_entry_detail.real_owning_cp_type
This parameter applies only if the local node is a Network Node or a Branch Network Node; it is reserved otherwise.

Specifies whether the real CP that owns the resource identified by this directory entry is the parent resource or another node. This is one of the following:

AP_NONE
The real owner is the parent resource.

AP_ENCP_RESOURCE
The real owner is an end node that is not the parent resource. For example, if the resource is owned by an End Node in the domain of a Branch Network Node (BrNN), the directory of this BrNN's Network Node Server includes the BrNN as the parent resource, but the real owning CP is the End Node.

directory_entry_detail.real_owning_cp_name
This parameter applies only if the local node is a Network Node or a Branch Network Node; it is reserved otherwise.

If the *real_owning_cp_type* parameter indicates that the real owner of the resource is not the parent, this parameter specifies the fully qualified name of the CP that owns the resource; otherwise it is reserved.

The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

directory_entry_detail.supplier_cp_type
This parameter applies only if the local node is a Network Node or a Branch Network Node; it is reserved otherwise.

Specifies whether this directory entry was registered by another node that is not the owning CP of the resource. This is one of the following:

AP_NONE
The directory entry was not registered, or was registered by its owning CP.

AP_ENCP_RESOURCE
The directory entry was registered by a node that is not its owning CP. For example, if the resource is owned by an End Node in the domain of a Branch Network Node (BrNN) that is itself in the domain of the local node, the BrNN is the supplier because it registers the resource with the local node, but the real owning CP is the End Node.

directory_entry_detail.supplier_cp_name
This parameter applies only if the local node is a Network Node or a Branch Network Node; it is reserved otherwise.

If the *supplier_cp_type* parameter indicates that the directory entry was registered by a node that is not the owning resource, this parameter specifies the fully qualified name of the CP that supplied the registration; otherwise it is reserved.

The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_RES_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, to list all entries starting from the supplied name, but the *resource_name* parameter was not valid.

AP_INVALID_RES_TYPE
The *resouce_type* parameter was not set to a valid value.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_DIRECTORY_LU

QUERY_DIRECTORY_LU returns a list of LUs from the directory database. It can be used to obtain information about a specific LU, or about multiple LUs, depending on the options used.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_directory_lu
{
   AP_UINT16         opcode;              /* verb operation code           */
   unsigned char     reserv2;             /* reserved                      */
   unsigned char     format;              /* reserved                      */
   AP_UINT16         primary_rc;          /* primary return code           */
   AP_UINT32         secondary_rc;        /* secondary return code         */
   unsigned char     *buf_ptr;            /* pointer to buffer             */
   AP_UINT32         buf_size;            /* buffer size                   */
   AP_UINT32         total_buf_size;      /* total buffer size required    */
   AP_UINT16         num_entries;         /* number of entries             */
   AP_UINT16         total_num_entries;   /* total number of entries       */
   unsigned char     list_options;        /* listing options               */
   unsigned char     reserv3;             /* reserved                      */
   unsigned char     lu_name[17];         /* network qualified lu name     */
} QUERY_DIRECTORY_LU;

typedef struct directory_lu_summary
{
   AP_UINT16         overlay_size;        /* size of returned entry        */
   unsigned char     lu_name[17];         /* network qualified lu name     */
   unsigned char     description[32];     /* resource description          */
   unsigned char     reserv1[16];         /* reserved                      */
} DIRECTORY_LU_SUMMARY;

typedef struct directory_lu_detail
{
   AP_UINT16         overlay_size;        /* size of returned entry         */
   unsigned char     lu_name[17];         /* network qualified lu name      */
   unsigned char     description[32];     /* resource description           */
   unsigned char     reserv1[16];         /* reserved                       */
   unsigned char     server_name[17];     /* network qualified server name  */
   unsigned char     lu_owner_name[17];   /* network qualified lu owner name */
   unsigned char     location;            /* Resource location              */
   unsigned char     entry_type;          /* Type of the directory entry    */
   unsigned char     wild_card;           /* type of wildcard entry         */
   unsigned char     apparent_lu_owner_name[17]; /* name of apparent LU owner */
   unsigned char     reserva[3];          /* reserved                       */
} DIRECTORY_LU_DETAIL;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_DIRECTORY_LU

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of LUs for which data should be returned. To request data for a specific LU rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *lu_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *lu_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

lu_name
Fully qualified name of the LU for which information is required, or the name to be used as an index into the list of LUs. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

directory_lu_summary.overlay_size
The size of the returned `directory_lu_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `directory_lu_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

directory_lu_summary.lu_name
Fully qualified name of the LU. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

directory_lu_summary.description
A null-terminated text string describing the directory entry, as specified in the definition of the directory entry.

directory_lu_detail.overlay_size
The size of the returned `directory_lu_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `directory_lu_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

directory_lu_detail.lu_name
Fully qualified name of the LU. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

directory_lu_detail.description
A null-terminated text string describing the directory entry, as specified in the definition of the directory entry.

directory_lu_detail.server_name
Fully qualified name of the node that serves the LU. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

directory_lu_detail.lu_owner_name
Fully qualified name of the node that owns the LU. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

directory_lu_detail.location
Specifies the location of the resource. This is one of the following.

AP_LOCAL
The resource is at the local node.

AP_DOMAIN
The resource belongs to an attached end node.

AP_CROSS_DOMAIN
The resource is not within the domain of the local node.

directory_lu_detail.entry_type
Specifies the type of the resource. This is one of the following:

AP_HOME
Local resource.

AP_CACHE
Cached entry.

AP_REGISTER
Registered resource (NN only).

directory_lu_detail.wild_card
Specifies whether the LU entry is for an explicit name, or for a wildcard value that will match a range of names. This is one of the following:

AP_EXPLICIT
The entry is an explicit LU name.

AP_FULL_WILDCARD
The entry is a full wildcard value that will match any LU name.

AP_PARTIAL_WILDCARD
The entry is a partial wildcard; the nonblank characters in the name will be used to match against an LU name.

AP_OTHER
Unknown type of LU entry.

directory_lu_detail.apparent_lu_owner_name
This parameter applies only if the local node is a Network Node or a Branch Network Node; it is reserved otherwise.

If the apparent owning CP of this LU is not the real owning CP, this parameter specifies the fully qualified name of the apparent owning CP; otherwise it is reserved. For example, if the resource is owned by an End Node in the domain of a Branch Network Node (BrNN), the directory of this BrNN's Network Node Server includes the BrNN as the apparent owner, but the real owning CP is the End Node.

The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, to list all entries starting from the supplied name, but the *lu_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_DIRECTORY_STATS

QUERY_DIRECTORY_STATS returns directory database statistics, which can be used to gauge the level of network locate traffic. For a network node, it returns information about the usage of the directory cache; you can use this information to determine the appropriate cache size, which is specified on the DEFINE_NODE verb.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_directory_stats
{
   AP_UINT16        opcode;                 /* verb operation code         */
   unsigned char    reserv2;                /* reserved                    */
   unsigned char    format;                 /* reserved                    */
   AP_UINT16        primary_rc;             /* primary return code         */
   AP_UINT32        secondary_rc;           /* secondary return code       */
   AP_UINT32        max_caches;             /* maximum number of cache     */
                                            /*  entries                    */
   AP_UINT32        cur_caches;             /* cache entry count           */
   AP_UINT32        cur_home_entries;       /* home entry count            */
   AP_UINT32        cur_reg_entries;        /* registered entry count      */
   AP_UINT32        cur_directory_entries;  /* current number of directory */
                                            /*  entries                    */
   AP_UINT32        cache_hits;             /* count of cache finds        */
   AP_UINT32        cache_misses;           /* count of resources found    */
                                            /*  by broadcast search        */
                                            /*  (not in cache)             */
   AP_UINT32        in_locates;             /* locates in                  */
   AP_UINT32        in_bcast_locates;       /* broadcast locates in        */
   AP_UINT32        out_locates;            /* locates out                 */
   AP_UINT32        out_bcast_locates;      /* broadcast locates out       */
   AP_UINT32        not_found_locates;      /* unsuccessful locates        */
   AP_UINT32        not_found_bcast_locates;/* unsuccessful broadcast      */
                                            /*  locates                    */
   AP_UINT32        locates_outstanding;    /* total outstanding locates   */
   unsigned char    reserva[20];            /* reserved                    */
} QUERY_DIRECTORY_STATS;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_DIRECTORY_STATS

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

max_caches
For a network node, the maximum number of cache entries allowed.

cur_caches
For a network node, the current number of cache entries.

cur_home_entries
Current number of home entries.

cur_reg_entries
Current number of registered entries.

cur_directory_entries
Total number of entries currently in the directory.

cache_hits
For a network node, the number of successful cache finds. The count is increased every time a resource is found in the local directory cache.

cache_misses
For a network node, the number of times a resource has been found by a broadcast search. The count is increased every time a resource is not found in the local directory cache but is then found using a broadcast search.

Note: The two counts *cache_hits* and *cache_misses* are maintained such that the size of the directory cache (specified on DEFINE_NODE) can be tuned. An increasing *cache_misses* over time indicates that the directory cache size is too small. A regularly increasing *cache_hits* with a steady *cache_misses* indicates that the cache is about the right size.

in_locates
Number of directed locates received.

in_bcast_locates
For a network node, the number of broadcast locates received.

out_locates
Number of directed locates sent.

out_bcast_locates
For a network node, the number of broadcast locates sent.

not_found_locates
Number of directed locates returned “not found”.

not_found_bcast_locates
For a network node, the number of broadcast locates returned “not found”.

locates_outstanding
Current number of outstanding locates, both directed and broadcast.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_DLC

QUERY_DLC returns information about DLCs. This information is structured as "determined data" (data gathered dynamically during execution) and "defined data" (data supplied on DEFINE_DLC).

This verb can be used to obtain either summary or detailed information, about a specific DLC or about multiple DLCs, depending on the options used.

VCB Structure

```
typedef struct query_dlc
{
   AP_UINT16       opcode;              /* verb operation code             */
   unsigned char   reserv2;             /* reserved                        */
   unsigned char   format;              /* reserved                        */
   AP_UINT16       primary_rc;          /* primary return code             */
   AP_UINT32       secondary_rc;        /* secondary return code           */
   unsigned char   *buf_ptr;            /* pointer to buffer               */
   AP_UINT32       buf_size;            /* buffer size                     */
   AP_UINT32       total_buf_size;      /* total buffer size required      */
   AP_UINT16       num_entries;         /* number of entries               */
   AP_UINT16       total_num_entries;   /* total number of entries         */
   unsigned char   list_options;        /* listing options                 */
   unsigned char   reserv3;             /* reserved                        */
   unsigned char   dlc_name[8];         /* name of DLC                     */
} QUERY_DLC;

typedef struct dlc_summary
{
   AP_UINT16       overlay_size;        /* size of returned entry          */
   unsigned char   dlc_name[8];         /* name of DLC                     */
   unsigned char   description[32];     /* resource description            */
   unsigned char   reserv1[16];         /* reserved                        */
   unsigned char   state;               /* State of the DLC                */
   unsigned char   dlc_type;            /* DLC type                        */
} DLC_SUMMARY;

typedef struct dlc_detail
{
   AP_UINT16       overlay_size;        /* size of returned entry          */
   unsigned char   dlc_name[8];         /* name of DLC                     */
   unsigned char   reserv2[2];          /* reserved                        */
   DLC_DET_DATA    det_data;            /* Determined data                 */
   DLC_DEF_DATA    def_data;            /* Defined data                    */
} DLC_DETAIL;

typedef struct dlc_det_data
{
   unsigned char   state;               /* State of the DLC                */
   unsigned char   reserv3[3];          /* reserved                        */
   unsigned char   reserva[20];         /* reserved                        */
} DLC_DET_DATA;

typedef struct dlc_def_data
{
   unsigned char   description[32];     /* resource description            */
   unsigned char   initially_active;    /* is DLC initially active?        */
   unsigned char   reserv1[15];         /* reserved                        */
   unsigned char   dlc_type;            /* DLC type                        */
   unsigned char   neg_ls_supp;         /* negotiable link station support  */
   unsigned char   port_types;          /* port types supported by DLC type */
   unsigned char   hpr_only;            /* only support HPR?               */
   unsigned char   reserv3;             /* reserved                        */
   unsigned char   retry_flags;         /* reserved                        */
   AP_UINT16       max_activation_attempts; /* reserved                    */
```

```
   AP_UINT16       activation_delay_timer;  /* reserved                      */
   unsigned char   reserv4[4];              /* reserved                      */
   AP_UINT16       dlc_spec_data_len;       /* Length of DLC specific data   */
} DLC_DEF_DATA;
```

For more details of the DLC-specific data, see "DEFINE_DLC" on page 87. The data structure for this data follows the `dlc_def_data` structure, but is padded to start on a 4-byte boundary.

Supplied Parameters

The application supplies the following parameters:

opcode `AP_QUERY_DLC`

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of DLCs for which data should be returned. To request data for a specific DLC rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical `OR` operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *dlc_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *dlc_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

dlc_name
DLC name for which information is required, or the name to be used as an index into the list of DLCs. This parameter is ignored if *list_options* is set to `AP_FIRST_IN_LIST`. The name is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

dlc_summary.overlay_size
The size of the returned dlc_summary structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each dlc_summary structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C sizeof() operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

dlc_summary.dlc_name
DLC name. The name is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters.

dlc_summary.description
A null-terminated text string describing the DLC, as specified in the definition of the DLC.

dlc_summary.state
State of the DLC. This is one of the following:

AP_ACTIVE
The DLC is active.

AP_NOT_ACTIVE
The DLC is not active.

AP_PENDING_INACTIVE
STOP_DLC is in progress.

dlc_summary.dlc_type
Type of DLC. This is one of the following:

AP_SDLC
SDLC

AP_X25 QLLC

AP_TR Token Ring

AP_ETHERNET
Ethernet

AP_MPC Multipath Channel (MPC) adapter, CS Linux for System z only

AP_IP Enterprise Extender (HPR/IP)

dlc_detail.overlay_size
The size of the returned `dlc_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `dlc_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

dlc_detail.dlc_name
DLC name. The name is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters.

dlc_detail.det_data.state
State of the DLC. This is one of the following:

AP_ACTIVE
The DLC is active.

AP_NOT_ACTIVE
The DLC is not active.

AP_PENDING_INACTIVE
STOP_DLC is in progress.

dlc_detail.def_data.description
A null-terminated text string describing the DLC, as specified in the definition of the DLC.

dlc_detail.def_data.initially_active
Specifies whether this DLC is automatically started when the node is started. Possible values are:

AP_YES The DLC is automatically started when the node is started.

AP_NO The DLC is not automatically started; it must be started manually.

dlc_detail.def_data.dlc_type
Type of DLC. This is one of the following:

AP_SDLC
SDLC

AP_X25 QLLC

AP_TR Token Ring

AP_ETHERNET
Ethernet

AP_IP Enterprise Extender (HPR/IP)

dlc_detail.def_data.neg_ls_supp
Specifies whether the DLC supports negotiable link stations. Possible values are:

AP_YES Link stations using this DLC may be negotiable.

AP_NO Link stations using this DLC must be defined as either primary or secondary; negotiable link stations are not supported.

dlc_detail.def_data.port_types
If *dlc_type* is set to AP_TR / AP_ETHERNET/ AP_IP, this parameter will be set to AP_PORT_SATF. For other DLC types, this parameter is reserved.

dlc_detail.def_data.hpr_only
Specifies whether the DLC is used for Enterprise Extender links and therefore supports only HPR traffic. Possible values are:

AP_YES This DLC is used for Enterprise Extender links, and supports only HPR traffic.

AP_NO This DLC is not used for Enterprise Extender links, and supports non-HPR traffic; it may also support HPR traffic.

dlc_detail.def_data.dlc_spec_data_len
Unpadded length, in bytes, of data specific to the type of DLC. The data structure for this data follows the def_data structure, but is padded to start on a 4-byte boundary. For more details of the DLC-specific data, see "DEFINE_DLC" on page 87.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_DLC_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, to list all entries starting from the supplied name, but the *dlc_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_DLC_TRACE

QUERY_DLC_TRACE returns information about DLC line tracing, which was set up using ADD_DLC_TRACE verbs.

This verb can be used to obtain information about tracing on all resources, on a specific resource type, or on a specific resource, depending on the options used.

VCB Structure

```
typedef struct query_dlc_trace
{
    AP_UINT16          opcode;              /* Verb operation code          */
    unsigned char      reserv2;             /* reserved                     */
    unsigned char      format;              /* reserved                     */
    AP_UINT16          primary_rc;          /* Primary return code          */
    AP_UINT32          secondary_rc;        /* Secondary return code        */
    unsigned char      *buf_ptr;            /* pointer to buffer            */
    AP_UINT32          buf_size;            /* buffer size                  */
    AP_UINT32          total_buf_size;      /* total buffer size required   */
    AP_UINT16          num_entries;         /* number of entries            */
    AP_UINT16          total_num_entries;   /* total number of entries      */
    unsigned char      list_options;        /* listing options              */
    unsigned char      list_type;           /* type of listing required     */
    DLC_TRACE_FILTER   filter_entry;        /* resource to start at         */
} QUERY_DLC_TRACE;

typedef struct dlc_trace_data
{
    AP_UINT16          overlay_size;        /* size of returned entry       */
    DLC_TRACE_FILTER   filter;              /* DLC trace filter information */
} DLC_TRACE_DATA;

typedef struct dlc_trace_filter
{
    unsigned char      resource_type;       /* type of resource             */
    unsigned char      resource_name[8];    /* name of resource             */
    SNA_LFSID          lfsid;               /* session identifier           */
    unsigned char      message_type;        /* type of messages             */
} DLC_TRACE_FILTER;

typedef struct sna_lfsid
{
      union
      {
           AP_UINT16            session_id;
           struct
           {
              unsigned char     sidh;
              unsigned char     sidl;
           } s;
      } uu;
      AP_UINT16                 odai;
} SNA_LFSID;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_DLC_TRACE

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of DLC_TRACE entries for which data should be returned. To request data for a specific entry rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options

The position in the list of DLC_TRACE entries from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the `filter_entry` structure.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the `filter_entry` structure.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

list_type

The type of resource for which to list tracing options. Possible values are:

AP_ALL_DLC_TRACES
List all specified tracing options (for any resource type).

AP_ALL_RESOURCES
List the tracing options specified for all resources (defined using ADD_DLC_TRACE with a resource type of `AP_ALL_RESOURCES`).

AP_DLC List tracing options for DLC resources.

AP_PORT
List tracing options for port resources for which all LSs are traced.

AP_LS List tracing options for LS resources.

AP_RTP_RESOURCE_TYPE
List tracing options for RTP connection resources.

AP_PORT_DEFINED_LS
List tracing options for port resources for which only defined LSs (not implicit LSs) are traced.

AP_PORT_IMPLICIT_LS
List tracing options for port resources for which only implicit LSs (not defined LSs) are traced.

filter_entry.resource_type

Specifies the resource type of the entry to be returned, or the entry to be used as an index into the list. This parameter is used only if *list_type* is set to `AP_ALL_DLC_TRACES` and *list_options* is not set to `AP_FIRST_IN_LIST`. Possible values are:

AP_ALL_RESOURCES
The required entry specifies the options used for tracing all DLCs, ports, and LSs.

AP_DLC The required entry specifies tracing options for the DLC named in *resource_name*, and for all ports and LSs that use this DLC.

AP_PORT
The required entry specifies tracing options for the port named in *resource_name*, and for all LSs that use this port.

AP_LS The required entry specifies tracing options for the LS named in *resource_name*.

AP_RTP_RESOURCE_TYPE
The required entry specifies tracing options for the RTP connection named in the *resource_name* parameter.

AP_PORT_DEFINED_LS
The required entry specifies tracing options for the port named in *resource_name*, and for all defined LSs (but not implicit LSs) that use this port.

AP_PORT_IMPLICIT_LS
The required entry specifies tracing options for the port named in *resource_name*, and for all implicit LSs (but not defined LSs) that use this port.

filter_entry.resource_name
The name of the entry to be returned, or the entry to be used as an index into the list. This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST, or if *resource_type* is set to AP_ALL_RESOURCES.

filter_entry.lfsid
The Local Form Session Identifier for a session on the specified LS. This is only valid for *resource_type* AP_LS, and indicates that the required entry specifies messages on a particular session for the specified LS. The structure contains the following three values, which are returned in the SESSION_STATS section of a QUERY_SESSION verb:

filter_entry.lfsid.uu.s.sidh
Session ID high byte.

filter_entry.lfsid.uu.s.sidl
Session ID low byte.

filter_entry.lfsid.odai
Origin Destination Assignor Indicator.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer contains the following parameters:

overlay_size
The size of the returned dlc_trace_data structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `dlc_trace_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

dlc_trace_filter.resource_type
The type of resource being traced. This can take one of the following values:

ALL_RESOURCES
The entry specifies tracing options for all resources.

AP_DLC The entry specifies tracing options for the DLC named in *resource_name*, and for all ports and LSs that use this DLC.

AP_PORT
The entry specifies tracing options for the port named in *resource_name*, and for all LSs that use this port.

AP_LS The entry specifies tracing options for the LS named in *resource_name* (or for a particular LFSID on this LS).

AP_RTP_RESOURCE_TYPE
The entry specifies tracing options for the RTP connection named in *resource_name*.

AP_PORT_DEFINED_LS
The entry specifies tracing options for the port named in *resource_name*, and for all defined LSs (but not implicit LSs) that use this port.

AP_PORT_IMPLICIT_LS
The entry specifies tracing options for the port named in *resource_name*, and for all implicit LSs (but not defined LSs) that use this port.

dlc_trace_filter.resource_name
The name of the DLC, port, or LS being traced.

dlc_trace_filter.lfsid
The Local Form Session Identifier for a session on the specified LS. This is only valid for *resource_type* `AP_LS`, and indicates that only messages on this session are to be traced. The structure contains the following three values, which are returned in the SESSION_STATS section of a QUERY_SESSION verb:

dlc_trace_filter.lfsid.uu.s.sidh
Session ID high byte.

dlc_trace_filter.lfsid.uu.s.sidl
Session ID low byte.

dlc_trace_filter.lfsid.odai
Origin Destination Assignor Indicator.

dlc_trace_filter.message_type
The type of messages being traced for the specified resource or session. This parameter is set to `AP_TRACE_ALL` to trace all messages, or to one or more of the following values (combined using a logical `OR`):

AP_TRACE_XID
XID messages

AP_TRACE_SC
Session Control RUs

AP_TRACE_DFC
Data Flow Control RUs

AP_TRACE_FMD
FMD messages

AP_TRACE_NLP
(this message type is currently not used)

AP_TRACE_NC
(this message type is currently not used)

AP_TRACE_SEGS
Non-BBIU segments that do not contain an RH

AP_TRACE_CTL
Messages other then MUs and XIDs

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns one of the following.

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LIST_TYPE
The *list_type* parameter specified a value that was not valid.

AP_INVALID_RESOURCE_TYPE
The *resource_type* parameter specified a value that was not valid.

AP_ALL_RESOURCES_NOT_DEFINED
The *resource_type* parameter was set to AP_ALL_RESOURCES, but there is no DLC_TRACE entry defined for tracing options on all resources.

AP_INVALID_RTP_CONNECTION
The RTP connection named in the *resource_name* parameter does not have any tracing options set.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_DLUR_DEFAULTS

The QUERY_DLUR_DEFAULTS verb allows the user to query the defaults defined using the DEFINE_DLUR_DEFAULTS verb.

VCB Structure

```
typedef struct query_dlur_defaults
{
    AP_UINT16         opcode;                   /* verb operation code      */
    unsigned char     reserv2;                  /* reserved                 */
    unsigned char     format;                   /* reserved                 */
    AP_UINT16         primary_rc;               /* primary return code      */
    AP_UINT32         secondary_rc;             /* secondary return code    */
    unsigned char     description[32];          /* resource description     */
    unsigned char     reserv1[16];              /* reserved                 */
    unsigned char     dlus_name[17];            /* DLUS name                */
    unsigned char     bkup_dlus_name[17];       /* Backup DLUS name         */
    unsigned char     reserv3;                  /* reserved                 */
    AP_UINT16         dlus_retry_timeout;       /* DLUS retry timeout       */
    AP_UINT16         dlus_retry_limit;         /* DLUS retry limit         */
    unsigned char     prefer_active_dlus;       /* reserved                  */
    unsigned char     persistent_pipe_support;  /* reserved                 */
    unsigned char     reserv4[14];              /* reserved                 */
} QUERY_DLUR_DEFAULTS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_DLUR_DEFAULTS

description
Resource description. The length of this parameter is a multiple of four bytes and is nonzero.

dlus_name
Name of the DLUS node that is the default. This name is set to all zeros or a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

bkup_dlus_name
Name of the DLUS node that serves as the backup default. This name is set to all zeros or a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

dlus_retry_timeout
Interval in seconds between second and subsequent attempts to contact a DLUS. The interval between the initial attempt and the first retry is always one second.

dlus_retry_limit
Maximum number of retries after an initial failure to contact a DLUS. A value of 0xFFFF indicates that CS Linux retries indefinitely.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameter:

primary_rc
AP_OK

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node configuration does not support it, CS Linux returns the following parameter:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support DLUR; this is defined by the *dlur_support* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_DLUR_LU

QUERY_DLUR_LU returns information about active LUs that are using the DLUR feature of CS Linux. This verb can be used to obtain information about a specific LU, or about multiple LUs, depending on the options used.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_dlur_lu
{
    AP_UINT16         opcode;              /* verb operation code           */
    unsigned char     reserv2;             /* reserved                      */
    unsigned char     format;              /* reserved                      */
    AP_UINT16         primary_rc;          /* primary return code           */
    AP_UINT32         secondary_rc;        /* secondary return code         */
    unsigned char     *buf_ptr;            /* pointer to buffer             */
    AP_UINT32         buf_size;            /* buffer size                   */
    AP_UINT32         total_buf_size;      /* total buffer size required    */
    AP_UINT16         num_entries;         /* number of entries             */
    AP_UINT16         total_num_entries;   /* total number of entries       */
    unsigned char     list_options;        /* listing options               */
    unsigned char     reserv3;             /* reserved                      */
    unsigned char     lu_name[8];          /* LU name                       */
    unsigned char     pu_name[8];          /* PU name filter                */
    unsigned char     filter;              /* local / downstream filter     */
} QUERY_DLUR_LU;

typedef struct dlur_lu_summary
{
    AP_UINT16         overlay_size;        /* size of returned entry        */
    unsigned char     lu_name[8];          /* LU name                       */
} DLUR_LU_SUMMARY;

typedef struct dlur_lu_detail
{
    AP_UINT16         overlay_size;        /* size of returned entry        */
    unsigned char     lu_name[8];          /* LU name                       */
    unsigned char     pu_name[8];          /* PU name of owning PU          */
    unsigned char     dlus_name[17];       /* DLUS name if SSCP-LU session  */
                                           /*  active                       */
    unsigned char     lu_location;         /* downstream or local LU        */
    unsigned char     nau_address;         /* NAU address of LU             */
    unsigned char     plu_name[17];        /* PLU name if PLU-SLU session   */
                                           /*  active                       */
    unsigned char     reserv1[27];         /* reserved                      */
    unsigned char     rscv_len;            /* length of appended RSCV       */
} DLUR_LU_DETAIL;
```

Note: The DLUR_LU_DETAIL structure may be followed by a Route Selection Control Vector (RSCV) as defined by SNA Formats. This control vector defines the session route through the network and is carried on the BIND.

This RSCV is included only if the node's configuration (specified using DEFINE_NODE) indicates that RSCVs should be stored for DLUR sessions and if the PLU-SLU session is active.

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_DLUR_LU

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of DLUR LUs for which data should be returned. To request data for a specific LU rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of the *pu_name* and *lu_name* parameters.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of the *pu_name* and *lu_name* parameters.

The list is ordered by *pu_name* and then by *lu_name*. For more information about how the application can obtain specific entries from the list, see "List Options For QUERY_* Verbs" on page 39.

lu_name
Name of the LU for which information is required, or the name to be used as an index into the list of LUs. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. The name is an 8-byte EBCDIC type-A string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

pu_name
PU name for which LU information is required. To list only information about LUs associated with a specific PU, specify the PU name. To obtain a

complete list for all PUs, set this field to binary zeros. The name is an 8-byte EBCDIC type-A string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

filter Specifies whether to filter the returned LUs according to their location. Allowed values for network node:

AP_INTERNAL
Return information only for internal LUs.

AP_DOWNSTREAM
Return information only for downstream LUs.

AP_NONE
Return information about all LUs irrespective of location.

For end node, this parameter is reserved (downstream DLUR LUs are not supported).

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

dlur_lu_summary.overlay_size
The size of the returned `dlur_lu_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `dlur_lu_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

dlur_lu_summary.lu_name
Name of the LU. The name is an 8-byte EBCDIC type-A string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

dlur_lu_detail.overlay_size
The size of the returned `dlur_lu_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `dur_lu_detail` structure in turn, it must use this value to move to the

correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

dlur_lu_detail.lu_name
Name of the LU. The name is an 8-byte EBCDIC type-A string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

dlur_lu_detail.pu_name
Name of PU associated with the LU. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

dlur_lu_detail.dlus_name
If the SSCP-LU session is active, this field contains the name of the DLUS node used by the LU; otherwise it is set to 17 binary zeros. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

dlur_lu_detail.lu_location
Location of LU.

This is set to one of the following.

AP_INTERNAL
LU is on the local node.

AP_DOWNSTREAM
LU is on a downstream node (network node only).

dlur_lu_detail.nau_address
Network accessible unit address of the LU.

dlur_lu_detail.plu_name
If the PLU-SLU session is active, this field contains the name of the PLU; otherwise it is set to 17 binary zeros. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

dlur_lu_detail.rscv_len
Length of the RSCV that is appended to the `dlur_lu_detail` structure. If the node's configuration specifies that DLUR RSCVs are not stored, or if the PLU-SLU session is not active, this length is set to zero and no RSCV is included.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
`AP_PARAMETER_CHECK`

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
The *list_options* parameter was set to `AP_LIST_INCLUSIVE` to list all entries starting from the supplied name, but the *lu_name* parameter was not valid.

AP_INVALID_FILTER_OPTION
The *filter* parameter was not set to a valid value.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node configuration does not support it, CS Linux returns the following parameter:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support DLUR; this is defined by the *dlur_support* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_DLUR_PU

QUERY_DLUR_PU returns information about PUs that use the DLUR feature of CS Linux.

This verb can be used to obtain information about a specific PU, or about multiple PUs, depending on the options used.

If this verb is issued to an inactive node, it returns information only about PUs defined at the local node; if it is issued to a running node, it also returns information about active downstream PUs using DLUR at this node.

VCB Structure

```
typedef struct query_dlur_pu
{
   AP_UINT16        opcode;                /* verb operation code          */
   unsigned char    reserv2;               /* reserved                     */
   unsigned char    format;                /* reserved                     */
   AP_UINT16        primary_rc;            /* primary return code          */
   AP_UINT32        secondary_rc;          /* secondary return code        */
   unsigned char    *buf_ptr;              /* pointer to buffer            */
   AP_UINT32        buf_size;              /* buffer size                  */
   AP_UINT32        total_buf_size;        /* total buffer size required   */
   AP_UINT16        num_entries;           /* number of entries            */
   AP_UINT16        total_num_entries;     /* total number of entries      */
   unsigned char    list_options;          /* listing options              */
   unsigned char    reserv3;               /* reserved                     */
   unsigned char    pu_name[8];            /* PU name                      */
   unsigned char    dlus_name[17];         /* fully-qualified DLUS name    */
   unsigned char    filter;                /* local / downstream filter    */
} QUERY_DLUR_PU;

typedef struct dlur_pu_summary
{
   AP_UINT16        overlay_size;          /* size of returned entry       */
```

```
   unsigned char    pu_name[8];             /* PU name                     */
   unsigned char    description[32];        /* resource description        */
   unsigned char    reserv1[16];            /* reserved                    */
} DLUR_PU_SUMMARY;

typedef struct dlur_pu_detail
{
   AP_UINT16        overlay_size;           /* size of returned entry      */
   unsigned char    pu_name[8];             /* PU name                     */
   unsigned char    description[32];        /* resource description        */
   unsigned char    initially_active;       /* is the PU initially active? */
   unsigned char    reserv1[15];            /* reserved                    */
   unsigned char    defined_dlus_name[17];  /* defined DLUS name           */
   unsigned char    bkup_dlus_name[17];     /* backup DLUS name            */
   unsigned char    pu_id[4];               /* PU identifier               */
   unsigned char    pu_location;            /* downstream or local PU      */
   unsigned char    active_dlus_name[17];   /* active DLUS name            */
   unsigned char    ans_support;            /* auto network shutdown support*/
   unsigned char    pu_status;              /* status of the PU            */
   unsigned char    dlus_session_status;    /* status of the DLUS pipe     */
   unsigned char    reserv3;                /* reserved                    */
   FQPCID           fqpcid;                 /* FQPCID used on pipe         */
   AP_UINT16        dlus_retry_timeout;     /* DLUR retry timeout          */
   AP_UINT16        dlus_retry_limit;       /* DLUR retry limit            */
} DLUR_PU_DETAIL;

typedef struct fqpcid
{
   unsigned char    pcid[8];              /* procedure correlator identifier */
   unsigned char    fqcp_name[17];        /* originator's network qualified  */
                                          /*  CP name                        */
   unsigned char    reserve3[3];          /* reserved                        */
} FQPCID;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_DLUR_PU

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of DLUR PUs for which data should be returned. To request data for a specific PU rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *pu_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *pu_name* parameter.

The list is ordered by *pu_name*. For more information about how the application can obtain specific entries from the list, see "List Options For QUERY_* Verbs" on page 39.

pu_name
Name of the PU for which information is required, or the name to be used as an index into the list of PUs. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. The name is an 8-byte EBCDIC type-A string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

dlus_name
DLUS name for which PU information is required. To list only information about PUs associated with a specific DLUS, specify the DLUS name; a PU will be listed only if it has an SSCP-PU session to the specified DLUS node. To obtain a complete list for all DLUSs, set this field to binary zeros.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

filter Specifies whether to filter the returned PUs according to their location.

Allowed values for network node are:

AP_INTERNAL
Return information only for internal PUs.

AP_DOWNSTREAM
Return information only for downstream PUs.

AP_NONE
Return information about all PUs irrespective of location.

For end node, this parameter is reserved (downstream DLUR PUs are not supported).

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

dlur_pu_summary.overlay_size
The size of the returned `dlur_pu_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `dlur_pu_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

dlur_pu_summary.pu_name
Name of the PU. The name is an 8-byte EBCDIC type-A string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

dlur_pu_summary.description
A null-terminated text string describing the PU, as specified in the definition of the PU. If the PU is an active downstream PU, rather than a defined internal PU, this parameter is reserved.

dlur_pu_detail.overlay_size
The size of the returned `dlur_pu_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `dlur_pu_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

dlur_pu_detail.pu_name
Name of the PU. The name is an 8-byte EBCDIC type-A string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

dlur_pu_detail.description
A null-terminated text string describing the PU, as specified in the definition of the PU. If the PU is an active downstream PU, rather than a defined internal PU, this parameter is reserved.

dlur_pu_detail.initially_active
Specifies whether this PU is automatically started when the node is started. For a downstream PU, this parameter is reserved. Possible values for an internal PU are:

AP_YES The PU is automatically started when the node is started.

AP_NO The PU is not automatically started; it must be started manually.

dlur_pu_detail.defined_dlus_name
Name of DLUS node, defined by either a DEFINE_INTERNAL_PU verb or a DEFINE_LS verb (with *dspu_services* set to `AP_DLUR`).

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

dlur_pu_detail.bkup_dlus_name
Name of backup DLUS node, defined by either a DEFINE_INTERNAL_PU verb or a DEFINE_LS verb (with *dspu_services* set to AP_DLUR).

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

dlur_pu_detail.pu_id
PU identifier, either defined on DEFINE_INTERNAL_PU or obtained in an XID from a downstream PU. This is a 4-byte hexadecimal string, consisting of a block number (3 hexadecimal digits) and a node number (5 hexadecimal digits).

dlur_pu_detail.pu_location
Location of PU.

This is set to one of the following.

AP_INTERNAL
PU is on the local node.

AP_DOWNSTREAM
PU is on a downstream node (network node only).

dlur_pu_detail.active_dlus_name
Name of DLUS node that the PU is currently using. If the SSCP-PU session is not active, this field will be set to all binary zeros.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

dlur_pu_detail.ans_support
Auto Network Shutdown support, as sent to DLUR from the DLUS at SSCP-PU activation. It specifies whether link-level contact should be continued if the subarea node initiates an auto network shutdown procedure for the SSCP controlling the PU. Possible values are:

AP_CONT
Continue link-level contact

AP_STOP
Stop link-level contact.

This field is reserved if the SSCP-LU session is inactive.

dlur_pu_detail.pu_status
Status of the PU (as seen by DLUR). Possible values are:

AP_RESET
The PU is in reset state.

AP_PEND_ACTPU
The PU is waiting for an ACTPU from the host.

AP_PEND_ACTPU_RSP
Having forwarded an ACTPU to the PU, DLUR is now waiting for the PU to respond to it.

AP_ACTIVE
The PU is active.

AP_PEND_DACTPU_RSP
Having forwarded a DACTPU to the PU, DLUR is waiting for the PU to respond to it.

AP_PEND_INOP
DLUR is waiting for all necessary events to complete before it deactivates the PU.

dlur_pu_detail.dlus_session_status
Status of the DLUS pipe currently being used by the PU. Possible values are:

AP_PENDING_ACTIVE
The pipe is in the process of being activated.

AP_ACTIVE
The pipe is active.

AP_PENDING_INACTIVE
The pipe is in the process of being deactivated.

AP_INACTIVE
The pipe is not active.

dlur_pu_detail.fqpcid.pcid
Procedure Correlator ID used on the pipe. This is an 8-byte hexadecimal string. If the SSCP-PU session is not active this field will be set to binary zeros.

dlur_pu_detail.fqpcid.fqcp_name
Fully qualified Control Point name used on the pipe. If the SSCP-PU session is not active this field will be set to binary zeros.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

The combination of the *pcid* and *fqcp_name* parameters uniquely identify each PU whose sessions are being routed using DLUR. The *fqcp_name* parameter is the CP name of either the DLUR or DLUS node, depending on which node initiated the SSCP-PU session activation.

dlur_pu_detail.dlus_retry_timeout
The interval in seconds between the second and subsequent attempts to contact the DLUS specified by the *def_data.dlus_name* and *def_data.bkup_dlus_name* parameters. The interval between the first and second attempts is always 1 second. If zero is specified, then the defaults specified using the DEFINE_DLUR_DEFAULTS verb are used. .

dlur_pu_detail.dlus_retry_limit
Number of attempts to recontact a DLUS after an initial failure. A value of zero indicates that the value from the DEFINE_DLUR_DEFAULTS verb is used. If `0xFFFF` is returned, CS Linux will retry indefinitely.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
`AP_PARAMETER_CHECK`

secondary_rc
Possible values are:

AP_INVALID_PU_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *pu_name* parameter was not valid.

AP_INVALID_FILTER_OPTION
The *filter* parameter was not set to a valid value.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support DLUR; this is defined by the *dlur_support* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_DLUS

QUERY_DLUS returns information about DLUS nodes known to the DLUR feature of CS Linux. This verb returns pipe statistics (SSCP-PU and SSCP-LU session statistics); the QUERY_ISR_SESSION verb may be used to obtain PLU-SLU session statistics.

This verb can be used to obtain information about a specific DLUS, or about multiple DLUSs, depending on the options used.

If this verb is issued to an inactive node, it returns information only on DLUS nodes defined using DEFINE_INTERNAL_PU or DEFINE_DLUR_DEFAULTS; if it is issued to a running node, it also returns information about active DLUS nodes. It does not return information about the backup DLUS that was defined using DEFINE_DLUR_DEFAULTS, unless this DLUS is active.

VCB Structure

```
typedef struct query_dlus
{
   AP_UINT16       opcode;                 /* verb operation code          */
   unsigned char   reserv2;                /* reserved                     */
   unsigned char   format;                 /* reserved                     */
   AP_UINT16       primary_rc;             /* primary return code          */
   AP_UINT32       secondary_rc;           /* secondary return code        */
   unsigned char   *buf_ptr;               /* pointer to buffer            */
   AP_UINT32       buf_size;               /* buffer size                  */
   AP_UINT32       total_buf_size;         /* total buffer size required   */
   AP_UINT16       num_entries;            /* number of entries            */
```

```
   AP_UINT16       total_num_entries;       /* total number of entries       */
   unsigned char   list_options;            /* listing options               */
   unsigned char   reserv3;                 /* reserved                      */
   unsigned char   dlus_name[17];           /* fully-qualified DLUS name     */
} QUERY_DLUS;

typedef struct dlus_data
{
   AP_UINT16       overlay_size;            /* size of returned entry        */
   unsigned char   dlus_name[17];           /* fully qualified DLUS name     */
   unsigned char   is_default;              /* is the DLUS the default       */
   unsigned char   is_backup_default;       /* is DLUS the backup default    */
   unsigned char   pipe_state;              /* state of CPSVRMGR pipe        */
   AP_UINT16       num_active_pus;          /* num of active PUs using pipe  */
   PIPE_STATS      pipe_stats;              /* pipe statistics               */
   unsigned char   persistent_pipe_support; /* reserved                      */
   unsigned char   persistent_pipe;         /* reserved                      */
} DLUS_DATA;

typedef struct pipe_stats
{
   AP_UINT32       reqactpu_sent;           /* REQACTPUs sent to DLUS        */
   AP_UINT32       reqactpu_rsp_received;   /* RSP(REQACTPU)s received       */
                                            /*  from DLUS                    */
   AP_UINT32       actpu_received;          /* ACTPUs received from DLUS     */
   AP_UINT32       actpu_rsp_sent;          /* RSP(ACTPU)s sent to DLUS      */
   AP_UINT32       reqdactpu_sent;          /* REQDACTPUs sent to DLUS       */
   AP_UINT32       reqdactpu_rsp_received;  /* RSP(REQDACTPU)s received      */
                                            /*  from DLUS                    */
   AP_UINT32       dactpu_received;         /* DACTPUs received from DLUS    */
   AP_UINT32       dactpu_rsp_sent;         /* RSP(DACTPU)s sent to DLUS     */
   AP_UINT32       actlu_received;          /* ACTLUs received from DLUS     */
   AP_UINT32       actlu_rsp_sent;          /* RSP(ACTLU)s sent to DLUS      */
   AP_UINT32       dactlu_received;         /* DACTLUs received from DLUS    */
   AP_UINT32       dactlu_rsp_sent;         /* RSP(DACTLU)s sent to DLUS     */
   AP_UINT32       sscp_pu_mus_rcvd;        /* MUs for SSCP-PU sessions rcvd */
   AP_UINT32       sscp_pu_mus_sent;        /* MUs for SSCP-PU sessions sent */
   AP_UINT32       sscp_lu_mus_rcvd;        /* MUs for SSCP-LU sessions rcvd */
   AP_UINT32       sscp_lu_mus_sent;        /* MUs for SSCP-LU sessions sent */
} PIPE_STATS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_DLUS

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of DLUSs for which data should be returned. To request data for a specific DLUS rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data. Specify one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *dlus_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *dlus_name* parameter.

The list is ordered by *dlus_name*. For more information about how the application can obtain specific entries from the list, see "List Options For QUERY_* Verbs" on page 39.

dlus_name
Name of the DLUS for which information is required, or the name to be used as an index into the list of DLUSs. This value is ignored if *list_options* is set to `AP_FIRST_IN_LIST`.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

dlus_data.overlay_size
The size of the returned `dlus_data` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `dlus_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

dlus_data.dlus_name
Name of DLUS. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

dlus_data.is_default
Specifies whether the DLUS node has been designated as the default by a DEFINE_DLUR_DEFAULTS verb (AP_YES or AP_NO).

dlus_data.is_backup_default
Specifies whether the DLUS node has been designated as the backup default by a DEFINE_DLUR_DEFAULTS verb (AP_YES or AP_NO).

dlus_data.pipe_state
State of the pipe to the DLUS. Possible values are:

AP_PENDING_ACTIVE
The pipe is in the process of being activated.

AP_ACTIVE
The pipe is active.

AP_PENDING_INACTIVE
The pipe is in the process of being deactivated.

AP_INACTIVE
The pipe is not active.

dlus_data.num_active_pus
Number of PUs currently using the pipe to the DLUS.

dlus_data.pipe_stats.reqactpu_sent
Number of REQACTPUs sent to DLUS over the pipe.

dlus_data.pipe_stats.reqactpu_rsp_received
Number of RSP(REQACTPU)s received from DLUS over the pipe.

dlus_data.pipe_stats.actpu_received
Number of ACTPUs received from DLUS over the pipe.

dlus_data.pipe_stats.actpu_rsp_sent
Number of RSP(ACTPU)s sent to DLUS over the pipe.

dlus_data.pipe_stats.reqdactpu_sent
Number of REQDACTPUs sent to DLUS over the pipe.

dlus_data.pipe_stats.reqdactpu_rsp_received
Number of RSP(REQDACTPU)s received from DLUS over the pipe.

dlus_data.pipe_stats.dactpu_received
Number of DACTPUs received from DLUS over the pipe.

dlus_data.pipe_stats.dactpu_rsp_sent
Number of RSP(DACTPU)s sent to DLUS over the pipe.

dlus_data.pipe_stats.actlu_received
Number of ACTLUs received from DLUS over the pipe.

dlus_data.pipe_stats.actlu_rsp_sent
Number of RSP(ACTLU)s sent to DLUS over the pipe.

dlus_data.pipe_stats.dactlu_received
Number of DACTLUs received from DLUS over the pipe.

dlus_data.pipe_stats.dactlu_rsp_sent
Number of RSP(DACTLU)s sent to DLUS over the pipe.

dlus_data.pipe_stats.sscp_pu_mus_rcvd
Number of SSCP-PU MUs received from DLUS over the pipe.

dlus_data.pipe_stats.sscp_pu_mus_sent
Number of SSCP-PU MUs sent to DLUS over the pipe.

dlus_data.pipe_stats.sscp_lu_mus_rcvd
Number of SSCP-LU MUs received from DLUS over the pipe.

dlus_data.pipe_stats.sscp_lu_mus_sent
Number of SSCP-LU MUs sent to DLUS over the pipe.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_DLUS_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, to list all entries starting from the supplied name, but the *dlus_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support DLUR; this is defined by the *dlur_support* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_DOMAIN_CONFIG_FILE

QUERY_DOMAIN_CONFIG_FILE returns the header information included in the CS Linux domain configuration file (the CS Linux version number, the revision level of the file, and an optional comment string supplied on DEFINE_DOMAIN_CONFIG_FILE).

This verb must be issued to the domain configuration file.

VCB Structure

```
typedef struct query_domain_config_file
{
    AP_UINT16           opcode;             /* verb operation code      */
    unsigned char       reserv2;            /* reserved                 */
    unsigned char       format;             /* reserved                 */
```

```
    AP_UINT16             primary_rc;          /* primary return code       */
    AP_UINT32             secondary_rc;        /* secondary return code     */
    unsigned char         reserv3[8];          /* Reserved                  */
    CONFIG_FILE_HEADER    hdr;
} QUERY_DOMAIN_CONFIG_FILE;

typedef struct config_file_header
{
    AP_UINT16             major_version;       /* major version number      */
    AP_UINT16             minor_version;       /* minor version number      */
    AP_UINT16             update_release;      /* update release            */
    AP_UINT32             revision_level;      /* file revision number      */
    unsigned char         comment[100];        /* optional comment string   */
    AP_UINT16             updating;            /* reserved                  */
} CONFIG_FILE_HEADER;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_DOMAIN_CONFIG_FILE

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

hdr.major_version, hdr.minor_version, hdr.update_release
The internal version identifier of the release of CS Linux that was used to create this file.

hdr.revision_level
The revision level of the file (stored internally by CS Linux).

hdr.comment
An optional comment string containing information about the file. This is an ASCII string of 0–99 characters, followed by a null character.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_DOWNSTREAM_LU

QUERY_DOWNSTREAM_LU returns information about downstream LUs that use SNA gateway or DLUR or both. It also returns information about downstream LUs used by applications that communicates with a CS Linux Primary RUI application. For more information about Primary RUI, see IBM Communications Server for Data Center Deployment on AIX or Linux LUA Programmer's Guide.

The returned information is structured as determined data (data gathered dynamically during execution, returned only if the node is active) and defined data (data supplied on DEFINE_DOWNSTREAM_LU). For DLUR-supported LUs, implicitly defined data is put in place when the downstream LU is activated.

This verb can be used to obtain information about a specific LU, or about multiple LUs, depending on the options used.

VCB Structure

```
typedef struct query_downstream_lu
{
   AP_UINT16        opcode;                 /* verb operation code         */
   unsigned char    reserv2;                /* reserved                    */
   unsigned char    format;                 /* reserved                    */
   AP_UINT16        primary_rc;             /* primary return code         */
   AP_UINT32        secondary_rc;           /* secondary return code       */
   unsigned char    *buf_ptr;               /* pointer to buffer           */
   AP_UINT32        buf_size;               /* buffer size                 */
   AP_UINT32        total_buf_size;         /* total buffer size required  */
   AP_UINT16        num_entries;            /* number of entries           */
   AP_UINT16        total_num_entries;      /* total number of entries     */
   unsigned char    list_options;           /* listing options             */
   unsigned char    reserv3;                /* reserved                    */
   unsigned char    dspu_name[8];           /* Downstream PU name filter   */
   unsigned char    dslu_name[8];           /* Downstream LU name          */
   unsigned char    dspu_services;          /* services provided to LU     */
} QUERY_DOWNSTREAM_LU;

typedef struct downstream_lu_summary
{
   AP_UINT16        overlay_size;           /* size of returned entry      */
   unsigned char    dspu_name[8];           /* PU name                     */
   unsigned char    dslu_name[8];           /* LU name                     */
   unsigned char    description[32];        /* resource description        */
   unsigned char    reserv1[16];            /* reserved                    */
   unsigned char    dspu_services;          /* Type of services provided   */
                                            /*  to downstream LU           */
   unsigned char    nau_address;            /* NAU address                 */
   unsigned char    lu_sscp_sess_active;    /* Is LU-SSCP session active   */
   unsigned char    plu_sess_active;        /* Is PLU-SLU session active   */
} DOWNSTREAM_LU_SUMMARY;

typedef struct downstream_lu_detail
{
   AP_UINT16        overlay_size;           /* size of returned entry      */
   unsigned char    dslu_name[8];           /* LU name                     */
   unsigned char    reserv1[2];             /* reserved                    */
   DOWNSTREAM_LU_DET_DATA  det_data;        /* Determined data             */
   DOWNSTREAM_LU_DEF_DATA  def_data;        /* Defined data                */
} DOWNSTREAM_LU_DETAIL;

typedef struct downstream_lu_det_data
{
   unsigned char    lu_sscp_sess_active;    /* Is LU-SSCP session active   */
   unsigned char    plu_sess_active;        /* Is PLU-SLU session active   */
   unsigned char    dspu_services;          /* Type of service provided to */
                                            /*  downstream node            */
   unsigned char    reserv1;                /* reserved                    */
   SESSION_STATS    lu_sscp_stats;          /* LU-SSCP session statistics  */
   SESSION_STATS    ds_plu_stats;           /* Downstream PLU-SLU session  */
                                            /*  statistics                 */
   SESSION_STATS    us_plu_stats;           /* Upstream PLU-SLU session    */
                                            /*  statistics                 */
   unsigned char    host_lu_name[8];        /* Determined host LU name     */
   unsigned char    host_pu_name[8];        /* Determined host PU name     */

   unsigned char    reserva[4];             /* reserved                    */
} DOWNSTREAM_LU_DET_DATA;

typedef struct downstream_lu_def_data
{
   unsigned char    description[32];        /* resource description        */
   unsigned char    reserv1[16];            /* reserved                    */
   unsigned char    nau_address;            /* downstream LU nau address   */
   unsigned char    dspu_name[8];           /* Downstream PU name          */
   unsigned char    host_lu_name[8];        /* Host LU or Pool name        */
   unsigned char    allow_timeout;          /* Allow timeout of host LU    */
```

```
   unsigned char    delayed_logon;           /* Allow delayed logon to      */
                                             /*  host LU                    */
   unsigned char    reserv2[6];              /* reserved                    */
} DOWNSTREAM_LU_DEF_DATA;

typedef struct session_stats
{
  AP_UINT16       rcv_ru_size;          /* session receive RU size          */
  AP_UINT16       send_ru_size;         /* session send RU size             */
  AP_UINT16       max_send_btu_size;    /* maximum send BTU size            */
  AP_UINT16       max_rcv_btu_size;     /* maximum rcv BTU size             */
  AP_UINT16       max_send_pac_win;     /* maximum send pacing window size  */
  AP_UINT16       cur_send_pac_win;     /* current send pacing window size  */
  AP_UINT16       max_rcv_pac_win;      /* maximum receive pacing window size*/
  AP_UINT16       cur_rcv_pac_win;      /* current receive pacing window size*/
  AP_UINT32       send_data_frames;     /* number of data frames sent       */
  AP_UINT32       send_fmd_data_frames; /* num fmd data frames sent         */
  AP_UINT32       send_data_bytes;      /* number of data bytes sent        */
  AP_UINT32       rcv_data_frames;      /* number of data frames received   */
  AP_UINT32       rcv_fmd_data_frames;  /* num fmd data frames received     */
  AP_UINT32       rcv_data_bytes;       /* number of data bytes received    */
  unsigned char   sidh;                 /* session ID high byte (from LFSID) */
  unsigned char   sidl;                 /* session ID low byte (from LFSID)  */
  unsigned char   odai;                 /* ODAI bit set                     */
  unsigned char   ls_name[8];           /* Link station name                */
  unsigned char   pacing_type;          /* type of pacing in use            */
} SESSION_STATS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_DOWNSTREAM_LU

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of downstream LUs for which data should be returned. To request data for a specific LU rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of the *dspu_name* and *dslu_name* parameters.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of the *dspu_name* and *dslu_name* parameters.

The list is ordered by *dspu_name* and then by *dslu_name*. For more information about how the application can obtain specific entries from the list, see "List Options For QUERY_* Verbs" on page 39.

dspu_name
PU name for which LU information is required (as specified on DEFINE_LS). To list only information about LUs associated with a specific PU, specify the PU name. To obtain a complete list for all PUs, set this field to binary zeros. The name is an 8-byte EBCDIC type-A string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

dslu_name
Name of the LU for which information is required, or the name to be used as an index into the list of LUs. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. The name is an 8-byte EBCDIC type-A string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

dspu_services
DSPU services filter. When the verb is issued to a running node, this parameter specifies whether to filter the returned information by the type of services provided to the LUs. Possible values are:

AP_PU_CONCENTRATION
Return information only on downstream LUs served by SNA gateway.

AP_DLUR
Return information only on downstream LUs served by DLUR.

AP_NONE
Return information about all downstream LUs.

When the node is not running, this parameter is ignored; CS Linux returns information about all downstream LUs.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

downstream_lu_summary.overlay_size
The size of the returned `downstream_lu_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `downstream_lu_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

downstream_lu_summary.dspu_name
Name of the PU associated with the LU. The name is an 8-byte EBCDIC type-A string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

downstream_lu_summary.dslu_name
Name of the LU. The name is an 8-byte EBCDIC type-A string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

downstream_lu_summary.description
A null-terminated text string describing the downstream LU, as specified in the definition of the downstream LU.

For a DLUR-supported LU, this parameter is reserved.

downstream_lu_summary.dspu_services
When the verb is issued to a running node, this parameter specifies the services provided by the local node to the downstream LU.

Possible values are:

AP_PU_CONCENTRATION
Downstream LU is served by SNA gateway.

AP_DLUR
Downstream LU is served by DLUR.

downstream_lu_summary.nau_address
Network accessible unit address of the LU.

downstream_lu_summary.lu_sscp_sess_active
Specifies whether the LU-SSCP session is active. Possible values are:

AP_YES The session is active.

AP_NO The session is not active.

downstream_lu_summary.plu_sess_active
Specifies whether the PLU-SLU session is active. Possible values are:

AP_YES The session is active.

AP_NO The session is not active.

downstream_lu_detail.overlay_size
The size of the returned `downstream_lu_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `downstream_lu_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

downstream_lu_detail.dslu_name
Name of the LU. The name is an 8-byte EBCDIC type-A string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

downstream_lu_detail.det_data.lu_sscp_sess_active
Specifies whether the LU-SSCP session is active. Possible values are:

AP_YES The session is active.

AP_NO The session is not active.

downstream_lu_detail.det_data.plu_sess_active
Specifies whether the PLU-SLU session is active. Possible values are:

AP_YES The session is active.

AP_NO The session is not active.

downstream_lu_detail.det_data.dspu_services
When the verb is issued to a running node, this parameter specifies the services provided by the local node to the downstream LU.

Possible values are:

AP_PU_CONCENTRATION
Downstream LU is served by SNA gateway.

AP_DLUR
Downstream LU is served by DLUR.

A `session_stats` structure is included for each of the three sessions (LU-SSCP session, downstream PLU-SLU session, and upstream PLU-SLU session). The fields in this structure are as follows:

rcv_ru_size
Maximum receive RU size. (In the LU-SSCP session statistics, this parameter is reserved.)

send_ru_size
Maximum send RU size. (In the LU-SSCP session statistics, this parameter is reserved.)

max_send_btu_size
Maximum BTU size that can be sent.

max_rcv_btu_size
Maximum BTU size that can be received.

max_send_pac_win
Maximum size of the send pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

cur_send_pac_win
Current size of the send pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

max_rcv_pac_win
Maximum size of the receive pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

cur_rcv_pac_win
Current size of the receive pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

send_data_frames
Number of normal flow data frames sent.

send_fmd_data_frames
Number of normal flow FMD data frames sent.

send_data_bytes
Number of normal flow data bytes sent.

rcv_data_frames
Number of normal flow data frames received.

rcv_fmd_data_frames
Number of normal flow FMD data frames received.

rcv_data_bytes
Number of normal flow data bytes received.

sidh Session ID high byte. (In the upstream PLU-SLU session statistics for an LU served by SNA gateway, this parameter is reserved.)

sidl Session ID low byte. (In the upstream PLU-SLU session statistics for an LU served by SNA gateway, this parameter is reserved.)

odai Origin Destination Assignor Indicator. When bringing up a session, the sender of the BIND sets this field to zero if the local node contains the primary link station, and sets it to one if the BIND sender is the node containing the secondary link station. (In the upstream PLU-SLU session statistics for an LU served by SNA gateway, this parameter is reserved.)

ls_name
Link station name associated with statistics. This is an 8-byte ASCII character string, right-padded with spaces if the name is shorter than 8 characters. (In the upstream PLU-SLU session statistics for an LU served by SNA gateway, this parameter is reserved.)

pacing_type
The type of receive pacing in use on this session. Possible values are:
```
AP_NONE
AP_PACING_FIXED
```

downstream_lu_detail.det_data.host_lu_name
Name of the host LU to which the downstream LU is mapped, or to which it was mapped when the PLU-SLU session was last active. This parameter value may differ from *def_data.host_lu_name* because *def_data.host_lu_name* can be the name of a host LU pool.

If the downstream LU is used to communicate with a CS Linux Primary RUI application instead of a host, this field is set to the string `#PRIRUI#` in EBCDIC.

downstream_lu_detail.det_data.host_pu_name
Name of the host PU to which the downstream LU is mapped, or to which it was mapped when the PLU-SLU session was last active.

downstream_lu_detail.def_data.description
A null-terminated text string describing the downstream LU, as specified in the definition of the downstream LU. For a DLUR-supported LU, this parameter is reserved.

downstream_lu_detail.def_data.nau_address
Network accessible unit address of the downstream LU.

downstream_lu_detail.def_data.dspu_name
Name of the downstream PU associated with this LU (as specified on the DEFINE_LS verb). This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

downstream_lu_detail.def_data.host_lu_name
Name of the host LU or host LU pool that the downstream LU uses. This is an 8-byte EBCDIC string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

If the downstream LU is used to communicate with a CS Linux Primary RUI application instead of a host, this field is set to the string `#PRIRUI#` in EBCDIC.

This field is reserved for DLUR-served downstream LUs.

downstream_lu_detail.allow_timeout
Specifies whether this downstream LU allows its session with the upstream LU to timeout. Possible values are:

AP_YES This downstream LU allows its session with the upstream LU to timeout.

AP_NO This downstream LU does not allow its session with the upstream LU to timeout.

This field is ignored if the downstream LU is used to communicate with a CS Linux Primary RUI application instead of a host.

downstream_lu_detail.delayed_logon
Specifies whether this downstream LU uses delayed logon (the upstream LU is not activated until the user requests that it be activated). Possible values are:

AP_YES This downstream LU uses delayed logon.

AP_NO This downstream LU does not use delayed logon.

This field is ignored if the downstream LU is used to communicate with a CS Linux Primary RUI application instead of a host.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
`AP_PARAMETER_CHECK`

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, to list all entries starting from the supplied name, but the *lu_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_INVALID_PU_TYPE
The PU specified by the *dspu_name* parameter is not a downstream PU.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support SNA gateway or DLUR; this is defined by the *pu_conc_support*and *dlur_support* parameters on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_DOWNSTREAM_PU

QUERY_DOWNSTREAM_PU returns information about downstream PUs that use SNA gateway or DLUR or both. This verb can be used to obtain information about a specific PU or about multiple PUs, depending on the options used.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_downstream_pu
{
  AP_UINT16        opcode;              /* verb operation code             */
  unsigned char    reserv2;             /* reserved                        */
  unsigned char    format;              /* reserved                        */
  AP_UINT16        primary_rc;          /* primary return code             */
  AP_UINT32        secondary_rc;        /* secondary return code           */
```

```
  unsigned char    *buf_ptr;             /* pointer to buffer                */
  AP_UINT32        buf_size;             /* buffer size                      */
  AP_UINT32        total_buf_size;       /* total buffer size required       */
  AP_UINT16        num_entries;          /* number of entries                */
  AP_UINT16        total_num_entries;    /* total number of entries          */
  unsigned char    list_options;         /* listing options                  */
  unsigned char    reserv3;              /* reserved                         */
  unsigned char    dspu_name[8];         /* Downstream PU name filter        */
  unsigned char    dspu_services;        /* services provided to PU          */
} QUERY_DOWNSTREAM_PU;

typedef struct downstream_pu_data
{
  AP_UINT16        overlay_size;         /* size of returned entry           */
  unsigned char    dspu_name[8];         /* PU name                          */
  unsigned char    description[32];      /* resource description             */
  unsigned char    reserv1[16];          /* reserved                         */
  unsigned char    ls_name[8];           /* Link name                        */
  unsigned char    pu_sscp_sess_active;  /* Is the PU-SSCP session active    */
  unsigned char    dspu_services;        /* DSPU service type                */
  SESSION_STATS    pu_sscp_stats;        /* SSCP-PU session statistics       */
  unsigned char    reserva[20];          /* reserved                         */
} DOWNSTREAM_PU_DATA;

typedef struct session_stats
{
  AP_UINT16        rcv_ru_size;          /* session receive RU size          */
  AP_UINT16        send_ru_size;         /* session send RU size             */
  AP_UINT16        max_send_btu_size;    /* maximum send BTU size            */
  AP_UINT16        max_rcv_btu_size;     /* maximum rcv BTU size             */
  AP_UINT16        max_send_pac_win;     /* maximum send pacing window size  */
  AP_UINT16        cur_send_pac_win;     /* current send pacing window size  */
  AP_UINT16        max_rcv_pac_win;      /* maximum receive pacing window    */
                                         /*  size                            */
  AP_UINT16        cur_rcv_pac_win;      /* current receive pacing window    */
                                         /*  size                            */
  AP_UINT32        send_data_frames;     /* number of data frames sent       */
  AP_UINT32        send_fmd_data_frames; /* num fmd data frames sent         */
  AP_UINT32        send_data_bytes;      /* number of data bytes sent        */
  AP_UINT32        rcv_data_frames;      /* number of data frames received   */
  AP_UINT32        rcv_fmd_data_frames;  /* num fmd data frames received     */
  AP_UINT32        rcv_data_bytes;       /* number of data bytes received    */
  unsigned char    sidh;                 /* session ID high byte (from LFSID)*/
  unsigned char    sidl;                 /* session ID low byte (from LFSID) */
  unsigned char    odai;                 /* ODAI bit set                     */
  unsigned char    ls_name[8];           /* Link station name                */
  unsigned char    pacing_type;          /* type of pacing in use            */
} SESSION_STATS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_DOWNSTREAM_PU

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of downstream PUs for which data should be returned. To request data for a specific PU rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *dspu_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *dspu_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

dspu_name
Name of the PU for which information is required (as specified on DEFINE_LS), or the name to be used as an index into the list of PUs. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. The name is an 8-byte EBCDIC type-A string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

dspu_services
DSPU services filter. Specifies whether to filter the returned information by the type of services provided to the PUs. Possible values are:

AP_PU_CONCENTRATION
Return information only on downstream PUs served by SNA gateway.

AP_DLUR
Return information only on downstream PUs served by DLUR.

AP_NONE
Return information about all downstream PUs.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

downstream_pu_data.overlay_size
The size of the returned `downstream_pu_data` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `downstream_pu_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

downstream_pu_data.dspu_name
Name of the downstream PU. The name is an 8-byte EBCDIC type-A string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

downstream_pu_data.description
A null-terminated text string describing the LS to the downstream PU, as specified in the definition of the LS.

downstream_pu_data.ls_name
Name of the LS used to access the downstream PU. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters.

downstream_pu_data.pu_sscp_sess_active
Specifies whether the PU-SSCP session to the downstream PU is active. Possible values are:

AP_YES The session is active.

AP_NO The session is not active.

downstream_pu_data.dspu_services
Specifies the type of services provided to the PU.

Possible values are:

AP_PU_CONCENTRATION
Downstream PU is served by SNA gateway.

AP_DLUR
Downstream PU is served by DLUR.

downstream_pu_data.pu_sscp_stats.rcv_ru_size
Maximum receive RU size; this field is reserved (and set to zero) if the downstream PU is served by SNA gateway.

downstream_pu_data.pu_sscp_stats.send_ru_size
Maximum send RU size; this field is reserved (and set to zero) if the downstream PU is served by SNA gateway.

downstream_pu_data.pu_sscp_stats.max_send_btu_size
Maximum BTU size that can be sent.

downstream_pu_data.pu_sscp_stats.max_rcv_btu_size
Maximum BTU size that can be received.

downstream_pu_data.pu_sscp_stats.max_send_pac_win
Reserved (always set to zero).

downstream_pu_data.pu_sscp_stats.cur_send_pac_win
Reserved (always set to zero).

downstream_pu_data.pu_sscp_stats.max_rcv_pac_win
Reserved (always set to zero).

downstream_pu_data.pu_sscp_stats.cur_rcv_pac_win
Reserved (always set to zero).

downstream_pu_data.pu_sscp_stats.send_data_frames
Number of normal flow data frames sent.

downstream_pu_data.pu_sscp_stats.send_fmd_data_frames
Number of normal flow FMD data frames sent.

downstream_pu_data.pu_sscp_stats.send_data_bytes
Number of normal flow data bytes sent.

downstream_pu_data.pu_sscp_stats.rcv_data_frames
Number of normal flow data frames received.

downstream_pu_data.pu_sscp_stats.rcv_fmd_data_frames
Number of normal flow FMD data frames received.

downstream_pu_data.pu_sscp_stats.rcv_data_bytes
Number of normal flow data bytes received.

downstream_pu_data.pu_sscp_stats.sidh
Session ID high byte.

downstream_pu_data.pu_sscp_stats.sidl
Session ID low byte.

downstream_pu_data.pu_sscp_stats.odai
Origin Destination Assignor Indicator. When bringing up a session, the sender of the BIND sets this field to zero if the local node contains the primary link station, and sets it to one if the BIND sender is the node containing the secondary link station.

downstream_pu_data.pu_sscp_stats.ls_name
Link station name associated with statistics. This is an 8-byte ASCII character string, right-padded with spaces if the name is shorter than 8 characters.

downstream_pu_data.pacing_type
The type of receive pacing in use on the PU-SSCP. This parameter will always be set to `AP_NONE`.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
`AP_PARAMETER_CHECK`

secondary_rc
Possible values are:

`AP_INVALID_PU_NAME`
The *list_options* parameter was set to `AP_LIST_INCLUSIVE`, to list all entries starting from the supplied name, but the *dspu_name* parameter was not valid.

`AP_INVALID_LIST_OPTION`
The *list_options* parameter was not set to a valid value.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support SNA gateway or DLUR; this is defined by the *pu_conc_support* and *dlur_support* parameters on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_DSPU_TEMPLATE

The QUERY_DSPU_TEMPLATE verb returns information about defined downstream PU templates used for SNA gateway over implicit links.

This verb can be used to obtain information about a specific downstream PU template, or about a number of downstream PU templates, depending on the options used. To obtain information about a specific downstream PU template or multiple downstream PU templates, set the *template_name* parameter. The *template_name* parameter is ignored if the *list_options* parameter is set to AP_FIRST_IN_LIST.

VCB Structure

```
typedef struct query_dspu_template
{
   AP_UINT16       opcode;            /* verb operation code                */
   unsigned char   reserv1;           /* reserved                           */
   unsigned char   format;            /* reserved                           */
   AP_UINT16       primary_rc;        /* primary return code                */
   AP_UINT32       secondary_rc;      /* secondary return code              */
   unsigned char   *buf_ptr;          /* pointer to buffer                  */
   AP_UINT32       buf_size;          /* buffer size                        */
   AP_UINT32       total_buf_size;    /* total buffer size required         */
   AP_UINT16       num_entries;       /* number of entries                  */
   AP_UINT16       total_num_entries; /* total number of entries            */
   unsigned char   list_options;      /* listing options                    */
   unsigned char   reserv3;           /* reserved                           */
   unsigned char   template_name[8];  /* name of DSPU template              */
} QUERY_DSPU_TEMPLATE;

typedef struct dspu_template_data
{
   AP_UINT16       overlay_size;      /* size of returned entry             */
   unsigned char   template_name[8];  /* name of DSPU template              */
   unsigned char   description[32];   /* resource description               */
   unsigned char   reserv2[16];       /* reserved                           */
   unsigned char   reserv1[12];       /* reserved                           */
   AP_UINT16       max_instance;      /* max active template instance       */
   AP_UINT16       active_instance;   /* current active instances           */
   unsigned char   num_of_dslu_templates;  /* number of DSLU templates      */
} DSPU_TEMPLATE_DATA;
```

Each dspu_template_data structure is followed by one or more downstream LU templates; the number of the downstream LU templates is specified by the *number_of_dslu_templates* parameter. Each downstream LU template has the following format:

```
typedef struct dslu_template_data
{
   AP_UINT16       overlay_size;      /* size of this entry                */
   unsigned char   reserv1[2];        /* reserved                          */
   DSLU_TEMPLATE   dslu_template;     /* downstream LU template            */
} DSLU_TEMPLATE_DATA;

typedef struct dslu_template
{
   unsigned char   min_nau;           /* minimum NAU address in range      */
   unsigned char   max_nau;           /* maximum NAU address in range      */
   unsigned char   allow_timeout;     /* allow timeout of host LU?         */
   unsigned char   delayed_logon;     /* allow delayed logon to host LU    */
   unsigned char   reserv1[8];        /* reserved                          */
   unsigned char   host_lu[8];        /* host LU or pool name              */
} DSLU_TEMPLATE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_DSPU_TEMPLATE

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of templates for which data should be returned. To request data for a specific template rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *template_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *template_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

template_name
Name of the DSPU template for which information is required, or the name to be used as an index into the list. This is an 8-byte string in a locally displayable character set. This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. This may be higher than *buf_size*.

num_entries
The number of entries actually returned.

total_num_entries
Total number of entries that could have been returned. This may be higher than *num_entries*.

dspu_template_data.overlay_size
The number of bytes in this entry, including any downstream LU templates, and the offset to the next entry returned (if any).

When your application needs to go through the returned buffer to find each `dspu_template_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

dspu_template_data.template_name
Name of the DSPU template.

dspu_template_data.description
Resource description, as defined on the DEFINE_DSPU_TEMPLATE verb.

dspu_template_data.max_instance
The maximum number of instances of the template which can be active simultaneously.

dspu_template_data.active_instance
The number of instances of the template which are currently active.

dspu_template_data.num_of_dslu_templates
Number of downstream LU templates for this downstream PU template. Following this parameter are *num_of_dslu_templates* entries, one for each DSLU template.

dslu_template_data.overlay_size
The number of bytes in this entry, and the offset to the next entry returned (if any).

When your application needs to go through the returned buffer to find each `dslu_template_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

dslu_template_data.min_nau
Minimum NAU address in the range of DSLU templates.

dslu_template_data.max_nau
Maximum NAU address in the range of DSLU templates.

dslu_template_data.allow_timeout
Indicates whether CS Linux is allowed to timeout host LUs used by this downstream LU if the session is left inactive for the timeout period specified on the host LU definition. Possible values are:

AP_YES CS Linux is allowed to timeout host LUs used by this downstream LU.

AP_NO CS Linux is not allowed to timeout host LUs used by this downstream LU.

This field is ignored if the downstream LUs are used to communicate with a CS Linux Primary RUI application instead of a host.

dslu_template_data.delayed_logon
Indicates whether CS Linux delays connecting the downstream LU to the host LU until the first data is received from the downstream LU. Instead, a simulated logon screen is sent to the downstream LU. Possible values are:

AP_YES CS Linux delays connecting the downstream LU to the host LU.

AP_NO CS Linux does not delay connecting the downstream LU to the host LU.

This field is ignored if the downstream LUs are used to communicate with a CS Linux Primary RUI application instead of a host.

dslu_template_data.host_lu_name
Name of the host LU or host LU pool onto which all the downstream LUs within the range will be mapped.

If the downstream LUs are used to communicate with a CS Linux Primary RUI application instead of a host, this field is set to the string `#PRIRUI#` in EBCDIC.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
`AP_PARAMETER_CHECK`

secondary_rc

AP_INVALID_TEMPLATE_NAME
The template specified in the *template_name* parameter was not valid.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with `AP_PARAMETER_CHECK`, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_FOCAL_POINT

QUERY_FOCAL_POINT returns information about the focal point for a specific Management Services category, or about multiple focal points, depending on the options used.

VCB Structure

```
typedef struct query_focal_point
{
   AP_UINT16       opcode;                /* verb operation code           */
   unsigned char   reserv2;               /* reserved                      */
   unsigned char   format;                /* reserved                      */
   AP_UINT16       primary_rc;            /* primary return code           */
   AP_UINT32       secondary_rc;          /* secondary return code         */
   unsigned char   *buf_ptr;              /* pointer to buffer             */
   AP_UINT32       buf_size;              /* buffer size                   */
   AP_UINT32       total_buf_size;        /* total buffer size required    */
   AP_UINT16       num_entries;           /* number of entries             */
   AP_UINT16       total_num_entries;     /* total number of entries       */
   unsigned char   list_options;          /* listing options               */
   unsigned char   reserv3;               /* reserved                      */
   unsigned char   ms_category[8];        /* name of MS category           */
} QUERY_FOCAL_POINT;

typedef struct fp_data
{
   AP_UINT16       overlay_size;          /* size of returned entry        */
   unsigned char   ms_appl_name[8];       /* focal point application name  */
   unsigned char   ms_category[8];        /* focal point category          */
   unsigned char   description[32];       /* resource description          */
   unsigned char   reserv1[16];           /* reserved                      */
   unsigned char   fp_fqcp_name[17];      /* focal point fully qualified   */
                                          /*  cp name                      */
   unsigned char   bkup_appl_name[8];     /* backup focal point            */
                                          /*  application name             */
   unsigned char   bkup_fp_fqcp_name[17]; /* backup fp fully qualified cp  */
                                          /*  name                         */
   unsigned char   implicit_appl_name[8]; /* implicit focal point appl name */
   unsigned char   implicit_fp_fqcp_name[17]; /* implicit fp fully qualified */
                                             /*  cp name                    */
   unsigned char   fp_type;               /* focal point type              */
   unsigned char   fp_status;             /* focal point status            */
   unsigned char   fp_routing;            /* type of MDS routing to use    */
   unsigned char   reserva[20];           /* reserved                      */
   AP_UINT16       number_of_appls;       /* number of applications        */
} FP_DATA;
```

Each fp_data structure is followed by one or more application names; the number of these is specified by the *number_of_appls* parameter. Each application name has the following format:

```
   unsigned char   appl_name[8];          /* application name              */
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_FOCAL_POINT

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of entries for which data should be returned. To request data for a specific entry rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of focal points from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *ms_category* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *ms_category* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

ms_category
Management Services category. This parameter is not used if *list_options* is set to `AP_FIRST_IN_LIST`.

This may be either one of the category names specified in the MS Discipline-Specific Application Programs table of *Systems Network Architecture: Management Services Reference* (see the Bibliography), padded with EBCDIC spaces (`0x40`), or a user-defined category. A user-defined category name is an 8-byte type-1134 EBCDIC string, padded with EBCDIC spaces (`0x40`) if necessary.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

fp_data.overlay_size
The size of the returned `fp_data` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `fp_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

fp_data.ms_appl_name
Name of the currently active focal point application. This is either one of the MS Discipline-Specific Application Programs specified in the *Systems Network Architecture: Management Services Reference* (see the Bibliography), or an EBCDIC string, using type-1134 characters, padded on the right with spaces if the name is shorter than 8 characters.

fp_data.ms_category
Management Services category. This is either one of the category names specified in the *Systems Network Architecture: Management Services Reference* (see the Bibliography), or an EBCDIC string, using type-1134 characters, padded on the right with spaces if the name is shorter than 8 characters.

fp_data.description
A null-terminated text string describing the focal point, as specified in the definition of the focal point.

fp_data.fp_fqcp_name
Fully qualified control point name of the currently active focal point. This name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

fp_data.bkup_appl_name
Backup focal point application name. This is either one of the MS Discipline-Specific Application Programs specified in the *Systems Network Architecture: Management Services Reference* (see the Bibliography), or an EBCDIC string, using type-1134 characters, padded on the right with spaces if the name is shorter than 8 characters.

fp_data.bkup_fp_fqcp_name
Fully qualified control point name of the backup focal point. This name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

fp_data.implicit_appl_name
Name of the implicit focal point application (specified using DEFINE_FOCAL_POINT). This is either one of the MS Discipline-Specific Application Programs specified in the *Systems Network Architecture: Management Services Reference* (see the Bibliography), or an EBCDIC string, using type-1134 characters, padded on the right with spaces if the name is shorter than 8 characters.

fp_data.implicit_fp_fqcp_name
Fully qualified control point name of the implicit focal point (specified using DEFINE_FOCAL_POINT). This name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

fp_data.fp_type
Type of focal point. Refer to the IBM *Systems Network Architecture: Management Services Reference* (see the Bibliography) for further detail. This is one of the following:

AP_EXPLICIT_PRIMARY_FP

AP_IMPLICIT_PRIMARY_FP

AP_BACKUP_FP

AP_DEFAULT_PRIMARY_FP

AP_DOMAIN_FP

AP_HOST_FP

AP_NO_FP

fp_data.fp_status
Status of the focal point. This is one of the following:

AP_ACTIVE
The focal point is currently active.

AP_NOT_ACTIVE
The focal point is currently not active.

AP_PENDING
The focal point is pending active. This occurs after an implicit request has been sent to the focal point and before the response has been received.

AP_NEVER_ACTIVE
No focal point information is available for the specified category although application registrations for the category have been accepted.

fp_data.fp_routing
Specifies whether applications should use default or direct routing to route traffic to the focal point. This is one of the following:

AP_DEFAULT
The MDS_MU should be delivered to the focal point using default routing.

AP_DIRECT
The MDS_MU should be routed on a session directly to the focal point.

fp_data.number_of_appls
Number of applications registered for this focal point category.

appl_name
Name of application registered for focal point category. This is either one of the MS Discipline-Specific Application Programs specified in the *Systems Network Architecture: Management Services Reference* (see the Bibliography), or an EBCDIC string, using type-1134 characters, padded on the right with spaces if the name is shorter than 8 characters.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_MS_CATEGORY
The *list_options* parameter was set to AP_LIST_INCLUSIVE, to list all entries starting from the supplied name, but the *ms_category* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support MS network management functions; this is defined by the *mds_supported* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_GLOBAL_LOG_TYPE

This verb allows a NOF application to determine the types of information that CS Linux records in log files. It specifies default values that are used on all servers (unless they are overridden on a particular server by SET_LOG_TYPE); QUERY_LOG_TYPE can be used to determine the values being used on a particular server.

CS Linux logs messages for the following types of event:

Problem
An abnormal event that degrades the system in a way perceptible to a user (such as abnormal termination of a session).

Exception
An abnormal event that may degrade the system but that is not immediately perceptible to a user (such as receiving a message that is not valid from the remote system).

Audit A normal event (such as starting a session).

Problem and exception messages are logged to the error log file; audit messages are logged to the audit log file. Problem messages are always logged and cannot be disabled, but you can specify whether to log each of the other two message types. For each of the two files (audit and error), you can specify whether to use succinct

logging (including only the text of the message and a summary of the message source) or full logging (including full details of the message source, cause, and any action required).

This verb must be issued to the node currently acting as the central logger; for more information, see "CONNECT_NODE" on page 61.

VCB Structure

```
typedef struct query_global_log_type
{
   AP_UINT16       opcode;            /* verb operation code                */
   unsigned char   reserv2;           /* reserved                           */
   unsigned char   format;            /* reserved                           */
   AP_UINT16       primary_rc;        /* primary return code                */
   AP_UINT32       secondary_rc;      /* secondary return code              */
   unsigned char   audit;             /* audit logging on or off            */
   unsigned char   exception;         /* exception logging on or off        */
   unsigned char   succinct_audits;   /* use succinct logging in audit file? */
   unsigned char   succinct_errors;   /* use succinct logging in error file? */
   unsigned char   reserv3[4];        /* reserved                           */
} QUERY_GLOBAL_LOG_TYPE;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_GLOBAL_LOG_TYPE

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

audit This parameter indicates whether audit messages are recorded. Possible values are:

AP_YES Audit messages are recorded.

AP_NO Audit messages are not recorded.

exception
This parameter indicates whether exception messages are recorded. Possible values are:

AP_YES Exception messages are recorded.

AP_NO Exception messages are not recorded.

succinct_audits
This parameter indicates whether succinct logging or full logging is used in the audit log file. Possible values are:

AP_YES Succinct logging: each message in the log file contains a summary of the message header information (such as the message number, log type, and system name) and the message text string and parameters. To obtain more details of the cause of the log and any action required, you can use the **snahelp** utility.

AP_NO Full logging: each message in the log file includes a full listing of

the message header information, the message text string and parameters, and additional information about the cause of the log and any action required.

If you are using central logging, the choice of succinct or full logging for messages from all computers is determined by the setting of this parameter on the server acting as the central logger; this setting may either be from the SET_GLOBAL_LOG_TYPE verb, or from a SET_LOG_TYPE verb issued to that server to override the default.

succinct_errors
This parameter indicates whether succinct logging or full logging is used in the error log file; this applies to both exception logs and problem logs. The possible values and their meanings are the same as for the *succinct_audits* parameter.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_NOT_CENTRAL_LOGGER
The verb was issued to a node that is not the central logger.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_ISR_SESSION

QUERY_ISR_SESSION returns list information about the sessions for which a network node is providing intermediate session routing.

This verb can be used to obtain information about a specific session, or about a number of sessions, depending on the options used. It can be used only if the CS Linux node is a network node, and is not valid if it is an end node or LEN node.

This list is ordered by *fqpcid.pcid* first and then by EBCDIC lexicographical ordering on *fqpcid.fqcp_name*. The format of the `fqpcid` structure is an 8-byte PCID (Procedure Correlator Identifier) and the network qualified CP name of the session originator.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_isr_session
{
   AP_UINT16       opcode;              /* verb operation code             */
   unsigned char   reserv2;             /* reserved                        */
   unsigned char   format;              /* reserved                        */
   AP_UINT16       primary_rc;          /* primary return code             */
   AP_UINT32       secondary_rc;        /* secondary return code           */
   unsigned char   *buf_ptr;            /* pointer to buffer               */
   AP_UINT32       buf_size;            /* buffer size                     */
```

```
   AP_UINT32       total_buf_size;       /* total buffer size required       */
   AP_UINT16       num_entries;          /* number of entries                */
   AP_UINT16       total_num_entries;    /* total number of entries          */
   unsigned char   list_options;         /* listing options                  */
   unsigned char   session_type;         /* is this query for DLUR or regular*/
                                         /*   ISR sessions?                  */
   FQPCID          fqpcid;               /* fully qualified procedure        */
                                         /* correlator ID                    */
} QUERY_ISR_SESSION;

typedef struct isr_session_summary
{
   AP_UINT16       overlay_size;         /* size of returned entry           */
   FQPCID          fqpcid;               /* fully qualified procedure        */
                                         /* correlator ID                    */
} ISR_SESSION_SUMMARY;

typedef struct isr_session_detail
{
   AP_UINT16       overlay_size;         /* size of returned entry            */
   AP_UINT16       sub_overlay_size;     /* offset to appended RSCV           */
   FQPCID          fqpcid;               /* fully qualified procedure         */
                                         /*  correlator ID                    */
   unsigned char   trans_pri;            /* Transmission priority:            */
   unsigned char   cos_name[8];          /* Class of Service name             */
   unsigned char   ltd_res;              /* Session spans a limited resource  */
   unsigned char   reserv1[2];           /* reserved                          */
   EXTENDED_SESSION_STATS  pri_ext_sess_stats; /* primary hop session stats   */
   EXTENDED_SESSION_STATS  sec_ext_sess_stats; /* secondary hop session stats */
   unsigned char   sess_lu_type;         /* session LU type                   */
   unsigned char   sess_lu_level;        /* session LU level                  */
   unsigned char   pri_tg_number;        /* Primary session TG number         */
   unsigned char   sec_tg_number;        /* Secondary session TG number       */
   AP_UINT32       rtp_tcid;             /* RTP TC identifier                 */
   AP_UINT32       time_active;          /* time elapsed since activation     */
   unsigned char   isr_state;            /* current state of ISR session      */
   unsigned char   reserv2[11];          /* reserved                          */
   unsigned char   mode_name[8];         /* mode name                         */
   unsigned char   pri_lu_name[17];      /* primary LU name                   */
   unsigned char   sec_lu_name[17];      /* secondary LU name                 */
   unsigned char   pri_adj_cp_name[17];  /* primary stage adjacent CP name    */
   unsigned char   sec_adj_cp_name[17];  /* secondary stage adjacent CP name  */
   unsigned char   reserv3[3];           /* reserved                          */
   unsigned char   rscv_len;             /* length of following RSCV          */
} ISR_SESSION_DETAIL;
```

The ISR session detail structure may be followed by a Route Selection Control Vector (RSCV) as defined by SNA Formats. This control vector defines the session route through the network and is carried on the BIND. This RSCV is included only if the node's configuration (specified using DEFINE_NODE) indicates that RSCVs should be stored for ISR sessions.

```
typedef struct fqpcid
{
   unsigned char   pcid[8];              /* procedure correlator identifier  */
   unsigned char   fqcp_name[17];        /* originator's network qualified   */
                                         /*  CP name                         */
   unsigned char   reserve3[3];          /* reserved                         */
} FQPCID;

typedef struct extended_session_stats
{
   AP_UINT16       rcv_ru_size;          /* session receive RU size           */
   AP_UINT16       send_ru_size;         /* session send RU size              */
   AP_UINT16       max_send_btu_size;    /* maximum send BTU size             */
   AP_UINT16       max_rcv_btu_size;     /* maximum rcv BTU size              */
   AP_UINT16       max_send_pac_win;     /* maximum send pacing window size   */
   AP_UINT16       cur_send_pac_win;     /* current send pacing window size   */
```

```
   AP_UINT16       send_rpc;             /* send residual pacing count        */
   AP_UINT16       max_rcv_pac_win;      /* maximum rcv pacing window size    */
   AP_UINT16       cur_rcv_pac_win;      /* current rcv pacing window size    */
   AP_UINT16       rcv_rpc;              /* receive residual pacing count     */
   AP_UINT32       send_data_frames;     /* number of data frames sent        */
   AP_UINT32       send_fmd_data_frames; /* num fmd data frames sent          */
   AP_UINT32       send_data_bytes;      /* number of data bytes sent         */
   AP_UINT32       send_fmd_data_bytes;  /* number of fmd data bytes sent     */
   AP_UINT32       rcv_data_frames;      /* number of data frames received    */
   AP_UINT32       rcv_fmd_data_frames;  /* num fmd data frames received      */
   AP_UINT32       rcv_data_bytes;       /* number of data bytes received     */
   AP_UINT32       rcv_fmd_data_bytes;   /* number of fmd data bytes received */
   unsigned char   sidh;                 /* session ID high byte (from LFSID) */
   unsigned char   sidl;                 /* session ID low byte (from LFSID)  */
   unsigned char   odai;                 /* ODAI bit set                      */
   unsigned char   ls_name[8];           /* link station name                 */
   unsigned char   pacing_type;          /* type of pacing in use             */
   unsigned char   reserv1[100];         /* reserved                          */
} EXTENDED_SESSION_STATS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_ISR_SESSION

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of sessions for which data should be returned. To request data for a specific session rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *pcid* and *fqcp_name* parameters.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *pcid* and *fqcp_name* parameters.

The list is ordered by *pcid* (numerically), and then by *fqcp_name*. For more information about how the application can obtain specific entries from the list, see "List Options For QUERY_* Verbs" on page 39.

session_type
Specifies whether DLUR-maintained sessions or regular ISR sessions are being queried. Possible values are:

AP_DLUR_SESSIONS
DLUR-maintained sessions are being queried.

AP_ISR_SESSIONS
Regular ISR sessions are being queried.

fqpcid.pcid
Procedure Correlator ID. This is an 8-byte hexadecimal string. This value is ignored if *list_options* is set to `AP_FIRST_IN_LIST`.

fqpcid.fqcp_name
Fully qualified control point name of the session for which information is required, or the name to be used as an index into the list of sessions. This value is ignored if *list_options* is set to `AP_FIRST_IN_LIST`.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

isr_session_summary.overlay_size
The size of the returned `isr_session_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `isr_session_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

isr_session_summary.fqpcid.pcid
Procedure Correlator ID.

isr_session_summary.fqpcid.fqcp_name
Fully qualified CP name. The name is a 17-byte EBCDIC string,

right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

isr_session_detail.overlay_size
The size of the returned `isr_session_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `isr_session_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

isr_session_detail.fqpcid.pcid
Procedure Correlator ID.

isr_session_detail.fqpcid.fqcp_name
Fully qualified CP name. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

isr_session_detail.trans_pri
Transmission priority. This parameter has one of the following values:
`AP_LOW AP_MEDIUM`
`AP_HIGH AP_NETWORK`

isr_session_detail.cos_name
Class of service name. This is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

isr_session_detail.ltd_res
Specifies whether the session uses a limited resource link. Possible values are:

AP_YES Session uses a limited resource link.

AP_NO Session does not use a limited resource link.

For each of the two sessions (primary and secondary), the `extended_session_stats` structure contains the following fields, each preceded by *isr_session_detail.pri_ext_sess_stats.*_* for the primary session and *isr_session_detail.sec_ext_sess_stats.*_* for the secondary session:

rcv_ru_size
Maximum receive RU size.

send_ru_size
Maximum send RU size.

max_send_btu_size
Maximum BTU size that can be sent.

max_rcv_btu_size
Maximum BTU size that can be received.

max_send_pac_win
Maximum size of the send pacing window.

cur_send_pac_win
Current size of the send pacing window.

send_rpc
Send residual pacing count.

max_rcv_pac_win
Maximum size of the receive pacing window.

cur_rcv_pac_win
Current size of the receive pacing window.

rcv_rpc
Receive residual pacing count.

send_data_frames
Number of normal flow data frames sent.

send_fmd_data_frames
Number of normal flow FMD data frames sent.

send_data_bytes
Number of normal flow data bytes sent.

send_fmd_data_bytes
Number of normal flow FMD data bytes sent.

rcv_data_frames
Number of normal flow data frames received.

rcv_fmd_data_frames
Number of normal flow FMD data frames received.

rcv_data_bytes
Number of normal flow data bytes received.

rcv_fmd_data_bytes
Number of normal flow FMD data bytes received.

sidh Session ID high byte.

sidl Session ID low byte.

odai Origin Destination Assignor Indicator. When bringing up a session, the sender of the BIND sets this field to zero if the local node contains the primary link station, and sets it to one if the BIND sender is the node containing the secondary link station.

ls_name
Link station name or name of the RTP connection associated with statistics. This is an 8-byte string in a locally displayable character set. All 8 bytes are significant. This field can be used to correlate the intermediate session statistics with a particular link station.

pacing_type
Receive pacing type in use on the session. Possible values are:

```
AP_NONE
AP_PACING_FIXED
AP_PACING_ADAPTIVE
```

The following parameters are also returned (these parameters are not part of the `session_stats` structure):

isr_session.detail.sess_lu_type
The LU type of the session specified on the BIND. Possible values are (LU type 5 is intentionally omitted):

```
AP_LU_TYPE_0
```

AP_LU_TYPE_1
AP_LU_TYPE_2
AP_LU_TYPE_3
AP_LU_TYPE_4
AP_LU_TYPE_6
AP_LU_TYPE_7
AP_LU_TYPE_UNKNOWN

isr_session.detail.sess_lu_level
The LU level of the session. Possible values are:

AP_LU_LEVEL_0
AP_LU_LEVEL_1
AP_LU_LEVEL_2
AP_LU_LEVEL_UNKNOWN

For LU types other than 6, this parameter is set to AP_LU_LEVEL_0. The value AP_LU_LEVEL_UNKNOWN is always returned unless collection of names has been enabled using DEFINE_ISR_STATS.

isr_session.detail.pri_tg_number
The TG number associated with the link traversed by the primary session hop. If the primary session stage traverses an RTP connection, zero is returned. The value zero is always returned unless collection of names has been enabled using DEFINE_ISR_STATS.

isr_session.detail.sec_tg_number
The TG number associated with the link traversed by the secondary session hop. If the secondary session stage traverses an RTP connection, zero is returned. The value zero is always returned unless collection of names has been enabled using DEFINE_ISR_STATS.

isr_session.detail.rtp_tcid
Total TC ID for the RTP connection. This is returned in cases where this ISR session forms part of an ANR/ISR boundary. In other cases, this parameter is set to zero. The value zero is always returned unless collection of names has been enabled using DEFINE_ISR_STATS.

isr_session.detail.time_active
The elapsed time since the activation of the session, in hundredths of a second. The value zero is always returned unless collection of names has been enabled using DEFINE_ISR_STATS.

isr_session.detail.isr_state
The current state of the session. Possible values are:

AP_ISR_INACTIVE
AP_ISR_PENDING_ACTIVE
AP_ISR_ACTIVE
AP_ISR_PENDING_INACTIVE

isr_session.detail.mode_name
The mode name for the session. This is an 8-byte alphanumeric type-A EBCDIC string starting with a letter, padded on the right with EBCDIC spaces. All binary zeros are returned unless collection of names has been enabled using DEFINE_ISR_STATS.

isr_session.detail.pri_lu_name
The primary LU name of the session. This name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. The name consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and an LU name of 1–8 A-string characters. If this name is not available,

all binary zeros are returned in this field. All binary zeros are always returned unless collection of names has been enabled using DEFINE_ISR_STATS.

isr_session.detail.sec_lu_name
The secondary LU name of the session. This name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. The name consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and an LU name of 1–8 A-string characters. If this name is not available, all binary zeros are returned in this field. All binary zeros are always returned unless collection of names has been enabled using DEFINE_ISR_STATS.

isr_session.detail.pri_adj_cp_name
The primary stage adjacent CP name of this session. If the primary session traverses an RTP connection, the CP name of the remote RTP endpoint is returned. This name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. The name consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a CP name of 1–8 A-string characters. If this name is not available, all binary zeros are returned in this field. All binary zeros are always returned unless collection of names has been enabled using DEFINE_ISR_STATS.

isr_session.detail.sec_adj_cp_name
The secondary stage adjacent CP name of this session. If the secondary session traverses an RTP connection, the CP name of the remote RTP endpoint is returned. This name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. The name consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a CP name of 1–8 A-string characters. If this name is not available, all binary zeros are returned in this field. All binary zeros are always returned unless collection of names has been enabled using DEFINE_ISR_STATS.

isr_session_detail.rscv_len
Length of the RSCV which is appended to the `session_detail` structure. (If none is appended, then the length is zero.)

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
`AP_PARAMETER_CHECK`

secondary_rc
Possible values are:

AP_INVALID_FQPCID
The *list_options* parameter was set to `AP_LIST_INCLUSIVE` to list all entries starting from the supplied name, but the *pcid* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with `AP_PARAMETER_CHECK`, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node is not a network node, CS Linux returns the following parameters:

primary_rc

AP_INVALID_VERB
The local node is not a network node. This verb can be used only at a network node.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_KERNEL_MEMORY_LIMIT

This verb returns information about the amount of kernel memory that CS Linux is currently using, the maximum amount it has used, and the configured limit. This allows you to check memory usage and set the limit appropriately, to ensure that sufficient memory is available for CS Linux components and for other programs on the Linux computer.

You can specify the kernel memory limit when starting the CS Linux software (for more information, see the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*), or modify it later when the node is running (using the SET_KERNEL_MEMORY_LIMIT verb).

VCB Structure

```
typedef struct query_kernel_memory_limit
{
   AP_UINT16        opcode;           /* verb operation code               */
   unsigned char    reserv2;          /* reserved                          */
   unsigned char    format;           /* reserved                          */
   AP_UINT16        primary_rc;       /* primary return code               */
   AP_UINT32        secondary_rc;     /* secondary return code             */
   AP_UINT32        limit;            /* kernel memory limit, 0 => no limit */
   AP_UINT32        actual;           /* current amount of memory allocated */
   AP_UINT32        max_used;         /* maximum amount of memory allocated */
   unsigned char    reset_max_used;   /* set max_used = actual             */
   unsigned char    reserv3[8];       /* Reserved                          */
} QUERY_KERNEL_MEMORY_LIMIT;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_KERNEL_MEMORY_LIMIT

reset_max_used
Specify whether CS Linux should reset the *max_used* value (after returning it on this verb) to match the amount of memory currently allocated. This ensures that a subsequent QUERY_KERNEL_MEMORY_LIMIT verb will return the maximum amount used since this verb, rather than the maximum amount used since the system was started (or since the *max_used* value was last reset). Possible values are:

AP_YES Reset the *max_used* value to match the current memory allocation.

AP_NO Do not reset the *max_used* value.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

limit The maximum amount of kernel memory, in bytes, that CS Linux is permitted to use at any time. If a CS Linux component attempts to allocate kernel memory that would take the total amount of memory currently allocated to CS Linux components above this limit, the allocation attempt will fail. A value of zero indicates no limit.

actual The amount of kernel memory, in bytes, currently allocated to CS Linux components.

max_used
The maximum amount of kernel memory, in bytes, that has been allocated to CS Linux components at any time since the *max_used* parameter was last reset (as described for *reset_max_used* above), or since the CS Linux software was started.

reset_max_used
Specifies whether CS Linux resets the *max_used* value (after returning it on this command) to match the amount of memory currently allocated. This ensures that a subsequent QUERY_KERNEL_MEMORY_LIMIT verb will return the maximum amount used since this command was issued, rather than the maximum amount used since the system was started (or since the *max_used* value was last reset). Possible values are:

AP_YES CS Linux resets the *max_used* value to match the current memory allocation.

AP_NO CS Linux does not reset the *max_used* value.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_LOCAL_LU

QUERY_LOCAL_LU returns information about local LUs.

This verb can be used to obtain either summary or detailed information, about a specific LU or about multiple LUs, depending on the options used. It can also obtain information about the LU associated with the CP (the default LU).

VCB Structure

```
typedef struct query_local_lu
{
   AP_UINT16          opcode;              /* verb operation code          */
   unsigned char      reserv2;             /* reserved                     */
   unsigned char      format;              /* reserved                     */
   AP_UINT16          primary_rc;          /* primary return code          */
   AP_UINT32          secondary_rc;        /* secondary return code        */
   unsigned char      *buf_ptr;            /* pointer to buffer            */
   AP_UINT32          buf_size;            /* buffer size                  */
   AP_UINT32          total_buf_size;      /* total buffer size required   */
```

```
   AP_UINT16          num_entries;          /* number of entries           */
   AP_UINT16          total_num_entries;    /* total number of entries     */
   unsigned char      list_options;         /* listing options             */
   unsigned char      reserv3;              /* reserved                    */
   unsigned char      lu_name[8];           /* LU name                     */
   unsigned char      lu_alias[8];          /* LU alias                    */
   unsigned char      pu_name[8];           /* PU name filter              */
} QUERY_LOCAL_LU;

typedef struct local_lu_summary
{
   AP_UINT16          overlay_size;         /* size of returned entry      */
   unsigned char      lu_name[8];           /* LU name                     */
   unsigned char      lu_alias[8];          /* LU alias                    */
   unsigned char      description[32];      /* resource description        */
   unsigned char      reserv1[16];          /* reserved                    */
} LOCAL_LU_SUMMARY;

typedef struct local_lu_detail
{
   AP_UINT16          overlay_size;         /* size of returned entry      */
   unsigned char      lu_name[8];           /* LU name                     */
   LOCAL_LU_DEF_DATA  def_data;             /* defined data                */
   LOCAL_LU_DET_DATA  det_data;             /* determined data             */
} LOCAL_LU_DETAIL;

typedef struct local_lu_def_data
{
   unsigned char    description[32];       /* resource description        */
   unsigned char    reserv1;               /* reserved                    */
   unsigned char    security_list_name[14];   /* security access list name*/
   unsigned char    reserv3;               /* reserved                    */
   unsigned char    lu_alias[8];           /* local LU alias              */
   unsigned char    nau_address;           /* NAU address                 */
   unsigned char    syncpt_support;        /* is Syncpoint supported?     */
   AP_UINT16        lu_session_limit;      /* LU session limit            */
   unsigned char    default_pool;          /* is LU in the pool of default*/
                                           /*  LUs?                       */
   unsigned char    reserv2;               /* reserved                    */
   unsigned char    pu_name[8];            /* PU name                     */
   unsigned char    lu_attributes;         /* LU attributes               */
   unsigned char    sscp_id[6]             /* SSCP ID                     */
   unsigned char    disable;               /* disable or enable local LU  */
   ROUTING_DATA     attach_routing_data;   /* routing data for incoming   */
                                           /* attaches                    */
   unsigned char    reserv6;               /* reserved                    */
   unsigned char    reserv4[7];            /* reserved                    */
   unsigned char    reserv5[16];           /* reserved                    */
} LOCAL_LU_DEF_DATA;

typedef struct local_lu_det_data
{
   unsigned char      lu_sscp_sess_active;  /* Is LU-SSCP session active  */
   unsigned char      appl_conn_active;     /* reserved                   */
   unsigned char      reserv1[2];           /* reserved                   */
   SESSION_STATS      lu_sscp_stats;        /* LU-SSCP session statistics */
   unsigned char      sscp_id[6];           /* SSCP ID                    */
} LOCAL_LU_DET_DATA;

typedef struct session_stats
{
   AP_UINT16          rcv_ru_size;          /* session receive RU size    */
   AP_UINT16          send_ru_size;         /* session send Ru size       */
   AP_UINT16          max_send_btu_size;    /* max send BTU size          */
   AP_UINT16          max_rcv_btu_size;     /* max rcv BTU size           */
   AP_UINT16          max_send_pac_win;     /* max send pacing window size*/
   AP_UINT16          cur_send_pac_win;     /* current send pacing win size*/
   AP_UINT16          max_rcv_pac_win;      /* max receive pacing win size*/
   AP_UINT16          cur_rcv_pac_win;      /* current receive pacing     */
                                            /*  window size               */
```

```
   AP_UINT32          send_data_frames;      /* number of data frames sent   */
   AP_UINT32          send_fmd_data_frames;  /* num of fmd data frames sent  */
   AP_UINT32          send_data_bytes;       /* number of data bytes sent    */
   AP_UINT32          rcv_data_frames;       /* num data frames received     */
   AP_UINT32          rcv_fmd_data_frames;   /* num of fmd data frames recvd */
   AP_UINT32          rcv_data_bytes;        /* number of data bytes received*/
   unsigned char      sidh;                  /* session ID high byte         */
   unsigned char      sidl;                  /* session ID low byte          */
   unsigned char      odai;                  /* ODAI bit set                 */
   unsigned char      ls_name;               /* link station name            */
   unsigned char      pacing_type;           /* type of pacing in use        */
} SESSION_STATS;

typedef struct routing_data
{
   unsigned char      sys_name[128];         /* Name of target system for TP */
   AP_INT32           timeout;               /* timeout value in seconds     */
   unsigned char      back_level;            /* reserved                     */
   unsigned char      reserved[59];          /* reserved                     */
} ROUTING_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_LOCAL_LU

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of LUs for which data should be returned. To request data for a specific LU rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *lu_name* or *lu_alias* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *lu_name* or *lu_alias* parameter.

If AP_FIRST_IN_LIST is specified, you can also include the following option, using a logical OR operation:

AP_LIST_BY_ALIAS
The list is returned in order of LU alias rather than LU name. This option is only valid if AP_FIRST_IN_LIST is also specified. (For AP_LIST_FROM_NEXT or AP_LIST_INCLUSIVE, the list is in order of LU alias or LU name, depending on which was specified as the index into the list.)

For more information about how the application can obtain specific entries from the list, see "List Options For QUERY_* Verbs" on page 39. The list is in EBCDIC lexicographical order (irrespective of the length of each name).

lu_name
Fully qualified name of the LU for which information is required, or the name to be used as an index into the list of LUs. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. To identify the LU by its alias instead of its name, set this parameter to 8 binary zeros, and specify the alias in the *lu_alias* parameter; to identify the default LU, set both *lu_name* and *lu_alias* to 8 binary zeros.

The name is an 8-byte EBCDIC string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

lu_alias
LU alias of the LU for which information is required, or the name to be used as an index into the list of LUs. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST.

This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters. To identify the LU by its LU name instead of its alias, set this parameter to 8 binary zeros, and specify the name in the *lu_name* parameter; to identify the default LU, set both *lu_name* and *lu_alias* to 8 binary zeros.

pu_name
PU name filter. To return information only on LUs associated with a specific PU, specify the PU name; to return information without filtering on PU name, set this parameter to 8 binary zeros.

The name is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

local_lu_summary.overlay_size
The size of the returned `local_lu_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `local_lu_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

local_lu_summary.lu_name
LU name. This name is an 8-byte type-A EBCDIC character string.

local_lu_summary.lu_alias
LU alias. This is an 8-byte ASCII character string.

local_lu_summary.description
A null-terminated text string describing the local LU, as specified in the definition of the LU.

local_lu_detail.overlay_size
The size of the returned `local_lu_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `local_lu_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

local_lu_detail.lu_name
LU name. This name is an 8-byte type-A EBCDIC character string.

local_lu_detail.def_data.description
A null-terminated text string describing the local LU, as specified in the definition of the LU.

local_lu_detail.def_data.security_list_name
Name of the security access list used by this local LU (defined using the DEFINE_SECURITY_ACCESS_LIST verb). If this parameter is set to 14 binary zeros, the LU is available for use by any user.

local_lu_detail.def_data.lu_alias
LU alias. This is an 8-byte ASCII character string.

local_lu_detail.def_data.nau_address
Network accessible unit address of the LU. This is in the range 1–255 if the LU is a dependent LU, or zero if the LU is an independent LU.

local_lu_detail.def_data.syncpt_support
Specifies whether the LU supports Syncpoint functions. Possible values are:

AP_YES Syncpoint is supported.

AP_NO Syncpoint is not supported.

local_lu_detail.def_data.lu_session_limit
Maximum total number of sessions (across all modes) for the local LU. A value of zero indicates that there is no limit.

local_lu_detail.def_data.default_pool
Specifies whether the LU is in the pool of default dependent LUs. When an application attempts to start a conversation without specifying a local LU name, CS Linux will select an unused LU from this pool. Possible values are:

AP_YES The LU is in the pool of default LUs, and can be used by applications that do not specify an LU name.

AP_NO The LU is not in the pool.

If the LU is an independent LU, this parameter is reserved.

local_lu_detail.def_data.pu_name
For dependent LUs, this parameter identifies the PU that this LU will use. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if necessary. For independent LUs, this field is not used; it is set to 8 binary zeros.

local_lu_detail.def_data.lu_attributes
Configured LU attributes. Possible values are:

AP_NONE
No additional information identified.

AP_DISABLE_PWSUB
Disable password substitution support for the local LU. Password substitution means that passwords are encrypted before transmission between the local and remote LUs, rather than being sent as clear text. CS Linux normally uses password substitution if the remote system supports it.

This value is provided as a work-around for communications with some remote systems that do not implement password substitution correctly. If you use this option, you should be aware that this involves sending and receiving passwords in clear text (which may represent a security risk). The option should not be set unless there are problems with the remote system's implementation of password substitution.

local_lu_detail.def_data.sscp_id
Specifies the ID of the SSCP permitted to activate this LU. It is a 6-byte binary field. This parameter is used only by dependent LUs, and is set to all binary zeros for independent LUs or if the LU can be activated by any SSCP.

local_lu_detail.def_data.attach_routing_data.sys_name
The name of the target computer for incoming Allocate requests (requests from a partner TP to start an APPC or CPI-C conversation) that arrive at this local LU. This identifies the computer where the target TP runs.

If this parameter is set to binary zeros, CS Linux routes the incoming Allocate request dynamically to a running copy of the TP, if available, or attempts to start the TP on the same computer as the local LU.

local_lu_detail.def_data.attach_routing_data.timeout
The timeout value (in seconds) for dynamic load requests. A request will time out if the invoked TP has not issued a Receive_Allocate verb (APPC), or Accept_Conversation or Accept_Incoming (CPI-C), within this time. A value of -1 indicates no timeout (dynamic load requests will wait indefinitely).

The following parameters are used only for dependent LUs. For independent LUs, they are reserved (set to binary zeros); you can obtain the equivalent information by issuing the QUERY_SESSION verb for the appropriate session between this LU and the partner LU.

local_lu_detail.det_data.lu_sscp_session_active
Specifies whether the LU-SSCP session is active. Possible values are:

AP_YES The LU-SSCP session is active.

AP_NO The LU-SSCP session is not active.

local_lu_detail.det_data.lu_sscp_stats
Statistics for the LU-SSCP session.

local_lu_detail.det_data.lu_sscp_stats.rcv_ru_size
This parameter is always reserved.

local_lu_detail.det_data.lu_sscp_stats.send_ru_size
This parameter is always reserved.

local_lu_detail.det_data.lu_sscp_stats.max_send_btu_size
Maximum basic transmission unit (BTU) size that can be sent.

local_lu_detail.det_data.lu_sscp_stats.max_rcv_btu_size
Maximum BTU size that can be received.

local_lu_detail.det_data.lu_sscp_stats.max_send_pac_win
This parameter is always set to zero.

local_lu_detail.det_data.lu_sscp_stats.cur_send_pac_win
This parameter is always set to zero.

local_lu_detail.det_data.lu_sscp_stats.max_rcv_pac_win
This parameter is always set to zero.

local_lu_detail.det_data.lu_sscp_stats.cur_rcv_pac_win
This parameter is always set to zero.

local_lu_detail.det_data.lu_sscp_stats.send_data_frames
Number of normal flow data frames sent

local_lu_detail.det_data.lu_sscp_stats.send_fmd_data_frames
Number of normal flow function management data (FMD) frames sent.

local_lu_detail.det_data.lu_sscp_stats.send_data_bytes
Number of normal flow data bytes sent.

local_lu_detail.det_data.lu_sscp_stats.rcv_data_frames
Number of normal flow data frames received.

local_lu_detail.det_data.lu_sscp_stats.rcv_fmd_data_frames
Number of normal flow FMD data frames received.

local_lu_detail.det_data.lu_sscp_stats.rcv_data_bytes
Number of normal flow data bytes received.

local_lu_detail.det_data.lu_sscp_stats.sidh
Session ID high byte.

local_lu_detail.det_data.lu_sscp_stats.sidl
Session ID low byte.

local_lu_detail.det_data.lu_sscp_stats.odai
Origin Destination Assignor Indicator. When bringing up a session, the

sender of the ACTLU sets this parameter to zero if the local node contains the primary link station, and sets it to one if the ACTLU sender is the node containing the secondary link station.

local_lu_detail.det_data.lu_sscp_stats.ls_name
Link station name associated with the statistics This is an 8-byte string in a locally displayable character set. All eight bytes are significant. This parameter can be used to correlate this session with the link over which the session flows.

local_lu_detail.det_data.lu_sscp_stats.pacing_type
Receive pacing type in use on the LU-SSCP session. This parameter is set to AP_NONE.

local_lu_detail.det_data.sscp_id
This parameter is a 6-byte field containing the SSCP ID received in the ACTPU for the PU used by this LU.

This parameter is reserved if *lu_sscp_sess_active* is not set to AP_YES.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_ALIAS
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *lu_alias* parameter was not valid.

AP_INVALID_LU_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *lu_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_LOCAL_TOPOLOGY

All APPN nodes maintain a local topology database which holds information about the TGs to all adjacent nodes. QUERY_LOCAL_TOPOLOGY allows information about these TGs to be returned.

This verb can be used to obtain either summary or detailed information, about a specific TG or about multiple TGs, depending on the options used.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_local_topology
{
   AP_UINT16          opcode;                /* verb operation code         */
   unsigned char      reserv2;               /* reserved                    */
   unsigned char      format;                /* reserved                    */
   AP_UINT16          primary_rc;            /* primary return code         */
   AP_UINT32          secondary_rc;          /* secondary return code       */
   unsigned char      *buf_ptr;              /* pointer to buffer           */
   AP_UINT32          buf_size;              /* buffer size                 */
   AP_UINT32          total_buf_size;        /* total buffer size required  */
   AP_UINT16          num_entries;           /* number of entries           */
   AP_UINT16          total_num_entries;     /* total number of entries     */
   unsigned char      list_options;          /* listing options             */
   unsigned char      reserv3;               /* reserved                    */
   unsigned char      dest[17];              /* TG destination node         */
   unsigned char      dest_type;             /* TG destination node type    */
   unsigned char      tg_num;                /* TG number                   */
} QUERY_LOCAL_TOPOLOGY;

typedef struct local_topology_summary
{
   AP_UINT16          overlay_size;          /* size of returned entry      */
   unsigned char      dest[17];              /* TG destination node         */
   unsigned char      dest_type;             /* TG destination node type    */
   unsigned char      tg_num;                /* TG number                   */
} LOCAL_TOPOLOGY_SUMMARY;

typedef struct local_topology_detail
{
   AP_UINT16          overlay_size;          /* size of returned entry      */
   unsigned char      dest[17];              /* TG destination node         */
   unsigned char      dest_type;             /* TG destination node type    */
   unsigned char      tg_num;                /* TG number                   */
   unsigned char      reserv1;               /* reserved                    */
   LINK_ADDRESS       dlc_data;              /* DLC signalling data         */
   AP_UINT32          rsn;                   /* resource sequence number    */
   unsigned char      status;                /* tg status                   */
   TG_DEFINED_CHARS   tg_chars;              /* TG characteristics          */
   unsigned char      cp_cp_session_active;  /* CP-CP sessions active?      */
   unsigned char      branch_link_type;      /* Up or down link?            */
   unsigned char      branch_tg;             /* Branch TG?                  */
   unsigned char      appended_data_format;  /* Format of appended data     */
   unsigned char      appended_data_len;     /* Length of appended data     */
   unsigned char      reserva[11];           /* reserved                    */
} LOCAL_TOPOLOGY_DETAIL;

typedef struct link_address
{
  unsigned char   format;                /* type of link address          */
  unsigned char   reserve1;              /* reserved                      */
  AP_UINT16       length;                /* length                        */
  unsigned char   address[32];           /* address                       */
} LINK_ADDRESS;
```

For details of the TG_DEFINED_CHARS structure, see “DEFINE_LS” on page 117.

If the *list_options* parameter specifies detailed information, a TG Descriptor CV may be appended to the returned information. See the descriptions of the parameters *local_topology_detail.appended_data_format* and *local_topology_detail.appended_data_len* for more information.

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_LOCAL_TOPOLOGY

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of entries for which data should be returned. To request a specific entry rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of the *dest*, *dest_type*, and *tg_num* parameters.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of the *dest*, *dest_type*, and *tg_num* parameters.

The list is ordered by *dest*, then by *dest_type* (in the order AP_NETWORK_NODE, AP_END_NODE, AP_VRN), and lastly in numerical order of *tg_num*. For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

dest Fully qualified destination node name of the TG for which information is required, or the name to be used as an index into the list of TGs. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

dest_type
Node type of the destination node for this TG. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. Possible values are:

AP_NETWORK_NODE
Network node.

AP_VRN Virtual routing node.

AP_END_NODE
End node or LEN node.

AP_LEARN_NODE
Unknown node type.

tg_num
Number associated with the TG. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

local_topology_summary.overlay_size
The size of the returned local_topology_summary structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each local_topology_summary structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C sizeof() operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

local_topology_summary.dest
Fully qualified destination node name of the TG. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

local_topology_summary.dest_type
Node type of the destination node for this TG. This is one of the following:

AP_NETWORK_NODE
Network node.

AP_VRN Virtual routing node.

AP_END_NODE
End node or LEN node.

local_topology_summary.tg_num
Number associated with the TG.

local_topology_detail.overlay_size
The size of the returned `local_topology_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `local_topology_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

local_topology_detail.dest
Fully qualified destination node name of the TG. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

local_topology_detail.dest_type
Node type of the destination node for this TG. This is one of the following:

AP_NETWORK_NODE
Network node.

AP_VRN Virtual routing node.

AP_END_NODE
End node or LEN node.

local_topology_detail.tg_num
Number associated with the TG.

local_topology_detail.dlc_data.length
If *dest_type* is `AP_VRN`, this field specifies the length of the DLC address of the connection to the VRN. Otherwise, this field is not used and is set to zero.

local_topology_detail.dlc_data.address
If *dest_type* is `AP_VRN`, this field specifies the DLC address (in hexadecimal) of the connection to the VRN. The number of bytes in the address is given by the preceding field, length; the remaining bytes in the field are undefined. Otherwise, this field is not used.

For Token Ring or Ethernet, the address is in two parts: a 6-byte MAC address and a 1-byte local SAP address. The bit ordering of the MAC address may not be in the expected format; for information about converting between the two address formats, see "Bit Ordering in MAC Addresses" on page 141.

local_topology_detail.rsn
Resource Sequence Number. This is assigned by the network node that owns this resource.

local_topology_detail.status
Specifies the status of the TG. This may be one or more of the following, combined by a logical `OR` operation.

`AP_TG_OPERATIVE`

`AP_TG_CP_CP_SESSIONS`

`AP_TG_QUIESCING`

AP_TG_HPR

AP_TG_RTP

local_topology_detail.tg_chars
TG characteristics. For more information about these parameters, see "DEFINE_LS" on page 117.

local_topology_detail.cp_cp_session_active
Specifies whether the owning node's contention winner CP-CP session is active. Possible values are:

AP_YES The CP-CP session is active.

AP_NO The CP-CP session is not active.

AP_UNKNOWN
The CP-CP session status is unknown.

local_topology_detail.branch_link_type
This parameter applies only if the node is a Branch Network Node; it is reserved otherwise.

Specifies the branch link type of this TG. Possible values are:

AP_UPLINK
The TG is an uplink.

AP_DOWNLINK
The TG is a downlink to an End Node.

AP_DOWNLINK_TO_BRNN
The TG is a downlink to a Branch Network Node that appears as an End Node from the perspective of the local node.

AP_OTHERLINK
The TG is a link to a VRN.

local_topology_detail.branch_tg
This parameter applies only if the node is a Network Node; it is reserved otherwise.

Specifies whether the TG is a branch TG. Possible values are:

AP_YES The TG is a branch TG.

AP_NO The TG is not a branch TG.

AP_UNKNOWN
The TG type is unknown.

local_topology_detail.appended_data_format
Specifies the format of data appended to this NOF VCB structure.

If the parameter *local_topology_detail.appended_data_len* is set to a non-zero value, indicating that appended data is included, this parameter is set to the following value:

AP_TG_DESCRIPTOR_CV
The appended data contains a TG Descriptor CV, as defined by SNA Formats.

If *local_topology_detail.appended_data_len* is zero, indicating that no appended data is included, this parameter is reserved.

local_topology_detail.appended_data_len
Specifies the length of the TG Descriptor CV data appended to this NOF VCB structure. If this parameter is set to zero, no appended data is included.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_TG
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *tg_num* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_LOG_FILE

This verb allows the application to determine the name of the file that CS Linux uses to record audit, error, or usage log messages, the name of the backup log file, and the file size at which log information is copied to the backup file.

VCB Structure

```
typedef struct query_log_file
{
   AP_UINT16         opcode;                  /* verb operation code     */
   unsigned char     reserv2;                 /* reserved                */
   unsigned char     format;                  /* reserved                */
   AP_UINT16         primary_rc;              /* primary return code     */
   AP_UINT32         secondary_rc;            /* secondary return code   */
   unsigned char     log_file_type;           /* type of log file        */
   unsigned char     file_name[81];           /* file name               */
   unsigned char     backup_file_name[81];    /* backup file name        */
   AP_UINT32         file_size;               /* log file size           */
   unsigned char     succinct;                /* reserved                */
   unsigned char     reserv3[3];              /* reserved                */
} QUERY_LOG_FILE;
```

Supplied Parameters

opcode AP_QUERY_LOG_FILE

log_file_type
The type of log file being queried. Possible values are:

AP_AUDIT_FILE
Audit log file (audit messages only).

AP_ERROR_FILE
Error log file (problem and exception messages).

AP_USAGE_FILE
Usage log file (information on current and peak usage of CS Linux resources).

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

file_name
Name of the log file. This parameter is an ASCII string of 1–80 characters, followed by a null (0x00) character.

If no path is included, the file is stored in the default directory for diagnostics files, **/var/opt/ibm/sna**; if a path is included, this is either a full path (starting with a / character) or the path relative to the default directory.

backup_file_name
Name of the backup log file. This parameter is an ASCII string of 1–80 characters, followed by a null (0x00) character.

When the log file reaches the size specified by *file_size* below, CS Linux copies the current contents of the log file to this file and then clears the log file. You can also request a backup at any time using the SET_LOG_FILE verb.

If no path is included, the file is stored in the default directory for diagnostics files, **/var/opt/ibm/sna**; if a path is included, this is either a full path (starting with a / character) or the path relative to the default directory.

file_size
The maximum size of the log file specified by *log_file_type*. When a message written to the file causes the file size to exceed this limit, CS Linux clears the backup log file, copies the current contents of the log file to the backup log file, and then clears the log file. This means that the maximum amount of disk space taken up by log files is approximately twice the value of *file_size*.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_FILE_TYPE
The *log_file_type* parameter was not set to a valid value.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_LOG_TYPE

This verb allows a NOF application to determine the types of information that CS Linux records in log files on a particular server, and whether these are the default settings specified on SET_GLOBAL_LOG_TYPE or local settings specified by a previous SET_LOG_TYPE verb.

CS Linux logs messages for the following types of event:

Problem
An abnormal event that degrades the system in a way perceptible to a user (such as abnormal termination of a session).

Exception
An abnormal event that may degrade the system but that is not immediately perceptible to a user (such as receiving a message that is not valid from the remote system).

Audit A normal event (such as starting a session).

Problem and exception messages are logged to the error log file; audit messages are logged to the audit log file. Problem messages are always logged and cannot be disabled, but you can specify whether to log each of the other two message types. For each of the two files (audit and error), you can specify whether to use succinct logging (including only the text of the message and a summary of the message source) or full logging (including full details of the message source, cause, and any action required).

VCB Structure

```
typedef struct query_log_type
{
   AP_UINT16       opcode;           /* verb operation code               */
   unsigned char   reserv2;          /* reserved                          */
   unsigned char   format;           /* reserved                          */
   AP_UINT16       primary_rc;       /* primary return code               */
   AP_UINT32       secondary_rc;     /* secondary return code             */
   unsigned char   override;         /* overriding global settings?       */
   unsigned char   audit;            /* audit logging on or off           */
   unsigned char   exception;        /* exception logging on or off       */
   unsigned char   succinct_audits;  /* use succinct logging in audit file? */
   unsigned char   succinct_errors;  /* use succinct logging in error file? */
   unsigned char   reserv3[3];       /* reserved                          */
} QUERY_LOG_TYPE;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_LOG_TYPE

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

override
Specifies whether the log types and succinct or full logging options returned on this verb are the global log types specified on SET_GLOBAL_LOG_TYPE, or local values specified on SET_LOG_TYPE. Possible values are:

AP_YES The *audit*, *exception*, and *succinct_** parameters returned are local settings overriding the global settings.

AP_NO The *audit*, *exception*, and *succinct_** parameters returned are the global settings, which are not being overridden.

audit This parameter indicates whether audit messages are recorded. Possible values are:

AP_YES Audit messages are recorded.

AP_NO Audit messages are not recorded.

exception
This parameter indicates whether exception messages are recorded. Possible values are:

AP_YES Exception messages are recorded.

AP_NO Exception messages are not recorded.

succinct_audits
This parameter indicates whether succinct logging or full logging is used in the audit log file. Possible values are:

AP_YES Succinct logging: each message in the log file contains a summary of the message header information (such as the message number, log type, and system name) and the message text string and parameters. To obtain more details of the cause of the log and any action required, you can use the **snahelp** utility.

AP_NO Full logging: each message in the log file includes a full listing of the message header information, the message text string and parameters, and additional information about the cause of the log and any action required.

If you are using central logging, the choice of succinct or full logging for messages from all computers is determined by the setting of this parameter on the server acting as the central logger; this setting may either be from the SET_GLOBAL_LOG_TYPE verb, or from a SET_LOG_TYPE verb issued to that server to override the default.

succinct_errors
This parameter indicates whether succinct logging or full logging is used in the error log file; this applies to both exception logs and problem logs. The possible values and their meanings are the same as for the *succinct_audits* parameter.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_LS

QUERY_LS returns a list of information about the link stations defined at the node. This information is structured as “determined data” (data gathered dynamically during execution, returned only if the node is active) and “defined data” (data supplied on DEFINE_LS).

This verb can be used to obtain either summary or detailed information, about a specific LS or about multiple LSs, depending on the options used.

VCB Structure

```
typedef struct query_ls
{
   AP_UINT16        opcode;                 /* verb operation code          */
   unsigned char    reserv2;                /* reserved                     */
   unsigned char    format;                 /* reserved                     */
   AP_UINT16        primary_rc;             /* Primary return code          */
   AP_UINT32        secondary_rc;           /* Secondary return code        */
   unsigned char    *buf_ptr;               /* pointer to buffer            */
   AP_UINT32        buf_size;               /* buffer size                  */
   AP_UINT32        total_buf_size;         /* total buffer size required   */
   AP_UINT16        num_entries;            /* number of entries            */
   AP_UINT16        total_num_entries;      /* total number of entries      */
   unsigned char    list_options;           /* listing options              */
   unsigned char    reserv3;                /* reserved                     */
   unsigned char    ls_name[8];             /* name of link station         */
   unsigned char    port_name[8];           /* port used by link station    */
} QUERY_LS;

typedef struct ls_summary
{
   AP_UINT16        overlay_size;           /* size of returned entry       */
   unsigned char    ls_name[8];             /* link station name            */
   unsigned char    description[32];        /* resource description         */
   unsigned char    reserv1[16];            /* reserved                     */
   unsigned char    dlc_type;               /* DLC type                     */
   unsigned char    state;                  /* link station state           */
   AP_UINT16        act_sess_count;         /* currently active sessions    */
                                            /*  count                       */
   unsigned char    det_adj_cp_name[17];    /* determined adjacent CP name  */
   unsigned char    det_adj_cp_type;        /* determined adjacent node type*/
   unsigned char    port_name[8];           /* port name                    */
   unsigned char    adj_cp_name[17];        /* adjacent CP name             */
   unsigned char    adj_cp_type;            /* adjacent node type           */
} LS_SUMMARY;

typedef struct ls_detail
{
   AP_UINT16        overlay_size;           /* size of returned entry       */
   unsigned char    ls_name[8];             /* link station name            */
   LS_DET_DATA      det_data;               /* determined data              */
   LS_DEF_DATA      def_data;               /* defined data                 */
} LS_DETAIL;

typedef struct ls_det_data
{
   AP_UINT16        act_sess_count;         /* currently active sessions    */
                                            /*  count                       */
   unsigned char    dlc_type;               /* DLC type                     */
   unsigned char    state;                  /* link station state           */
   unsigned char    sub_state;              /* link station sub state       */
   unsigned char    det_adj_cp_name[17];    /* adjacent CP name             */
   unsigned char    det_adj_cp_type;        /* adjacent node type           */
   unsigned char    dlc_name[8];            /* name of DLC                  */
   unsigned char    dynamic;                /* specifies whether LS is      */
                                            /*  dynamic                     */
```

```
   unsigned char    migration;              /* supports migration partners  */
   unsigned char    tg_num;                 /* TG number                    */
   LS_STATS         ls_stats;               /* link station statistics      */
   AP_UINT32        start_time;             /* time LS started              */
   AP_UINT32        stop_time;              /* time LS stopped              */
   AP_UINT32        up_time;                /* total time LS active         */
   AP_UINT32        current_state_time;     /* time in current state        */
   unsigned char    deact_cause;            /* deactivation cause           */
   unsigned char    hpr_support;            /* TG HPR support               */
   unsigned char    anr_label[2];           /* local ANR label              */
   unsigned char    hpr_link_lvl_error;     /* HPR link-level error         */
   unsigned char    auto_act;               /* auto-activation supported    */
   unsigned char    ls_role;                /* LS role                      */
   unsigned char    ls_type;                /* LS type (defined,dynamic,..) */
   unsigned char    node_id[4];             /* determined node ID           */
   AP_UINT16        active_isr_count;       /* active isr count             */
   AP_UINT16        active_lu_sess_count;   /* count of active LU sessions  */
   AP_UINT16        active_sscp_sess_count; /* count of active SSCP sessions*/
   ANR_LABEL        reverse_anr_label;      /* Reverse ANR label            */
   LINK_ADDRESS     local_address;          /* Local address                */
   AP_UINT16        max_send_btu_size;      /* Max send BTU size            */
   unsigned char    brnn_link_type;         /* type of branch link          */
   unsigned char    adj_cp_is_brnn;         /* is adjacent node a BrNN?     */
   unsigned char    mltg_member;            /* reserved                     */
   unsigned char    tg_sharing;             /* reserved                     */
   unsigned char    reservb[62];            /* reserved                     */
} LS_DET_DATA;

typedef struct ls_def_data
{
   unsigned char    description[32];        /* resource description         */
   unsigned char    initially_active;       /* is this LS initially active? */
   unsigned char    reserv2;                /* reserved                     */
   AP_UINT16        react_timer;            /* timer for retrying failed LS */
   AP_UINT16        react_timer_retry;      /* retry count for failed LS    */
   AP_UINT16        activation_count;       /* reserved                     */
   unsigned char    restart_on_normal_deact; /* restart the link on any     */
                                            /* failure                      */
   unsigned char    reserv3[7];             /* reserved                     */
   unsigned char    port_name[8];           /* name of associated port      */
   unsigned char    adj_cp_name[17];        /* adjacent CP name             */
   unsigned char    adj_cp_type;            /* adjacent node type           */
   LINK_ADDRESS     dest_address;           /* destination address          */
   unsigned char    auto_act_supp;          /* auto-activate supported      */
   unsigned char    tg_number;              /* pre-assigned TG number       */
   unsigned char    limited_resource;       /* limited resource             */
   unsigned char    solicit_sscp_sessions;  /* solicit SSCP sessions        */
   unsigned char    pu_name[8];             /* Local PU name (reserved if   */
                                            /*  solicit_sscp_sessions is    */
                                            /*  set to AP_NO)               */
   unsigned char    disable_remote_act;     /* disable remote activation    */
   unsigned char    dspu_services;          /* Services provided for        */
                                            /*  downstream PU               */
   unsigned char    dspu_name[8];           /* Downstream PU name (reserved */
                                            /*  if dspu_services is AP_NONE)*/
   unsigned char    dlus_name[17];          /* DLUS name if dspu_services   */
                                            /*  is AP_DLUR                  */
   unsigned char    bkup_dlus_name[17];     /* Backup DLUS name if          */
                                            /*  dspu_services is AP_DLUR    */
   unsigned char    hpr_supported;          /* does the link support HPR?   */
   unsigned char    hpr_link_lvl_error;     /* does link use link-level     */
                                            /*  recovery for HPR frames?    */
   AP_UINT16        link_deact_timer;       /* deact timer for limited      */
                                            /*  resource                    */
   unsigned char    reserv1;                /* reserved                     */
   unsigned char    default_nn_server;      /* default LS to NN server?     */
   unsigned char    ls_attributes[4];       /* LS attributes                */
   unsigned char    adj_node_id[4];         /* adjacent node ID             */
```

```
   unsigned char    local_node_id[4];        /* local node ID               */
   unsigned char    cp_cp_sess_support;      /* CP-CP session support       */
   unsigned char    use_default_tg_chars;    /* Use default tg_chars        */
   TG_DEFINED_CHARS tg_chars;                /* TG characteristics          */
   AP_UINT16        target_pacing_count;     /* target pacing count         */
   AP_UINT16        max_send_btu_size;       /* maximum send BTU size       */
   AP_UINT16        ls_role;                 /* link station role           */
   unsigned char    max_ifrm_rcvd;           /* no. before acknowledgment   */
   AP_UINT16        dlus_retry_timeout;      /* seconds to recontact a DLUS */
   AP_UINT16        dlus_retry_limit;        /* attempts to recontact a DLUS */
   unsigned char   conventional_lu_compression; /* compression for LU 0-3?  */
   unsigned char    conventional_lu_cryptography; /* reserved               */
   unsigned char    reserv3a;                 /* reserved                   */
   unsigned char    retry_flags;              /* reserved                   */
   AP_UINT16        max_activation_attempts;  /* reserved                   */
   AP_UINT16        activation_delay_timer;   /* reserved                   */
   unsigned char    branch_link_type;         /* is link an up or down link */
   unsigned char    adj_brnn_cp_support;      /* adj CP allowed to be BrNN? */
   unsigned char    mltg_pacing_algorithm;    /* reserved                   */
   unsigned char    reserv5;                  /* reserved                   */
   AP_UINT16        max_rcv_btu_size;         /* reserved                   */
   unsigned char    tg_sharing_prohibited;    /* reserved                   */
   unsigned char    link_spec_data_format;    /* reserved                   */
   unsigned char    pu_can_send_dddlu_offline;  /* does the PU send NMVT    */
                                                /*  (power off) to the host? */
   unsigned char    reserv4[13];             /* reserved                    */
   AP_UINT16        link_spec_data_len;      /* length of link specific data */
} LS_DEF_DATA;

typedef struct link_address
{
  unsigned char   format;                 /* type of link address          */
  unsigned char   reserve1;               /* reserved                      */
  AP_UINT16       length;                 /* length                        */
  unsigned char   address[32];            /* address                       */
} LINK_ADDRESS;
```

For Token Ring or Ethernet, the *address* parameter in the `link_address` structure is replaced by the following:

```
typedef struct tr_address
{
   unsigned char    mac_address[6];          /* MAC address                 */
   unsigned char    lsap_address;            /* local SAP address           */
} TR_ADDRESS;
```

For Enterprise Extender (HPR/IP), the *address* parameter in the `link_address` structure is replaced by the following:

```
typedef struct ip_address_info
{
  unsigned char lsap;                      /* Local Service Access Point addr */
  unsigned char version;                   /* IPv4 or IPv6                    */
  unsigned char address[272];              /* IP Address or hostname          */

} IP_ADDRESS_INFO;
```

For multipath channel (MPC) or MPC+, the *address* parameter in the `link_address` structure is replaced by the following:

```
typedef unsigned char GDLC_MPC_ADDRESS[20];
```

For all link types:

```
typedef struct tg_defined_chars
{
   unsigned char    effect_cap;              /* Effective capacity          */
   unsigned char    reserve1[5];             /* Reserved                    */
```

```
   unsigned char    connect_cost;           /* Connection Cost             */
   unsigned char    byte_cost;              /* Byte cost                   */
   unsigned char    reserve2;               /* Reserved                    */
   unsigned char    security;               /* Security                    */
   unsigned char    prop_delay;             /* Propagation delay           */
   unsigned char    modem_class;            /* reserved                    */
   unsigned char    user_def_parm_1;        /* User-defined parameter 1    */
   unsigned char    user_def_parm_2;        /* User-defined parameter 2    */
   unsigned char    user_def_parm_3;        /* User-defined parameter 3    */
} TG_DEFINED_CHARS;

typedef struct ls_stats
{
   AP_UINT32       in_xid_bytes;         /* number of XID bytes received     */
   AP_UINT32       in_msg_bytes;         /* number of message bytes received */
   AP_UINT32       in_xid_frames;        /* number of XID frames received    */
   AP_UINT32       in_msg_frames;        /* number of message frames received*/
   AP_UINT32       out_xid_bytes;        /* number of XID bytes sent         */
   AP_UINT32       out_msg_bytes;        /* number of message bytes sent     */
   AP_UINT32       out_xid_frames;       /* number of XID frames sent        */
   AP_UINT32       out_msg_frames;       /* number of message frames sent    */
   AP_UINT32       in_invalid_sna_frames;       /* number of invalid frames  */
                                                /*  received                 */
   AP_UINT32       in_session_control_frames;   /* number of control frames  */
                                                /*  received                 */
   AP_UINT32       out_session_control_frames;  /* number of control frames  */
                                                /*  sent                     */
   AP_UINT32       echo_rsps;           /* reserved                          */
   AP_UINT32       current_delay;       /* reserved                          */
   AP_UINT32       max_delay;           /* reserved                          */
   AP_UINT32       min_delay;           /* reserved                          */
   AP_UINT32       max_delay_time;      /* reserved                          */
   AP_UINT32       good_xids;           /* successful XID on LS count        */
   AP_UINT32       bad_xids;            /* unsuccessful XID on LS count      */
} LS_STATS;
```

For more details of the link-specific data, see "DEFINE_LS" on page 117. The data structure for this data follows the `ls_def_data` structure, but is padded to start on a 4-byte boundary.

Supplied Parameters

The application supplies the following parameters:

opcode `AP_QUERY_LS`

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of LSs for which data should be returned. To request data for a specific LS rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *ls_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *ls_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

ls_name
Link station name. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST.

port_name
Port name filter. To return information only on LSs associated with a specific port, specify the name of the port. This is an 8-byte ASCII string), padded on the right with spaces if the name is shorter than 8 characters. To return information about all LSs without filtering on the port name, set this parameter to 8 binary zeros.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

ls_summary.overlay_size
The size of the returned ls_summary structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each ls_summary structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C sizeof() operator. This is because the size of the returned overlay may increase in

future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

ls_summary.ls_name
Link station name. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters.

ls_summary.description
A null-terminated text string describing the LS, as specified in the definition of the LS.

ls_summary.dlc_type
Type of DLC. This is one of the following:

AP_SDLC
SDLC

AP_X25 QLLC

AP_TR Token Ring

AP_ETHERNET
Ethernet

AP_MPC Multipath Channel (MPC), CS Linux for System z only

AP_IP Enterprise Extender (HPR/IP)

ls_summary.state
State of this link station. This is one of the following:

AP_ACTIVE
The LS is active.

AP_NOT_ACTIVE
The LS is not active.

AP_PENDING_ACTIVE
The LS is being activated.

AP_PENDING_INACTIVE
The LS is being deactivated.

AP_PENDING_ACTIVE_BY_LR
The LS has failed (or an attempt to activate it has failed), and CS Linux is attempting to reactivate it.

ls_summary.act_sess_count
The total number of active sessions (both endpoint and intermediate) using the link.

ls_summary.det_adj_cp_name
Fully qualified name of the adjacent control point. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

This name is normally determined during activation; it is null if the LS is inactive. However, for an LS to a back-level LEN node (specified by the *adj_cp_type* parameter on DEFINE_LS), this name is taken from the LS definition and is not determined during activation.

ls_summary.det_adj_cp_type
Type of the adjacent node. This is one of the following:

AP_APPN_NODE
Node type is unknown, or LS is inactive.

AP_END_NODE
End node, Branch Network Node acting as an End Node from the local node's perspective, or up-level LEN node (one that includes the Network Name CV in its XID3).

AP_NETWORK_NODE
Network node, or Branch Network Node acting as a Network Node from the local node's perspective.

AP_VRN Virtual routing node.

The node type is normally determined during activation; it is null if the LS is inactive. However, for an LS to a back-level LEN node (specified by the *adj_cp_type* parameter on DEFINE_LS), the node type is taken from the LS definition and is not determined during activation.

ls_summary.port_name
Name of the port associated with this link station. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters.

ls_summary.adj_cp_name
Fully qualified name of the adjacent control point; this parameter is null for an implicit link. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

ls_summary.adj_cp_type
Type of the adjacent node, determined during link activation. This is one of the following:

AP_APPN_NODE
Node type is unknown, or LS is inactive.

AP_END_NODE
End node, Branch Network Node acting as an End Node from the local node's perspective, or up-level LEN node (one that includes the Network Name CV in its XID3).

AP_NETWORK_NODE
Network node, or Branch Network Node acting as a Network Node from the local node's perspective.

AP_BACK_LEVEL_LEN_NODE
Back-level LEN node (one that does not include the Network Name CV in its XID3).

AP_HOST_XID3
Host node; CS Linux should respond to a polling XID from the node with a format 3 XID.

AP_HOST_XID0
Host node; CS Linux should respond to a polling XID from the node with a format 0 XID.

AP_DSPU_XID
Downstream PU; CS Linux should include XID exchange in link activation. The *dspu_name* and *dspu_services* fields must also be set.

AP_DSPU_NOXID
Downstream PU; CS Linux should not include XID exchange in link activation. The *dspu_name* and *dspu_services* fields must also be set.

AP_VRN Virtual routing node.

ls_detail.overlay_size
The size of the returned `ls_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `ls_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

ls_detail.ls_name
Link station name. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters.

ls_detail.det_data.act_sess_count
The total number of active sessions (both endpoint and intermediate) using the link.

ls_detail.det_data.dlc_type
Type of DLC. This is one of the following:

AP_SDLC
SDLC

AP_X25 QLLC

AP_TR Token Ring

AP_ETHERNET
Ethernet

AP_MPC Multipath Channel (MPC), CS Linux for System z only

AP_IP Enterprise Extender (HPR/IP)

ls_detail.det_data.state
State of this link station. This is one of the following:

AP_ACTIVE
The LS is active.

AP_NOT_ACTIVE
The LS is not active.

AP_PENDING_ACTIVE
The LS is being activated.

AP_PENDING_INACTIVE
The LS is being deactivated.

AP_PENDING_ACTIVE_BY_LR
The LS has failed (or an attempt to activate it has failed), and CS Linux is attempting to reactivate it.

ls_detail.det_data.sub_state
This field provides more detailed information about the state of this link station. Possible values are:

AP_SENT_CONNECT_OUT

AP_PENDING_XID_EXCHANGE

AP_SENT_ACTIVATE_AS

AP_SENT_SET_MODE

AP_ACTIVE

AP_SENT_DEACTIVATE_AS_ORDERLY

AP_SENT_DISCONNECT

AP_WAITING_STATS

AP_RESET

ls_detail.det_data.det_adj_cp_name
Fully qualified name of the adjacent control point. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

This name is normally determined during activation; it is null if the LS is inactive. However, for an LS to a back-level LEN node (specified by the *adj_cp_type* parameter on DEFINE_LS), this name is taken from the LS definition and is not determined during activation.

ls_detail.det_data.det_adj_cp_type
Type of the adjacent node. This is one of the following:

AP_END_NODE
End node, or Branch Network Node acting as an End Node from the local node's perspective.

AP_NETWORK_NODE
Network node, or Branch Network Node acting as a Network Node from the local node's perspective.

AP_LEARN_NODE
Node type is unknown.

The node type is normally determined during activation; it is null if the LS is inactive. However, for an LS to a back-level LEN node (specified by the *adj_cp_type* parameter on DEFINE_LS), the node type is taken from the LS definition and is not determined during activation.

ls_detail.det_data.dlc_name
Name of the DLC. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters.

ls_detail.det_data.dynamic
Specifies whether the link was defined dynamically. Possible values are:

AP_YES The link was defined dynamically (in response to a connection request from the adjacent node, or to connect dynamically to another node across a Connection Network).

AP_NO The link was defined explicitly (by DEFINE_LS).

ls_detail.det_data.migration
Specifies whether the adjacent node is a migration level node (such as a Low Entry Networking or LEN node), or a full APPN network node or end node. Possible values are:

AP_YES The adjacent node is a migration-level node.

AP_NO The adjacent node is a network node or end node.

AP_UNKNOWN
The adjacent node level is unknown.

ls_detail.det_data.tg_num
Number associated with the TG.

ls_detail.det_data.ls_stats.in_xid_bytes
Total number of XID (Exchange Identification) bytes received on this link station.

ls_detail.det_data.ls_stats.in_msg_bytes
Total number of data bytes received on this link station.

ls_detail.det_data.ls_stats.in_xid_frames
Total number of XID (Exchange Identification) frames received on this link station.

ls_detail.det_data.ls_stats.in_msg_frames
Total number of data frames received on this link station.

ls_detail.det_data.ls_stats.out_xid_bytes
Total number of XID (Exchange Identification) bytes sent on this link station.

ls_detail.det_data.ls_stats.out_msg_bytes
Total number of data bytes sent on this link station.

ls_detail.det_data.ls_stats.out_xid_frames
Total number of XID (Exchange Identification) frames sent on this link station.

ls_detail.det_data.ls_stats.out_msg_frames
Total number of data frames sent on this link station.

ls_detail.det_data.ls_stats.in_invalid_sna_frames
Total number of not valid SNA frames received on this link station.

ls_detail.det_data.ls_stats.in_session_control_frames
Total number of session control frames received on this link station.

ls_detail.det_data.ls_stats.out_session_control_frames
Total number of session control frames sent on this link station.

ls_detail.det_data.ls_stats.good_xids
Total number of successful XID exchanges that have occurred on this link station since it was started.

ls_detail.det_data.ls_stats.bad_xids
Total number of unsuccessful XID exchanges that have occurred on this link station since it was started.

ls_detail.det_data.start_time
Time since system startup (in hundredths of a second) when the link station was last activated (that is, when the mode setting commands completed).

ls_detail.det_data.stop_time
Time since system startup (in hundredths of a second) when the link station was last deactivated.

ls_detail.det_data.up_time
Total time (in hundredths of a second) that this link station has been active since system startup.

ls_detail.det_data.current_state_time
Total time (in hundredths of a second) that this link station has been in its current state.

ls_detail.det_data.deact_cause
The cause of the last deactivation of the link station. Possible values are:

AP_NONE
The link station has never been deactivated.

AP_DEACT_OPER_ORDERLY
The link station was deactivated as a result of an orderly STOP command from an operator.

AP_DEACT_OPER_IMMEDIATE
The link station was deactivated as a result of an immediate STOP command from an operator.

AP_DEACT_AUTOMATIC
The link station was deactivated automatically, for example because there were no more sessions using the link station.

AP_DEACT_FAILURE
The link station was deactivated because of a failure.

ls_detail.det_data.hpr_support
Level of High Performance Routing (HPR) supported on this transmission group (TG), taking account of the capabilities of the local and adjacent nodes. Possible values are:

AP_NONE
This TG does not support HPR protocols.

AP_BASE
This TG supports base level HPR.

AP_RTP This TG supports Rapid Transport Protocols (RTP).

ls_detail.det_data.anr_label
The HPR automatic network routing (ANR) label allocated to the local link.

ls_detail.det_data.hpr_link_lvl_error
For SDLC, this parameter is reserved.

For other port types, this parameter specifies whether link-level error recovery is being used for HPR traffic on the link.

ls_detail.det_data.auto_act
Specifies whether the link currently allows remote activation or activation on demand. This is set to AP_NONE if neither is allowed, or to one or both of the following values (combined using a logical OR):

AP_AUTO_ACT
The link can be activated on demand by the local node when a session requires it.

AP_REMOTE_ACT
The link can be activated by the remote node.

ls_detail.det_data.ls_role
The LS role of this link. This is normally taken from the definition of the

port that owns the LS (or from the definition of the LS, if this overrides the LS role in the port definition). However, if the LS role is defined to be negotiable, it will be negotiated to either primary or secondary while the LS is active; if this verb is used to query an active LS, the returned LS role is the negotiated role currently in use and not the defined role. Possible values are:

AP_LS_PRI
Primary.

AP_LS_SEC
Secondary.

AP_LS_NEG
Negotiable.

ls_detail.det_data.ls_type
Specifies how this link was defined or discovered. Possible values are:

AP_LS_DEFINED
The link station was defined explicitly by a CS Linux administration program.

AP_LS_DYNAMIC
The link station was created when the local node connected to another node through a connection network.

AP_LS_TEMPORARY
The link station was created temporarily to process an incoming call, but has not yet become active.

AP_LS_IMPLICIT
The link station was defined implicitly when CS Linux received an incoming call that it could not match to a defined link station.

AP_LS_DLUS_DEFINED
The link station is a dynamic link station to a DLUR-served downstream PU, and was defined when the local node received an ACTPU from a DLUS.

ls_detail.det_data.node_id
Node ID received from adjacent node during XID exchange. This is a 4-byte hexadecimal string.

ls_detail.det_data.active_isr_count
Number of active intermediate sessions using the link.

ls_detail.det_data.active_lu_sess_count
The count of active LU-LU sessions using this link.

ls_detail.det_data.active_sscp_sess_count
The count of active PU-SSCP sessions using this link.

ls_detail.det_data.reverse_anr_label
The Reverse Automatic Network Routing (ANR) label for this link station.

For SDLC:

ls_detail.det_data.local_address
The local address of this link station.

For QLLC:

ls_detail.det_data.local_address
The local address of this link station.

For Token Ring, Ethernet:

ls_detail.det_data.local_address.mac_address
MAC address of the local link station.

ls_detail.det_data.local_address.lsap_address
Local SAP address of the local link station.

For Enterprise Extender:

ls_detail.det_data.local_address.ip_address_info.lsap
For Enterprise Extender: Local SAP address of the port. Specify a multiple of `0x04` in the range `0x04`–`0xEC`. The usual value is `0x04`, but VTAM may use `0x08` in some circumstances.

If you need to use two or more ports with different LSAP addresses on the same TCP/IP interface, you will need to create two or more Enterprise Extender DLCs, and then create a separate Enterprise Extender port for each DLC with the same *if_name* but a different LSAP address.

ls_detail.det_data.local_address.ip_address_info.version
For Enterprise Extender: Specifies whether the following field represents an IPv4 or IPv6 address. Possible values:

IP_VERSION_4_HOSTNAME
The *address* field specifies an IPv4 address, or a hostname or alias that resolves to an IPv4 address.

IP_VERSION_6_HOSTNAME
The *address* field specifies an IPv6 address, or a hostname or alias that resolves to an IPv6 address.

ls_detail.det_data.local_address.ip_address_info.address
For Enterprise Extender: IP address of the port. This can be any of the following.

- An IPv4 dotted-decimal address (such as `193.1.11.100`).
- An IPv6 colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).
- A name (such as `newbox.this.co.uk`).
- An alias (such as `newbox`).

For multipath channel (MPC), CS Linux for System z only:

ls_detail.det_data.local_address.address
This parameter is reserved.

ls_detail.det_data.max_send_btu_size
Maximum BTU size that can be sent on this link, as determined by negotiation with the adjacent node. If the link activation has not yet been attempted, a zero value is returned.

ls_detail.det_data.brnn_link_type
This parameter applies only if the local node is a Branch Network Node; it is reserved otherwise.

Specifies the branch link type of this link. Possible values are:

AP_UPLINK
The link is an uplink.

AP_DOWNLINK
The link is a downlink.

AP_OTHERLINK
The link is to a VRN.

AP_UNKNOWN_LINK_TYPE
The branch link type is unknown.

AP_BRNN_NOT_SUPPORTED
The link supports PU 2.0 traffic only.

ls_detail.det_data.adj_cp_is_brnn
Specifies whether the adjacent node is a Branch Network Node. Possible values are:

AP_YES The adjacent node is a Branch Network Node.

AP_NO The adjacent node is not a Branch Network Node.

AP_UNKNOWN
The adjacent node type is unknown.

ls_detail.def_data.description
A null-terminated text string describing the LS, as specified in the definition of the LS.

ls_detail.def_data.initially_active
Specifies whether this LS is automatically started when the node is started. Possible values are:

AP_YES The LS is automatically started when the node is started.

AP_NO The LS is not automatically started; it must be started manually.

ls_detail.def_data.react_timer
Reactivation timer for reactivating a failed LS. If the *react_timer_retry* parameter below is nonzero, to specify that CS Linux should retry activating the LS if it fails, this parameter specifies the time in seconds between retries. When the LS fails, or when an attempt to reactivate it fails, CS Linux waits for the specified time before retrying the activation. If *react_timer_retry* is zero, this parameter is ignored.

ls_detail.def_data.react_timer_retry
Retry count for reactivating a failed LS. This parameter is used to specify whether CS Linux should attempt to reactivate the LS if it fails while in use (or if an attempt to start the LS fails).

Zero indicates that CS Linux should not attempt to reactivate the LS; a nonzero value specifies the number of retries to be made. A value of `65,535` indicates that CS Linux should retry indefinitely until the LS is activated.

CS Linux waits for the time specified by the *react_timer* parameter above between successive retries. If the retry count is reached without successfully reactivating the LS, or if a STOP_LS is issued while CS Linux is retrying the activation, no further retries are made; the LS remains inactive unless START_LS is issued for it.

If the *auto_act_supp* parameter is set to AP_YES, the reactivation timer fields are ignored; if the link fails, CS Linux does not attempt to reactivate it until the user application that was using the session attempts to restart the session.

ls_detail.def_data.restart_on_normal_deact
Specifies whether CS Linux should attempt to reactivate the LS if it is deactivated normally by the remote system. Possible values are:

AP_YES If the remote system deactivates the LS normally, CS Linux attempts to reactivate it, using the same retry timer and count values as for reactivating a failed LS (the *react_timer* and *react_timer_retry* parameters above).

AP_NO If the remote system deactivates the LS normally, CS Linux does not attempt to reactivate it.

If the LS is a host link (specified by the *adj_cp_type* parameter), or is automatically started when the node is started (the *initially_active* parameter is set to AP_YES), this parameter is ignored; CS Linux always attempts to reactivate the LS if it is deactivated normally by the remote system (unless *react_timer_retry* is zero).

ls_detail.def_data.port_name
Name of the port associated with this link station. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters. If the link is to a VRN, this field specifies the name of the actual port used to connect to the VRN (as specified in the DEFINE_CN verb).

ls_detail.def_data.adj_cp_name
Fully qualified name of the adjacent control point. This parameter is used only if *adj_cp_type* specifies that the adjacent node is an APPN node or a back-level LEN node.

The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

ls_detail.def_data.adj_cp_type
Adjacent node type. This is one of the following:

AP_APPN_NODE
APPN-capable node; the node type will be learned during XID exchange.

AP_NETWORK_NODE
Network node, or Branch Network Node acting as a Network Node from the local node's perspective.

AP_END_NODE
End node, Branch Network Node acting as an End Node from the local node's perspective, or up-level LEN node (one that includes the Network Name CV in its XID3).

AP_BACK_LEVEL_LEN_NODE
Back-level LEN node (one that does not include the Network Name CV in its XID3).

AP_HOST_XID3
Host node; CS Linux responds to a polling XID from the node with a format 3 XID.

AP_HOST_XID0
Host node; CS Linux responds to a polling XID from the node with a format 0 XID.

AP_DSPU_XID
Downstream PU; CS Linux includes XID exchange in link activation.

AP_DSPU_NOXID
Downstream PU; CS Linux does not include XID exchange in link activation.

For SDLC:

ls_detail.def_data.dest_address
Address of the secondary link station.

The value of this parameter depends on how the port that owns this LS is configured, as follows:

- If the port is used only for incoming calls (*out_link_act_lim* on DEFINE_PORT is `0`), this parameter is reserved.
- If the port is switched primary and is used for outgoing calls (*port_type* is `PORT_SWITCHED`, *ls_role* is `LS_PRI`, and *out_link_act_lim* on DEFINE_PORT is a nonzero value), this parameter is set to either `0xFF` to accept whatever address is configured at the secondary station, or to a 1-byte value in the range `0x01`–`0xFE` (this value must match the value configured at the secondary station).
- For all other port configurations, this parameter is set to a 1-byte value in the range `0x01`–`0xFE` to identify the link station. If the port is primary multi-drop (*ls_role* on DEFINE_PORT is `LS_PRI` and *tot_link_act_lim* is greater than 1), this address must be different for each LS on the port.

For QLLC:

ls_detail.def_data.dest_address
Destination address of link station on the adjacent node. This parameter is used only for SVC outgoing calls (defined by the *vc_type* parameter in the link-specific data, and by the link activation limit parameters on DEFINE_PORT); it is ignored for incoming calls or for PVC.

For Token Ring, Ethernet:

ls_detail.def_data.dest_address.mac_address
MAC address of link station on adjacent node.

If this parameter is null, the LS is a non-selective listening LS (one that can be used only for incoming calls, but can have LUs defined on it to support dependent LU traffic). The LS can be used to receive incoming calls from any remote link station, but cannot be used for outgoing calls.

If the local and adjacent nodes are on LANs of different types (one Token Ring, the other Ethernet) connected by a bridge, you will probably need to reverse the bit order of the bytes in the MAC address. For more information, see "Bit Ordering in MAC Addresses" on page 141. If the two nodes are on the same LAN, or on LANs of the same type connected by a bridge, no change is required.

ls_detail.def_data.dest_address.lsap_address
Local SAP address of link station on adjacent node.

For multipath channel (MPC), CS Linux for System z only:

def_data.dest_address.address
This parameter is reserved.

For Enterprise Extender (HPR/IP):

ls_detail.def_data.dest_address.ip_address_info.lsap
Local SAP address of link station on adjacent node. Specify a multiple of `0x04` in the range `0x04`–`0xEC`. The usual value is `0x04`, but VTAM may use `0x08` in some circumstances.

ls_detail.def_data.dest_address.ip_address_info.version
Specifies whether the following field represents an IPv4 or IPv6 address. Possible values:

IP_VERSION_4_HOSTNAME
The *address* field specifies an IPv4 address, or a hostname or alias that resolves to an IPv4 address.

IP_VERSION_6_HOSTNAME
The *address* field specifies an IPv6 address, or a hostname or alias that resolves to an IPv6 address.

ls_detail.def_data.dest_address.ip_address_info.address
IP address of link station on adjacent node. This can be either of the following.

- An IPv4 dotted-decimal address (such as `193.1.11.100`).
- An IPv6 colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).

For all link types:

ls_detail.def_data.auto_act_supp
Specifies whether the link can be activated automatically when required by a session. Possible values are:

AP_YES The link can be activated automatically.

AP_NO The link cannot be activated automatically.

ls_detail.def_data.tg_number
Preassigned TG number, used to represent the link when the link is activated. This parameter is used only if the adjacent node is an APPN node (*adj_cp_type* is either `AP_NETWORK_NODE` or `AP_END_NODE`); it is ignored otherwise. Zero indicates that the TG number is not preassigned and is negotiated when the link is activated.

ls_detail.def_data.limited_resource
Specifies whether this link station is to be deactivated when there are no sessions using the link. Possible values are:

AP_NO The link is not a limited resource and will not be deactivated automatically.

AP_NO_SESSIONS
The link is a limited resource and will be deactivated automatically when no active sessions are using it.

AP_INACTIVITY
The link is a limited resource and will be deactivated automatically

when no active sessions are using it, or when no data has flowed on the link for the time period specified by the *link_deact_timer* field.

ls_detail.def_data.solicit_sscp_sessions
Specifies whether to request the adjacent node to initiate sessions between the SSCP and the local CP and dependent LUs. This parameter is used only if the adjacent node is an APPN node (*adj_cp_type* is either AP_NETWORK_NODE or AP_END_NODE); it is ignored otherwise. If the adjacent node is a host (*adj_cp_type* is either AP_HOST_XID3 or AP_HOST_XID0), CS Linux always requests the host to initiate SSCP sessions.

Possible values are:

AP_YES Request the adjacent node to initiate SSCP sessions.

AP_NO Do not request the adjacent node to initiate SSCP sessions.

ls_detail.def_data.pu_name
Name of the local PU that uses this link. This parameter is used only if *adj_cp_type* is set to AP_HOST_XID3 or AP_HOST_XID0, or if *solicit_sscp_sessions* is set to AP_YES; it is reserved otherwise.

The PU name is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

ls_detail.def_data.disable_remote_act
Specifies whether the LS can be activated by a remote node. Possible values are:

AP_YES The LS can only be activated by the local node; if the remote node attempts to activate it, CS Linux will reject the attempt.

AP_NO The LS can be activated by the remote node.

ls_detail.def_data.dspu_services
Specifies the services which the local node will provide to the downstream PU across this link. This parameter is used only if the adjacent node is a downstream PU or an APPN node with *solicit_sscp_sessions* set to AP_NO; it is reserved otherwise. Possible values are:

AP_PU_CONCENTRATION
Local node will provide SNA gateway for the downstream PU.

AP_DLUR
Local node will provide DLUR services for the downstream PU.

AP_NONE
Local node will provide no services for this downstream PU.

ls_detail.def_data.dspu_name
Name of the downstream PU. This parameter is required if *solicit_sscp_sessions* is set to AP_NO and *dspu_services* is set to AP_PU_CONCENTRATION or AP_DLUR; it is reserved otherwise. The name is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

ls_detail.def_data.dlus_name
Name of the DLUS node from which DLUR solicits SSCP services when the link to the downstream node is activated. This field is reserved if *dspu_services* is not set to AP_DLUR.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

A string of 17 binary zeros indicates the global default DLUS, defined using the DEFINE_DLUR_DEFAULTS verb. If this parameter is set to zeros and there is no global default DLUS, then DLUR will not initiate SSCP contact when the link is activated.

ls_detail.def_data.bkup_dlus_name
Name of the DLUS node from which DLUR solicits SSCP services when the link to the downstream node is activated. This field is reserved if *dspu_services* is not set to AP_DLUR.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

A string of 17 binary zeros indicates the global backup default DLUS, defined using the DEFINE_DLUR_DEFAULTS verb.

ls_detail.def_data.hpr_supported
Specifies whether HPR is supported on this link. Possible values are:

AP_YES HPR is supported on this link.

AP_NO HPR is not supported on this link.

ls_detail.def_data.hpr_link_lvl_error
For SDLC, this parameter is reserved.

For other port types, this parameter specifies whether link-level error recovery is supported for HPR traffic on the link.

This parameter is reserved if the *ls_detail.def_data.hpr_supported* parameter is set to AP_NO. Possible values are:

AP_YES The HPR link-level error recovery tower is supported on this link.

AP_NO The HPR link-level error recovery tower is not supported on this link.

ls_detail.def_data.link_deact_timer
Limited resource link deactivation timer (in seconds, minimum 5). If *limited_resource* is set to AP_INACTIVITY, the link will be deactivated if no data flows on it for the time specified by this parameter. A value of zero indicates no timeout (the link is not deactivated, as though *limited_resource* were set to AP_NO), and that values in the range 1–4 are interpreted as 5.

ls_detail.def_data.default_nn_server
End node: Specifies whether this is a link supporting CP-CP sessions to a network node that can act as the local node's network node server. When the local node has no CP-CP sessions to a network node server and needs to establish them, it checks this parameter on its defined LSs to find a suitable LS to activate. This allows you to specify which adjacent NNs are suitable to act as the NN server (for example, to avoid using NNs that are accessed by expensive or slow links).

Possible values are:

AP_YES This link supports CP-CP sessions to a network node that can act as the local node's NN server; the local node can automatically activate this link if it needs to contact an NN server.

AP_NO This link should not be automatically activated in an attempt to contact a network node server.

If the local node is not an end node, this parameter is reserved.

ls_detail.def_data.ls_attributes
This array contains further information about the adjacent node, as described in the following parameters:

ls_detail.def_data.ls_attributes[0]
Host type (normally standard SNA). Possible values are:

AP_SNA Standard SNA host.

AP_FNA Fujitsu Network Architecture (VTAM-F) host.

AP_HNA Hitachi Network Architecture host.

ls_detail.def_data.ls_attributes[1]
Network Name CV suppression for a link to a back-level LEN node.

If *adj_cp_type* is set to AP_BACK_LEVEL_LEN_NODE, this parameter specifies whether to suppress inclusion of the Network Name CV in the format 3 XID sent to the LEN node. Possible values are:

AP_NO Include the Network Name CV in the XID.

AP_SUPPRESS_CP_NAME
Do not include the Network name CV.

If *adj_cp_type* is set to any other value, this parameter is reserved.

ls_detail.def_data.adj_node_id
Node ID of adjacent node. This is a 4-byte hexadecimal string; a value of 4 zeros indicates that node ID checking is disabled.

ls_detail.def_data.local_node_id
Node ID sent in XIDs on this LS. This is a 4-byte hexadecimal string, consisting of a block number (3 hexadecimal digits) and a node number (5 hexadecimal digits). A value of all zeros indicates that CS Linux uses the node ID specified in the DEFINE_NODE verb.

ls_detail.def_data.cp_cp_sess_support
Specifies whether CP-CP sessions are supported. Possible values are:

AP_YES CP-CP sessions are supported.

AP_NO CP-CP sessions are not supported.

ls_detail.def_data.use_default_tg_chars
Specifies whether the default TG characteristics supplied on the DEFINE_PORT verb are used. Possible values are:

AP_YES Use the default TG characteristics; ignore the tg_chars structure on this verb.

AP_NO Use the tg_chars structure on this verb.

ls_detail.def_data.tg_chars.effect_cap
Actual bits per second rate (line speed). The value is encoded as a 1-byte floating point number, represented by the formula 0.1 mmm * 2^{eeeee} where the bit representation of the byte is b'eeeeemmm'. Each unit of effective capacity is equal to 300 bits per second.

ls_detail.def_data.tg_chars.connect_cost
Cost per connect time. Valid values are integer values in the range 0–255, where 0 is the lowest cost per connect time and 255 is the highest.

ls_detail.def_data.tg_chars.byte_cost
Cost per byte. Valid values are integer values in the range 0–255, where 0 is the lowest cost per byte and 255 is the highest.

ls_detail.def_data.tg_chars.security
Security level of the network. Possible values are:

AP_SEC_NONSECURE
No security.

AP_SEC_PUBLIC_SWITCHED_NETWORK
Data is transmitted over a public switched network.

AP_SEC_UNDERGROUND_CABLE
Data is transmitted over secure underground cable.

AP_SEC_SECURE_CONDUIT
Data is transmitted over a line in a secure conduit that is not guarded.

AP_SEC_GUARDED_CONDUIT
Data is transmitted over a line in a conduit that is protected against physical tapping.

AP_SEC_ENCRYPTED
Data is encrypted before transmission over the line.

AP_SEC_GUARDED_RADIATION
Data is transmitted over a line that is protected against physical and radiation tapping.

AP_SEC_MAXIMUM
Maximum security.

ls_detail.def_data.tg_chars.prop_delay
Propagation delay: the time that a signal takes to travel the length of the link. Possible values are:

AP_PROP_DELAY_MINIMUM
Minimum propagation delay.

AP_PROP_DELAY_LAN
Delay is less than 480 microseconds (typical for a LAN).

AP_PROP_DELAY_TELEPHONE
Delay is in the range 480–49,512 microseconds (typical for a telephone network).

AP_PROP_DELAY_PKT_SWITCHED_NET
Delay is in the range 49,512–245,760 microseconds (typical for a packet-switched network).

AP_PROP_DELAY_SATELLITE
Delay is greater than 245,760 microseconds (typical for a satellite link).

AP_PROP_DELAY_MAXIMUM
Maximum propagation delay.

ls_detail.def_data.tg_chars.user_def_parm_1 **through** *def_data.tg_chars.user_def_parm_3*
User-defined parameters, which include other TG characteristics not covered by the above parameters. Each of these parameters is set to a value in the range 0–255.

ls_detail.def_data.target_pacing_count
Numeric value between 1 and 32,767 inclusive indicating the desired pacing window size. (The current version of CS Linux does not make use of this value.)

ls_detail.def_data.max_send_btu_size
Maximum BTU size that can be sent.

ls_detail.def_data.ls_role
Link station role. This is normally set to AP_USE_PORT_DEFAULTS, specifying that the LS role is taken from the definition of the port that owns this LS.

If the LS has been defined with a specific LS role overriding the port definition, this is one of the following values:

AP_LS_PRI
Primary

AP_LS_SEC
Secondary

AP_LS_NEG
Negotiable

ls_detail.def_data.max_ifrm_rcvd
Maximum of I-frames that can be received by this link station before an acknowledgment is sent. This value is in the range 0–127. When this field is zero, the value of *max_ifrm_rcvd* from DEFINE_PORT is used as default.

ls_detail.def_data.dlus_retry_timeout
Interval in seconds between second and subsequent attempts to contact the DLUS specified in the *ls_detail.def_data.dlus_name* and *ls_detail.def_data.bkup_dlus_name* parameters. The interval between the initial attempt and the first retry is always one second. If zero is returned, the default value configured with DEFINE_DLUR_DEFAULTS is used. This parameter is ignored if *ls_detail.def_data.dspu_services* is not set to AP_DLUR.

ls_detail.def_data.dlus_retry_limit
Maximum number of retries after an initial failure to contact the DLUS specified in the *ls_detail.def_data.dlus_name* and *ls_detail.def_data.bkup_dlus_name* parameters. If zero is returned, the default value configured through DEFINE_DLUR_DEFAULTS is used. If 0x0FFFF is returned, CS Linux retries indefinitely. This parameter is ignored if *ls_detail.def_data.dspu_services* is not set to AP_DLUR.

def_data.conventional_lu_compression
Specifies whether data compression is requested for LU 0–3 sessions on this link. This parameter is used only if this link carries LU 0–3 traffic; it does not apply to LU 6.2 sessions.

Possible values are:

AP_YES Data compression should be used for LU 0–3 sessions on this link if the host requests it.

AP_NO Data compression should not be used for LU 0–3 sessions on this link.

ls_detail.def_data.branch_link_type
This parameter applies only if the local node is a Branch Network Node; it is reserved if the local node is any other type.

If the parameter *def_data.adj_cp_type* is set to AP_NETWORK_NODE, AP_END_NODE, AP_APPN_NODE, or AP_BACK_LEVEL_LEN_NODE, this parameter defines whether the link is an uplink or a downlink. Possible values are:

AP_UPLINK
The link is an uplink.

AP_DOWNLINK
The link is a downlink.

ls_detail.def_data.adj_brnn_cp_support
This parameter applies only if the local node is a Branch Network Node and the adjacent node is a network node (the parameter *def_data.adj_cp_type* is set to AP_NETWORK_NODE, or it is set to AP_APPN_NODE and the node type discovered during XID exchange is network node). It is reserved if the local and remote nodes are any other type.

This parameter defines whether the adjacent node can be a Branch Network Node that is acting as a Network Node from the point of view of the local node. Possible values are:

AP_BRNN_ALLOWED
The adjacent node is allowed (but not required) to be a Branch Network Node.

AP_BRNN_REQUIRED
The adjacent node must be a Branch Network Node.

AP_BRNN_PROHIBITED
The adjacent node must not be a Branch Network Node.

ls_detail.def_data.pu_can_send_dddlu_offline
Specifies whether the local PU should send NMVT (power off) messages to the host. If the host system supports DDDLU (Dynamic Definition of Dependent LUs), CS Linux sends NMVT (power off) to the host when it has finished using a dynamically defined LU. This allows the host to save resources by removing the definition when it is no longer required.

This parameter is used only if this link is to a host (*solicit_sscp_sessions* is set to AP_YES and *dspu_services* is not set to AP_NONE).

Possible values are:

AP_YES The local PU sends NMVT (power off) messages to the host.

AP_NO The local PU does not send NMVT (power off) messages to the host.

If the host supports DDDLU but does not support the NMVT (power off) message, this parameter must be set to AP_NO.

ls_detail.def_data.link_spec_data_len
Length of link-specific data that is passed unchanged to link station component during initialization. The data structure for this data follows the ls_def_data structure, but is padded to start on a 4-byte boundary. For more details of the link-specific data, see "DEFINE_LS" on page 117.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LINK_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *ls_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_LS_ROUTING

The QUERY_LS_ROUTING verb returns information for local LUs about the location of a partner LU using a link station. If information is requested about more than one local LU, the information is ordered by local LU name and then by the partner LU names associated with each local LU name. Wildcard partner LU names can be interspersed with entries that do not contain wildcards.

VCB Structure

```
typedef struct query_ls_routing
{
  AP_UINT16         opcode;               /* verb operation code           */
  unsigned char     reserv2;              /* reserved                      */
  unsigned char     format;               /* reserved                      */
  AP_UINT16         primary_rc;           /* primary return code           */
  AP_UINT32         secondary_rc;         /* secondary return code         */
  unsigned char    *buf_ptr;              /* buffer pointer                */
  AP_UINT32         buf_size;             /* buffer size                   */
  AP_UINT32         total_buf_size;       /* total buffer size             */
  AP_UINT16         num_entries;          /* number of entries             */
  AP_UINT16         total_num_entries;    /* total number of entries       */
  unsigned char     list_options;         /* list options                  */
  unsigned char     reserv3;              /* reserved                      */
  unsigned char     lu_name[8];           /* LU Name                       */
  unsigned char     lu_alias[8];          /* reserved                      */
  unsigned char     fq_partner_lu[17];    /* partner lu name               */
  unsigned char     wildcard_fqplu;       /* wildcard partner LU flag      */
  unsigned char     reserv4[2];           /* reserved                      */
} QUERY_LS_ROUTING;

typedef struct ls_routing_data
{
  AP_UINT16        overlay_size;
  unsigned char    lu_name[8];             /* local LU name               */
  unsigned char    lu_alias[8];            /* reserved                    */
  unsigned char    fq_partner_lu[17];      /* partner lu                  */
```

```
  unsigned char    wildcard_fqplu;          /* wildcard partner LU flag      */
  unsigned char    ls_name[8];              /* link to use                   */
  unsigned char    reserv3[2];              /* reserved                      */
} LS_ROUTING_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_LS_ROUTING

num_entries
Maximum number of LS routing entries for which data should be returned. To request data for a specific LS rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of LS routing entries from which CS Linux begins to return data.

Specify one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of the *lu_name* and *fq_partner_lu* parameters.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of the *lu_name*, *fq_partner_lu*, and *wildcard_fqplu* parameters.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

lu_name
Name of the local LU, as defined to CS Linux. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than eight bytes. This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST.

lu_alias
This parameter is reserved; set it to binary zeros.

fq_partner_lu
Fully qualified name of the partner LU, as defined to CS Linux. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. This parameter is used to qualify the entry to return within the list of partner LU names for the specified local LU. This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST.

If this parameter is set to binary zeros and *list_options* is set to AP_LIST_FROM_NEXT, the returned list starts at the first partner LU name for the LU identified by the *lu_name* parameter.

wildcard_fqplu
Wildcard partner LU flag indicating whether the *fq_partner_lu* parameter contains a full or partial wildcard. This flag is used only to identify the

first record to return. It cannot be used to specify that only entries matching the wildcard specification are to be returned. Possible values are:

AP_YES The *fq_partner_lu* parameter contains a wildcard entry.

AP_NO The *fq_partner_lu* parameter does not contain a wildcard entry.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

lu_name
Name of the local LU.

fq_partner_lu
Fully qualified name of the partner LU.

wildcard_fqplu
Flag indicating whether the *fq_partner_lu* parameter contains a full or partial wildcard. Possible values are:

AP_YES The *fq_partner_lu* parameter contains a full or partial wildcard.

AP_NO The *fq_partner_lu* parameter does not contain a full or partial wildcard.

ls_name
Name of the link station used for sessions between the LU specified in the *lu_name* parameter and the partner LU specified in the *fq_plu_name* parameter.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, but the value specified for the *lu_name* paraemter did not match any exisiting LS routing data record.

AP_INVALID_PARTNER_LU_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, but the value specified by the *fq_partner_lu* parameter did not match any existing LS routing data record for the specified partner LU name.

AP_INVALID_WILDCARD_NAME
The *wildcard_fqplu* parameter was set to AP_YES, but the *fq_partner_lu* parameter was not a valid wildcard name.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_LU_0_TO_3

QUERY_LU_0_TO_3 returns information about local LUs of type 0, 1, 2, or 3. This information is structured as “determined data” (data gathered dynamically during execution, returned only if the node is active) and “defined data” (the data supplied by the application on DEFINE_LU_0_TO_3).

This verb can be used to obtain either summary or detailed information, about a specific LU or about multiple LUs, depending on the options used.

VCB Structure

```
typedef struct query_lu_0_to_3
{
   AP_UINT16       opcode;                 /* verb operation code          */
   unsigned char   reserv2;                /* reserved                     */
   unsigned char   format;                 /* reserved                     */
   AP_UINT16       primary_rc;             /* primary return code          */
   AP_UINT32       secondary_rc;           /* secondary return code        */
   unsigned char   *buf_ptr;               /* pointer to buffer            */
   AP_UINT32       buf_size;               /* buffer size                  */
   AP_UINT32       total_buf_size;         /* total buffer size required   */
   AP_UINT16       num_entries;            /* number of entries            */
   AP_UINT16       total_num_entries;      /* total number of entries      */
   unsigned char   list_options;           /* listing options              */
   unsigned char   reserv3;                /* reserved                     */
   unsigned char   pu_name[8];             /* PU name filter               */
   unsigned char   lu_name[8];             /* LU name                      */
   unsigned char   host_attachment;        /* host attachment filter       */
} QUERY_LU_0_TO_3;

typedef struct lu_0_to_3_summary
{
   AP_UINT16       overlay_size;           /* size of returned entry       */
   unsigned char   pu_name[8];             /* PU name                      */
   unsigned char   lu_name[8];             /* LU name                      */
   unsigned char   description[32];        /* resource description         */
   unsigned char   reserv1[16];            /* reserved                     */
   unsigned char   nau_address;            /* NAU address                  */
   unsigned char   lu_sscp_sess_active;    /* Is LU-SSCP session active    */
   unsigned char   appl_conn_active;       /* Is connection to appl active */
   unsigned char   plu_sess_active;        /* Is PLU-SLU session active    */
   unsigned char   host_attachment;        /* LU's host attachment         */
} LU_0_TO_3_SUMMARY;

typedef struct lu_0_to_3_detail
{
   AP_UINT16       overlay_size;           /* size of returned entry       */
   unsigned char   lu_name[8];             /* LU name                      */
   unsigned char   reserv1[2];             /* reserved                     */
   LU_0_TO_3_DET_DATA  det_data;           /* Determined data              */
   LU_0_TO_3_DEF_DATA  def_data;           /* Defined data                 */
} LU_0_TO_3_DETAIL;

typedef struct lu_0_to_3_det_data
{
   unsigned char   lu_sscp_sess_active;    /* Is LU-SSCP session active    */
   unsigned char   appl_conn_active;       /* Application is using LU      */
   unsigned char   plu_sess_active;        /* Is PLU-SLU session active    */
   unsigned char   host_attachment;        /* Host attachment              */
   SESSION_STATS   lu_sscp_stats;          /* reserved                     */
   SESSION_STATS   plu_stats;              /* reserved                     */
```

```
   unsigned char   plu_name[8];             /* PLU name                    */
   unsigned char   session_id[8];           /* Internal ID of PLU-SLU sess  */
   unsigned char   app_spec_det_data[360];  /* Application specified data   */
   unsigned char   app_type;                /* Type of application using LU */
   unsigned char   sscp_id[6];              /* sscp id                      */
   unsigned char   bind_lu_type;            /* LU type from BIND message    */
   unsigned char   compression;             /* data compression level       */
   unsigned char   cryptography;            /* reserved                     */
   unsigned char   reserva[10];             /* reserved                     */
} LU_0_TO_3_DET_DATA;

typedef struct session_stats
{
   AP_UINT16       rcv_ru_size;          /* session receive RU size         */
   AP_UINT16       send_ru_size;         /* session send RU size            */
   AP_UINT16       max_send_btu_size;    /* maximum send BTU size           */
   AP_UINT16       max_rcv_btu_size;     /* maximum rcv BTU size            */
   AP_UINT16       max_send_pac_win;     /* maximum send pacing window size */
   AP_UINT16       cur_send_pac_win;     /* current send pacing window size */
   AP_UINT16       max_rcv_pac_win;      /* maximum receive pacing window   */
                                         /*  size                           */
   AP_UINT16       cur_rcv_pac_win;      /* current receive pacing window   */
                                         /*  size                           */
   AP_UINT32       send_data_frames;     /* number of data frames sent      */
   AP_UINT32       send_fmd_data_frames; /* num fmd data frames sent        */
   AP_UINT32       send_data_bytes;      /* number of data bytes sent       */
   AP_UINT32       rcv_data_frames;      /* number of data frames received  */
   AP_UINT32       rcv_fmd_data_frames;  /* num fmd data frames received    */
   AP_UINT32       rcv_data_bytes;       /* number of data bytes received   */
   unsigned char   sidh;                 /* session ID high byte (from LFSID)*/
   unsigned char   sidl;                 /* session ID low byte (from LFSID) */
   unsigned char   odai;                 /* ODAI bit set                    */
   unsigned char   ls_name[8];           /* Link station name               */
   unsigned char   pacing_type;          /* type of pacing in use           */
} SESSION_STATS;

typedef struct lu_0_to_3_def_data
{
   unsigned char   description[32];          /* resource description        */
   unsigned char   reserv1[16];              /* reserved                    */
   unsigned char   nau_address;              /* LU NAU address              */
   unsigned char   pool_name[8];             /* LU Pool name                */
   unsigned char   pu_name[8];               /* PU name                     */
   unsigned char   priority;                 /* LU priority                 */
   unsigned char   lu_model;                 /* LU model (type)             */
   unsigned char   sscp_id[6];               /* SSCP ID                     */
   AP_UINT16       timeout;                  /* Timeout                     */
   unsigned char   app_spec_def_data[16];    /* application-specified data  */
   unsigned char   model_name[7];            /* reserved                    */
   unsigned char   term_method;              /* session termination type    */
    unsigned char       disconnect_on_unbind;    /* disconnect on UNBIND flag */
   unsigned char   reserv3[15];              /* reserved                    */
} LU_0_TO_3_DEF_DATA;
```

If the *app_type* parameter in the `lu_0_to_3_det_data` structure is set to `AP_LUA_APPLICATION`, the *app_spec_det_data* field contains the following structure:

```
typedef struct lua_session_user_info
{
   unsigned char   user_ip_address[40];      /* IP address of LUA application    */
   unsigned char   user_host_address[256];   /* Host name of LUA application     */
   unsigned char   reserved[24];             /* reserved                         */
} SESSION_USER_INFO;
```

If the *app_type* parameter in the `lu_0_to_3_det_data` structure is set to `AP_FMI_APPLICATION`, the *app_spec_det_data* field contains the following structure:

```
typedef struct session_user_info
{
   unsigned char   user_name[32];           /* 3270 user name               */
   unsigned char   system_name[128];        /* computer name                */
   AP_UINT32       user_pid;                /* process ID                   */
   AP_UINT32       user_type;               /* type of application using LU */
   AP_UINT32       user_uid;                /* user ID                      */
   AP_UINT32       user_gid;                /* group ID                     */
   unsigned char   user_gname[32];          /* group name                   */
   unsigned char   reserv4[32];             /* reserved                     */
} SESSION_USER_INFO;
```

If the *app_type* parameter in the `lu_0_to_3_det_data` structure is set to `AP_PU_CONCENTRATION`, the *app_spec_det_data* field contains the same structure as the 3270 structure above except that the *app_type* parameter is set to `AP_PU_CONCENTRATION` and the *user_name* through *user_gname* parameters are replaced by a *pu_conc_downstream_lu* parameter.

If the *app_type* parameter in the `lu_0_to_3_det_data` structure is set to `AP_LUA_APPLICATION`, the *app_spec_det_data* field contains the same structure as the 3270 structure above except that the *app_type* parameter is set to `AP_LUA_APPLICATION` and the *user_name* through *user_gname* parameters are not returned.

If the *app_type* parameter in the `lu_0_to_3_det_data` structure is set to `AP_TN_SERVER`, the *app_spec_det_data* field contains the following structure:

```
typedef struct tn_server_session_user_info
{
   unsigned char   user_ip_address[40];     /* user's IP address            */
   AP_UINT16       port_number;             /* TCP/IP port number           */
   AP_UINT16       cb_number;               /* reserved                     */
   AP_UINT16       cfg_default;             /* using the default record?    */
   unsigned char   cfg_address[68];         /* address from config record   */
   AP_UINT16       cfg_format;              /* format of address            */
   unsigned char   tn3270_level;            /* TN3270 level used:           */
                                            /*   AP_LEVEL_TN3270            */
                                            /*   AP_LEVEL_TN3270E           */
   unsigned char   lu_select;               /* method of LU selection:      */
                                            /*   AP_GENERIC_LU              */
                                            /*   AP_SPECIFIC_LU             */
                                            /*   AP_ASSOCIATED_LU           */
   unsigned char   request_lu_name[8];      /* requested LU name or         */
                                            /* associated display LU name   */
                                            /*  (in EBCDIC)                 */
   unsigned char   cipher_spec;             /* SSL cipher specification     */
   unsigned char   reserv3[21];             /* reserved                     */
} TN_SERVER_SESSION_USER_INFO;
```

Supplied Parameters

The application supplies the following parameters:

opcode `AP_QUERY_LU_0_TO_3`

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of LUs for which data should be returned. To request data for a specific LU rather than a range, specify the value 1. To return as

many entries as possible, specify 0; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *lu_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *lu_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

pu_name
PU name for which LU information is required. To list only information about LUs associated with a specific PU, specify the PU name. To obtain a complete list for all PUs, set this field to binary zeros.

lu_name
Name of the local LU. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters. This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST.

host_attachment
Host attachment filter. If the verb is issued to a running node, this parameter specifies whether to filter the returned information by whether the LUs are attached to the host directly or using DLUR or PU Concentration. Possible values are:

AP_DIRECT_ATTACHED
Return information only on LUs directly attached to the host system.

AP_DLUR_ATTACHED
Return information only on LUs supported by DLUR on the local node.

AP_DLUR
Return information only on LUs supported by passthrough DLUR from a downstream node. This option is valid only if the local node is a Network Node.

AP_PU_CONCENTRATION
Return information only on LUs supported by SNA gateway from a downstream node.

AP_NONE
Return information about all LUs regardless of host attachment.

If the node is not running, this parameter is ignored; CS Linux returns information about all LUs regardless of host attachment.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

lu_0_to_3_summary.overlay_size
The size of the returned `lu_0_to_3_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `lu_0_to_3_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

lu_0_to_3_summary.pu_name
Name of the local PU used by the LU. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

lu_0_to_3_summary.lu_name
Name of the local LU. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

lu_0_to_3_summary.description
A null-terminated text string describing the LU, as specified in the definition of the LU.

lu_0_to_3_summary.nau_address
Network accessible unit address of the LU. This is in the range 1–255.

lu_0_to_3_summary.lu_sscp_sess_active
Specifies whether the LU-SSCP session is active. Possible values are:

AP_YES The session is active.

AP_NO The session is inactive.

lu_0_to_3_summary.appl_conn_active
Specifies whether an application is using the LU. Possible values are:

AP_YES An application is using the LU.

AP_NO No application is using the LU.

lu_0_to_3_summary.plu_sess_active
Specifies whether the PLU-SLU session is active. Possible values are:

AP_YES The session is active.

AP_NO The session is inactive.

lu_0_to_3_summary.host_attachment
LU host attachment type.

When the verb is issued to a running node, this parameter takes one of the following values:

AP_DIRECT_ATTACHED
LU is directly attached to the host system.

AP_DLUR_ATTACHED
LU is supported by DLUR on the local node.

AP_DLUR
LU is supported by passthrough DLUR from a downstream node.

AP_PU_CONCENTRATION
LU is supported by SNA gateway from a downstream node.

lu_0_to_3_detail.overlay_size
The size of the returned `lu_0_to_3_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `lu_0_to_3_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

lu_0_to_3_detail.lu_name
Name of the local LU. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

lu_0_to_3_detail.det_data.lu_sscp_sess_active
Specifies whether the LU-SSCP session is active. Possible values are:

AP_YES The session is active.

AP_NO The session is inactive.

lu_0_to_3_detail.det_data.appl_conn_active
Specifies whether an application is using the LU. Possible values are:

AP_YES An application is using the LU.

AP_NO No application is using the LU.

lu_0_to_3_detail.det_data.plu_sess_active
Specifies whether the PLU-SLU session is active. Possible values are:

AP_YES The session is active.

AP_NO The session is inactive.

lu_0_to_3_detail.det_data.host_attachment
LU host attachment type.

When the verb is issued to a running node, this parameter takes one of the following values:

AP_DIRECT_ATTACHED
LU is directly attached to the host system.

AP_DLUR_ATTACHED
LU is supported by DLUR on the local node.

AP_DLUR
LU is supported by passthrough DLUR from a downstream node.

AP_PU_CONCENTRATION
LU is supported by SNA gateway from a downstream node.

For each of the two sessions (LU-SSCP session and PLU-SLU session), the `session_stats` structure contains the following parameters:

rcv_ru_size
Maximum receive RU size. (In the LU-SSCP session statistics, this parameter is reserved.)

send_ru_size
Maximum send RU size. (In the LU-SSCP session statistics, this parameter is reserved.)

max_send_btu_size
Maximum BTU size that can be sent.

max_rcv_btu_size
Maximum BTU size that can be received.

max_send_pac_win
Maximum size of the send pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

cur_send_pac_win
Current size of the send pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

max_rcv_pac_win
Maximum size of the receive pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

cur_rcv_pac_win
Current size of the receive pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

send_data_frames
Number of normal flow data frames sent.

send_fmd_data_frames
Number of normal flow FMD data frames sent.

send_data_bytes
Number of normal flow data bytes sent.

rcv_data_frames
Number of normal flow data frames received.

rcv_fmd_data_frames
Number of normal flow FMD data frames received.

rcv_data_bytes
Number of normal flow data bytes received.

sidh Session ID high byte.

sidl Session ID low byte.

odai Origin Destination Assignor Indicator. When bringing up a session, the sender of the BIND sets this field to zero if the local node contains the primary link station, and sets it to one if the BIND sender is the node containing the secondary link station.

ls_name
Link station name associated with statistics. This is an 8-byte ASCII character string, right-padded with spaces if the name is shorter than 8 characters.

pacing_type
Receive pacing type in use on the PLU-SLU session. Possible values are:
```
AP_NONE
AP_PACING_FIXED
```

lu_0_to_3_detail.det_data.plu_name
Name of the primary LU. This is an 8-byte type-A EBCDIC string, right-padded with spaces if the name is shorter than 8 characters. This name is reserved if the PLU-SLU session is inactive.

lu_0_to_3_detail.det_data.session_id
Eight byte internal identifier of the PLU-SLU session.

lu_0_to_3_detail.det_data.app_spec_det_data
The format of the data in this field depends on the value of the *app_type* field below, as follows:

- If *app_type* is set to `AP_NONE`, this field is reserved.
- If *app_type* is set to `AP_PU_CONCENTRATION`, the first 8 bytes of this field contain the LU name of the downstream LU currently using this local LU. This is an EBCDIC string, right-padded with spaces if the name is shorter than 8 characters. The remaining bytes are reserved.
- If *app_type* is set to `AP_LUA_APPLICATION`, this field is replaced by the `lua_session_user_info` structure, as described below.
- If *app_type* is set to `AP_FMI_APPLICATION`, this field is replaced by the `session_user_info` structure, as described below.

If *app_type* is set to `AP_LUA_APPLICATION`, the *app_spec_det_data*field is replaced by the `lua_session_user_info` structure, containing information about the LUA application using this LU. The structure consists of the following fields:

user_ip_address
The IP address of the computer (client or server) where the LUA application is running. This is a null-terminated ASCII string, which can be either of the following.

- An IPv4 dotted-decimal address (such as `193.1.11.100`).

- An IPv6 colon-hexadecimal address (such as 2001:0db8:0000:0000:0000:0000:1428:57ab or 2001:db8::1428:57ab).

user_host_address
The name of the computer (client or server) where the LUA application is running. This is a null-terminated ASCII string, representing an IP hostname (such as newbox.this.co.uk).

If *app_type* is set to AP_FMI_APPLICATION, the *app_spec_det_data*field is replaced by the session_user_info structure, containing information about the user of this LU. The structure consists of the following fields:

user_name
The Linux user name with which the 3270 emulation program using this LU is running. This is an ASCII string of 1–32 characters.

system_name
The computer name on which the program is running.

user_pid
The process ID of the program using the LU.

user_type
The type of session (3270 display session, 3270 printer session) using the LU. Possible values are:

AP_3270_DISPLAY_MODEL_2

AP_3270_DISPLAY_MODEL_3

AP_3270_DISPLAY_MODEL_4

AP_3270_DISPLAY_MODEL_5

AP_PRINTER

AP_SCS_PRINTER

AP_UNKNOWN

user_uid
The Linux user ID with which the program is running.

user_gid
The Linux group ID with which the program is running.

user_gname
The Linux group name with which the program is running. This is an ASCII string of 1–32 characters.

If *app_type* is set to AP_TN_SERVER, this field is replaced by the tn_server_session_user_info structure, containing information about the TN3270 program that is using this LU. The structure consists of the following fields:

user_ip_address
The IP address of the computer where the TN3270 program is running. This is a null-terminated ASCII string, which can be either of the following.

- An IPv4 dotted-decimal address (such as 193.1.11.100).
- An IPv6 colon-hexadecimal address (such as 2001:0db8:0000:0000:0000:0000:1428:57ab or 2001:db8::1428:57ab).

port_number
The TCP/IP port number that the TN3270 program uses to access TN server.

cb_number
TN server control block number.

cfg_default
Specifies whether the TN3270 program is using an explicitly-defined TN server user record, or is using the configured default record. For more information about configuring a default TN server user record, see "DEFINE_TN3270_ACCESS" on page 200. Possible values are:

AP_YES The program is using the default record. The *cfg_address* and *cfg_format* parameters below are reserved.

AP_NO The program is using an explicitly-defined record.

cfg_address
The TCP/IP address of the computer on which the TN3270 program runs, as defined in the configuration record that this user is using. This can be any of the following; the format is indicated by the *cfg_format* parameter.

- An IPv4 dotted-decimal address (such as `193.1.11.100`).
- An IPv6 colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).
- A name (such as `newbox.this.co.uk`.
- An alias (such as `newbox`).

cfg_format
Specifies the format of the *cfg_address* parameter. Possible values are:

AP_ADDRESS_IP
IP address

AP_ADDRESS_FQN
Alias or fully qualified name

tn3270_level
Level of TN3270 support. Possible values are:

AP_LEVEL_TN3270
TN3270E protocols are disabled.

AP_LEVEL_TN3270E
TN3270E protocols are enabled.

lu_select
Method of LU selection. Possible values are:

AP_GENERIC_LU
The TN3270 program selected a generic display or printer LU.

AP_SPECIFIC_LU
The TN3270 program selected this LU specifically.

AP_ASSOCIATED_LU
This is a printer LU that has been associated with a display LU by a DEFINE_TN3270_ASSOCIATION verb, or a display LU that has been associated with a printer LU by a DEFINE_TN3270_ASSOCIATION verb. The LU is in use by the TN3270 through its association.

request_lu_name
Requested LU name or associated display LU name. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

cipher_spec
Indicates the type of SSL security and the encryption level in use for this session. Possible values are:

AP_SSL_NO_SSL
SSL is not being used.

AP_SSL_NULL_MD5
Certificates are exchanged, but no encryption is used.

AP_SSL_NULL_SHA
Certificates are exchanged, but no encryption is used.

AP_SSL_RC4_MD5_EXPORT
40-bit encryption.

AP_SSL_RC2_MD5_EXPORT
40-bit encryption.

AP_SSL_DES_SHA_EXPORT
56-bit encryption.

AP_SSL_RC4_MD5_US
128-bit encryption.

AP_SSL_RC4_SHA_US
128-bit encryption.

AP_SSL_AES_128_SHA
128-bit encryption.

AP_SSL_3DES_SHA_US
Triple–DES (168-bit) encryption.

AP_SSL_AES_256_SHA
256-bit encryption.

lu_0_to_3_detail.det_data.app_type
The type of application, if any, that is using the LU. Possible values are:

AP_NONE
The LU is not in use.

AP_LUA_APPLICATION
The LU is being used by an LUA application.

AP_PU_CONCENTRATION
The LU is being used by a downstream LU using SNA gateway.

AP_FMI_APPLICATION
The LU is being used by a 3270 emulation program.

AP_TN_SERVER
The LU is being used by a TN3270 program accessing TN server.

lu_0_to_3_detail.det_data.sscp_id
A 6-byte field containing the SSCP ID received in the ACTPU for the PU used by this LU. If *lu_sscp_sess_active* is AP_NO, this parameter will be all zeros.

lu_0_to_3_detail.det_data.bind_lu_type
Specifies the LU type of the LU which issued the original BIND (if there is an active LU-LU session). Possible values are:

AP_LU_TYPE_0
LU type 0.

AP_LU_TYPE_1
LU type 1.

AP_LU_TYPE_2
LU type 2.

AP_LU_TYPE_3
LU type 3.

AP_LU_TYPE_6
Downstream dependent LU 6.2.

AP_LU_TYPE_UNKNOWN
There is no active LU-LU session.

lu_0_to_3_detail.det_data.compression
Compression level in use on the PLU-SLU session, if any. Possible values are:

AP_NO Data flowing on the PLU-SLU session is not compressed by CS Linux, or there is no active PLU-SLU session.

AP_YES CS Linux performs compression and decompression on PLU-SLU session data. RLE compression is used on data flowing upstream to the primary LU, and LZ9 compression is used on data flowing downstream from the primary LU.

AP_PASSTHRU
Compression on this session is performed by the session endpoints (the host LU and the local application or downstream LU), and not by CS Linux.

lu_0_to_3_detail.def_data.description
A null-terminated text string describing the LU, as specified in the definition of the LU.

lu_0_to_3_detail.def_data.nau_address
Network accessible unit address of the LU, in the range 1–255.

lu_0_to_3_detail.def_data.pool_name
Name of the LU pool to which this LU belongs. This is an 8-byte EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters. If the LU does not belong to a pool, this field is set to 8 binary zeros.

lu_0_to_3_detail.def_data.pu_name
Name of the PU (as specified on the DEFINE_LS verb) which this LU will use. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

lu_0_to_3_detail.def_data.priority
LU priority when sending to the host. This is set to one of the following:

```
AP_NETWORK
AP_HIGH
AP_MEDIUM
AP_LOW
```

lu_0_to_3_detail.def_data.lu_model
Type of the LU. This is set to one of the following:

```
AP_3270_DISPLAY_MODEL_2

AP_3270_DISPLAY_MODEL_3
```

AP_3270_DISPLAY_MODEL_4

AP_3270_DISPLAY_MODEL_5

AP_PRINTER

AP_SCS_PRINTER

AP_UNKNOWN

lu_0_to_3_detail.def_data.sscp_id
Specifies the ID of the SSCP permitted to activate this LU. This is a 6-byte binary field. If this parameter is set to binary zeros, the LU may be activated by any SSCP.

lu_0_to_3_detail.def_data.timeout
Timeout for the LU, specified in seconds. If a timeout is supplied and the user of the LU specified allow_timeout on the OPEN_LU_SSCP_SEC_RQ (or, in the case of SNA gateway, on the downstream LU definition), then the LU will be deactivated after the PLU-SLU session is left inactive for this period and one of the following conditions applies:

- The session passes over a limited resource link.
- Another application wishes to use the LU before the session is used again.

If the timeout is set to zero, the LU will not be deactivated.

lu_0_to_3_detail.def_data.term_method
This parameter specifies how CS Linux should attempt to end a PLU-SLU session to a host from this LU. Possible values are:

AP_USE_NODE_DEFAULT
Use the node's default termination method, specified by the *send_term_self* parameter on DEFINE_NODE.

AP_SEND_UNBIND
End the session by sending an UNBIND.

AP_SEND_TERM_SELF
End the session by sending a TERM_SELF.

lu_0_to_3_detail.def_data.disconnect_on_unbind
This parameter applies only when this LU is being used by a TN3270 client. It specifies whether to end the session when the host sends an UNBIND instead of displaying the VTAM MSG10 or returning to a host session manager. Possible values are:

AP_YES End the session if the host sends an UNBIND that is not type 2 (BIND forthcoming).

AP_NO Do not end the session if the host sends an UNBIND.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *lu_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_LU_LU_PASSWORD

QUERY_LU_LU_PASSWORD returns information about passwords used for session-level security verification between a local LU and a partner LU. It can be used to obtain information about the password for a specific partner LU or about passwords for multiple partner LUs, depending on the options used.

VCB Structure

```
typedef struct query_lu_lu_password
{
   AP_UINT16        opcode;                /* Verb operation code          */
   unsigned char    reserv2;               /* reserved                     */
   unsigned char    format;                /* reserved                     */
   AP_UINT16        primary_rc;            /* Primary return code          */
   AP_UINT32        secondary_rc;          /* Secondary return code        */
   unsigned char    *buf_ptr;              /* pointer to buffer            */
   AP_UINT32        buf_size;              /* buffer size                  */
   AP_UINT32        total_buf_size;        /* total buffer size required   */
   AP_UINT16        num_entries;           /* number of entries    *       */
   AP_UINT16        total_num_entries;     /* total number of entries      */
   unsigned char    list_options;          /* listing options              */
   unsigned char    reserv3;               /* reserved                     */
   unsigned char    lu_name[8];            /* LU name                      */
   unsigned char    lu_alias[8];           /* LU alias                     */
   unsigned char    plu_alias[8];          /* partner LU alias             */
   unsigned char    fqplu_name[17];        /* fully-qual. partner LU name  */
} QUERY_LU_LU_PASSWORD;

typedef struct password_info
{
   AP_UINT16        overlay_size;          /* size of returned entry       */
   unsigned char    plu_alias[8];          /* partner LU alias             */
   unsigned char    fqplu_name[17];        /* fully-qual. partner LU name  */
   unsigned char    description[32];        /* resource description         */
   unsigned char    reserv1[16];           /* reserved                     */
   unsigned char    password[8];           /* password                     */
   unsigned char    protocol_defined;      /* protocol defined             */
   unsigned char    protocol_in_use;       /* protocol in use              */
} PASSWORD_INFO;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_LU_LU_PASSWORD

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of partner LUs for which password information should be returned. To request a specific entry rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data. Specify one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *plu_alias* or *fqplu_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *plu_alias* or *fqplu_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

lu_name
LU name. This name is an 8-byte type-A EBCDIC character string. To indicate that the LU is identified by its LU alias instead of its LU name, set this parameter to 8 binary zeros, and specify the LU alias in the *lu_alias* parameter.

lu_alias
Locally defined LU alias. This is an 8-byte ASCII character string. This parameter is used only if *lu_name* is set to all zeros; it is ignored otherwise. To indicate the LU associated with the CP (the default LU), set both *lu_name* and *lu_alias* to all zeros.

plu_alias
Partner LU alias. This is an 8-byte ASCII character string. If *list_options* is set to AP_FIRST_IN_LIST, this parameter is ignored; otherwise you must specify either the LU alias or the fully qualified LU name for the partner LU. To indicate that the partner LU is identified by its fully qualified LU name instead of its LU alias, set this parameter to 8 binary zeros, and specify the LU alias in the *fqplu_name* parameter.

fqplu_name
Fully qualified network name for the partner LU. If *list_options* is set to AP_FIRST_IN_LIST, this parameter is ignored; otherwise you must specify either the LU alias or the fully qualified LU name for the partner LU. This parameter is used only if *plu_alias* is set to all zeros; it is ignored otherwise.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

password_info.overlay_size
The size of the returned password_info structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each password_info structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C sizeof() operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

password_info.plu_alias
Partner LU alias. This is an 8-byte ASCII character string.

password_info.fqplu_name
Fully qualified network name for the partner LU. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

password_info.description
A null-terminated text string describing the LU-LU password, as specified in the definition of the password.

password_info.password
An encrypted version of the password supplied on a DEFINE_LU_LU_PASSWORD verb. This is an 8-byte hexadecimal string.

password_info.protocol_defined
Requested LU-LU verification protocol defined for use with this partner LU. Possible values are:

AP_BASIC
Basic security protocols requested.

AP_ENHANCED
Enhanced security protocols requested.

AP_EITHER
Basic or enhanced security accepted.

password_info.protocol_in_use
LU-LU verification protocol in use with this partner LU. Possible values are:

AP_BASIC
Basic security protocols in use.

AP_ENHANCED
Enhanced security protocols in use.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_ALIAS
The supplied *lu_alias* parameter did not match the alias of any configured LU.

AP_INVALID_LU_NAME
The supplied *lu_name* parameter did not match the name of any configured LU.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_LU_POOL

QUERY_LU_POOL returns information about LU pools and the LUs that belong to them.

This verb can be used to obtain information about a specific LU or pool, or about multiple LUs or pools, depending on the options used.

VCB Structure

```
typedef struct query_lu_pool
{
   AP_UINT16        opcode;                 /* verb operation code        */
   unsigned char    reserv2;                /* reserved                   */
   unsigned char    format;                 /* reserved                   */
   AP_UINT16        primary_rc;             /* primary return code        */
   AP_UINT32        secondary_rc;           /* secondary return code      */
   unsigned char    *buf_ptr;               /* pointer to buffer          */
   AP_UINT32        buf_size;               /* buffer size                */
   AP_UINT32        total_buf_size;         /* total buffer size required */
   AP_UINT16        num_entries;            /* number of entries          */
   AP_UINT16        total_num_entries;      /* total number of entries    */
   unsigned char    list_options;           /* listing options            */
```

```
   unsigned char    reserv3;                /* reserved                  */
   unsigned char    pool_name[8];           /* Pool name                 */
   unsigned char    lu_name[8];             /* LU name                   */
} QUERY_LU_POOL;

typedef struct lu_pool_summary
{
   AP_UINT16        overlay_size;           /* size of returned entry    */
   unsigned char    pool_name[8];           /* Pool name                 */
   unsigned char    description[32];        /* resource description      */
   unsigned char    reserv1[16];            /* reserved                  */
   AP_UINT16        num_active_lus;         /* number of active lus      */
   AP_UINT16        num_avail_lus;          /* number of available lus   */
} LU_POOL_SUMMARY;

typedef struct lu_pool_detail
{
   AP_UINT16        overlay_size;           /* size of returned entry    */
   unsigned char    pool_name[8];           /* Pool name                 */
   unsigned char    description[32];        /* resource description      */
   unsigned char    reserv1[16];            /* reserved                  */
   unsigned char    lu_name[8];             /* LU name                   */
   unsigned char    lu_sscp_sess_active;    /* Is LU-SSCP session active */
   unsigned char    appl_conn_active;       /* Is appl connection open   */
   unsigned char    plu_sess_active;        /* Is PLU-SLU session active */
} LU_POOL_DETAIL;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_LU_POOL

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of entries for which data should be returned. If *list_options* is set to AP_SUMMARY, each entry is a single LU pool; if *list_options* is set to AP_DETAIL, each entry is an LU in a pool (or an entry indicating an empty LU pool).

To request a specific entry rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only (list LU pools).

AP_DETAIL
Detailed information (list individual LUs in LU pools).

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of the *pool_name* and *lu_name* parameters.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of the *pool_name* and *lu_name* parameters.

The list is ordered by *pool_name* and then by *lu_name*. For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

pool_name
Name of LU pool. This value is ignored if *list_options* is set to `AP_FIRST_IN_LIST`. This is an 8-byte EBCDIC type-A string, padded on the right with spaces if the name is shorter than 8 characters.

lu_name
LU name. This value is ignored if *list_options* is set to `AP_FIRST_IN_LIST` or `AP_SUMMARY`. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

To obtain information about all LUs in a pool, set *pool_name* to the name of the pool, set *num_entries* to `0`, and set *lu_name* to 8 binary zeros.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

lu_pool_summary.overlay_size
The size of the returned `lu_pool_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `lu_pool_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

lu_pool_summary.pool_name
Name of LU pool. This is an 8-byte EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

lu_pool_summary.description
A null-terminated text string describing the LU pool, as specified in the definition of the pool.

lu_pool_summary.num_active_lus
Number of LUs in the pool that are active.

lu_pool_summary.num_avail_lus
Number of LUs in the pool that are available for activation by a forced open request. It includes all LUs whose PU is active or whose host link can be auto-activated, and whose connection is free.

This count does not take account of the LU *model_type*, *model_name* and the DDDLU support of the PU. If the open request specifies a particular value for *model_type*, some LUs that are included in this count may not be available because they do not have the correct model type.

lu_pool_detail.overlay_size
The size of the returned `lu_pool_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `lu_pool_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

lu_pool_detail.pool_name
Name of LU pool to which the LU belongs. This is an 8-byte EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

lu_pool_detail.description
A null-terminated text string describing the LU pool, as specified in the definition of the pool.

lu_pool_detail.lu_name
LU name of the LU. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters. If a single `lu_pool_detail` structure is returned for a particular pool name with a string of 8 binary zeros for the LU name, this indicates that the specified pool is empty.

lu_pool_detail.lu_sscp_sess_active
Specifies whether the LU-SSCP session is active. Possible values are:

AP_YES The session is active.

AP_NO The session is inactive.

lu_pool_detail.appl_conn_active
Specifies whether an application is using the LU. Possible values are:

AP_YES An application is using the LU.

AP_NO No application is using the LU.

lu_pool_detail.plu_sess_active
Specifies whether the PLU-SLU session is active. Possible values are:

AP_YES The session is active.

AP_NO The session is inactive.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *lu_name* parameter was not valid.

AP_INVALID_POOL_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *pool_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_LU62_TIMEOUT

The QUERY_LU62_TIMEOUT verb returns information about the definition of an LU type 6.2 session timeout that was defined previously with a DEFINE_LU62_TIMEOUT verb.

The information is returned as a list. To obtain information about a specific timeout, or about several timeout values, specify values for the *resource_type* and *resource_name* parameters. If the *list_options* parameter is set to AP_FIRST_IN_LIST, the *resource_type* and *resource_name* parameters are ignored. The returned list is ordered on *resource_type* and then on *resource_name*.

For *resource_type*, the ordering is:

1. Global timeouts
2. Local LU timeouts
3. Partner LU timeouts
4. Mode timeouts

For *resource_name*, the ordering is by:

1. Name length
2. By ASCII lexicographical ordering for names of the same length

If the *list_options* parameter is set to AP_LIST_FROM_NEXT, the returned list starts for the next entry according to the defined ordering (whether or not the specified entry exists).

VCB Structure

```
typedef struct query_lu62_timeout
{
  AP_UINT16      opcode;                    /* verb operation code       */
  unsigned char  reserv2;
  unsigned char  format;                    /* reserved                  */
  AP_UINT16      primary_rc;                /* primary return code       */
  AP_UINT32      secondary_rc;              /* secondary return code     */
  unsigned char *buf_ptr;                   /* buffer pointer            */
  AP_UINT32      buf_size;                  /* buffer size               */
  AP_UINT32      total_buf_size;            /* total buffer size         */
  AP_UINT16      num_entries;               /* number of entries         */
  AP_UINT16      total_num_entries;         /* total number of entries   */
  unsigned char  list_options;              /* list options              */
  unsigned char  reserv3;                   /* reserved                  */
  unsigned char  resource_type;             /* resource type             */
  unsigned char  resource_name[17];         /* resource name             */
} QUERY_LU62_TIMEOUT;

typedef struct lu62_timeout_data
{
  AP_UINT16      overlay_size;              /* overlay size              */
  unsigned char  resource_type;             /* resource type             */
  unsigned char  resource_name[17];         /* resource name             */
  AP_UINT16      timeout;                   /* timeout                   */
} LU62_TIMEOUT_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_LU62_TIMEOUT

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of entries for which data should be returned. To request data for a specific entry rather than a range, specify the value 1. To return as many entries as possible, specify 0; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of entries from which CS Linux begins to return data. The list is ordered by *resource_type* in the order AP_GLOBAL_TIMEOUT, AP_LOCAL_LU_TIMEOUT, AP_PARTNER_LU_TIMEOUT, AP_MODE_TIMEOUT, then by *resource_name* in order of the name length, then by ASCII lexicographical ordering for names of the same length.

Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of the *resource_type* and *resource_name* parameters

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of the *resource_type* and *resource_name* parameters

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

resource_type
Specifies the type of timeout being queried. This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST.

Possible values are:

AP_GLOBAL_TIMEOUT
Timeout applies to all LU 6.2 sessions for the local node.

AP_LOCAL_LU_TIMEOUT
Timeout applies to all LU 6.2 sessions for the local LU specified in the *resource_name* parameter.

AP_PARTNER_LU_TIMEOUT
Timeout applies to all LU 6.2 sessions to the partner LU specified in the *resource_name* parameter.

AP_MODE_TIMEOUT
Timeout applies to all LU 6.2 sessions using the mode specified in the *resource_name* parameter.

resource_name
Name of the resource being queried. This value can be one of the following:

- If *resource_type* is set to AP_GLOBAL_TIMEOUT, do not specify this parameter.
- If *resource_type* is set to AP_LOCAL_LU_TIMEOUT, only the first 8 bytes of *resource_name* are valid and should be set to the name of the local LU. This is an 8-byte alphanumeric type-A EBCDIC string starting with a letter, padded to the right with EBCDIC spaces. Set the remaining nine bytes to all zeros.
- If *resource_type* is set to AP_PARTNER_LU_TIMEOUT, all 17 bytes of resource_name are valid and should be set to the fully-qualified name of the partner LU which is padded on the right with EBCDIC spaces. The name consists of a 1–8 type-A character network name, followed by an EBCDIC dot (period) character, followed by a 1–8 type-A character partner LU name.
- If *resource_type* is set to AP_MODE_TIMEOUT, only the first 8 bytes of resource_name are valid and should be set to the name of the mode. This is an 8-byte alphanumeric type-A EBCDIC string starting with a letter, padded to the right with EBCDIC spaces. Set he remaining 9 bytes to all zeros.

This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

resource_type
The type of the timeout. Possible values are:

AP_GLOBAL_TIMEOUT
Timeout applies to all LU 6.2 sessions for the local node. The *resource_name* parameter is set to all zeros.

AP_LOCAL_LU_TIMEOUT
Timeout applies to all LU 6.2 sessions for the local LU indicated by the *resource_name* parameter.

AP_PARTNER_LU_TIMEOUT
Timeout applies to all LU 6.2 sessions to the partner LU indicated by the *resource_name* parameter.

AP_MODE_TIMEOUT
Timeout applies to all LU 6.2 sessions using the mode indicated by the *resource_name* parameter.

resource_name
Name of the resource. This name is a local LU, a partner LU, or a mode, depending on the value of the *resource_type* parameter. This parameter is set to zeros if *resource_type* is set to AP_GLOBAL_TIMEOUT.

timeout
Timeout period in seconds. A value of 0 (zero) indicates that the session times out immediately after it becomes free.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_RESOURCE_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name and type, but the combination of *resource_type* and *resource_name* did not match any that are configured.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_MDS_APPLICATION

QUERY_MDS_APPLICATION returns a list of applications that have registered for MDS-level messages by issuing the MS verb REGISTER_MS_APPLICATION. For more information about this verb, see the *IBM Communications Server for Data Center Deployment on AIX or Linux MS Programmer's Guide*.

This verb can be used to obtain information about a specific application or about multiple applications, depending on the options used.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_mds_application
{
   AP_UINT16        opcode;               /* verb operation code            */
   unsigned char    reserv2;              /* reserved                       */
   unsigned char    format;               /* reserved                       */
   AP_UINT16        primary_rc;           /* primary return code            */
   AP_UINT32        secondary_rc;         /* secondary return code          */
   unsigned char    *buf_ptr;             /* pointer to buffer              */
   AP_UINT32        buf_size;             /* buffer size                    */
   AP_UINT32        total_buf_size;       /* total buffer size required     */
   AP_UINT16        num_entries;          /* number of entries              */
   AP_UINT16        total_num_entries;    /* total number of entries        */
   unsigned char    list_options;         /* listing options                */
   unsigned char    reserv3;              /* reserved                       */
   unsigned char    application[8];       /* application                    */
} QUERY_MDS_APPLICATION;

typedef struct mds_application_data
{
   AP_UINT16        overlay_size;         /* size of returned entry         */
   unsigned char    application[8];       /* application name               */
   AP_UINT16        max_rcv_size;         /* max data size appl can receive */
   unsigned char    reserva[20];          /* reserved                       */
} MDS_APPLICATION_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_MDS_APPLICATION

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of applications for which data should be returned. To

request data for a specific application rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of applications from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the application parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the application parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

application
Application name for which information is required, or the name to be used as an index into the list. This parameter is ignored if *list_options* is set to `AP_FIRST_IN_LIST`. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

mds_application_data.overlay_size
The size of the returned `mds_application_data` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `mds_application_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

mds_application_data.application
Name of registered application. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

mds_application_data.max_rcv_size
The maximum number of bytes that the application can receive in one message (this is specified when an application registers with MDS). For more information about MDS-level application registration, refer to the *IBM Communications Server for Data Center Deployment on AIX or Linux MS Programmer's Guide*.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_APPLICATION_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *application* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support MS network management functions; this is defined by the *mds_supported* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_MDS_STATISTICS

QUERY_MDS_STATISTICS returns Management Services statistics. This verb can be used to gauge the level of MDS routing traffic. The information can also be used to determine the required size of the send alert queue, which is configured using the DEFINE_NODE verb.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_mds_statistics
{
   AP_UINT16       opcode;                   /* verb operation code         */
   unsigned char   reserv2;                  /* reserved                    */
   unsigned char   format;                   /* reserved                    */
   AP_UINT16       primary_rc;               /* primary return code         */
   AP_UINT32       secondary_rc;             /* secondary return code       */
   AP_UINT32       alerts_sent;              /* number of alert sends       */
   AP_UINT32       alert_errors_rcvd;        /* error messages received     */
                                             /*  for alert sends            */
   AP_UINT32       uncorrelated_alert_errors; /* uncorrelated alert errors  */
                                             /*  received                   */
   AP_UINT32       mds_mus_rcvd_local;       /* number of MDS_MUs received  */
                                             /*  from local applications    */
   AP_UINT32       mds_mus_rcvd_remote;      /* number of MDS_MUs received  */
                                             /*  from remote applications   */
   AP_UINT32       mds_mus_delivered_local;  /* number of MDS_MUs delivered */
                                             /*  to local applications      */
   AP_UINT32       mds_mus_delivered_remote; /* number of MDS_MUs delivered */
                                             /*  to remote applications     */
   AP_UINT32       parse_errors;             /* number of MDS_MUs received  */
                                             /*  with parse errors          */
   AP_UINT32       failed_deliveries;        /* number of MDS_MUs where     */
                                             /*  delivery failed            */
   AP_UINT32       ds_searches_performed;    /* number of DS searches       */
                                             /*  performed                  */
   AP_UINT32       unverified_errors;        /* number of unverified errors */
   unsigned char   reserva[20];              /* reserved                    */
} QUERY_MDS_STATISTICS;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_MDS_STATISTICS

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

alerts_sent
Number of locally originated alerts sent using the MDS transport system.

alert_errors_rcvd
Number of error messages received by MDS indicating a delivery failure for a message containing an alert.

uncorrelated_errors_rcvd
Number of error messages received by MDS indicating a delivery failure for a message containing an alert. Delivery failure occurs when the error message could not be correlated to an alert on the MDS send alert queue. MDS maintains a fixed-size queue where it caches alerts sent to the problem determination focal point. Once the queue reaches maximum size, the oldest alert will be discarded and replaced by the new alert. If a delivery error message is received, MDS attempts to correlate the error message to a cached alert so that the alert may be held until the problem determination focal point is restored.

Note: The two counts *alert_errors_rcvd* and *uncorrelated_errors_rcvd* can be used to check that the size of the send alert queue (specified on

DEFINE_NODE) is appropriate. If the value of *uncorrelated_errors_rcvd* increases over time, this indicates that the send alert queue size is too small.

mds_mus_rcvd_local
Number of MDS_MUs received from local applications.

mds_mus_rcvd_remote
Number of MDS_MUs received from remote nodes using the MDS_RECEIVE and MSU_HANDLER transaction programs.

mds_mus_delivered_local
Number of MDS_MUs successfully delivered to local applications.

mds_mus_delivered_remote
Number of MDS_MUs successfully delivered to a remote node using the MDS_SEND transaction program.

parse_errors
Number of MDS_MUs received which contained header format errors.

failed_deliveries
Number of MDS_MUs this node failed to deliver.

ds_searches_performed
Number of Directory Services searches used to locate the next hop for an MDS_MU. (Significant for network nodes only).

unverified_errors
Number of routing errors due to using unverified (local Directory Services search) data for determining the next hop for an MDS_MU. Each time one of these errors occurs, Directory Services must repeat the search using either a Central Directory Search or a broadcast search mechanism. (Significant for network nodes only).

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node configuration does not support it, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support MS network management functions; this is defined by the *mds_supported* parameter on the DEFINE_NODE verb.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_MODE

QUERY_MODE returns information about modes that a local LU is using, or has used, with partner LUs.

This verb can be used to obtain information about a specific partner LU-mode combination or about multiple modes, and about modes for which sessions are currently active or about all modes that have been used, depending on the options

used. This verb returns information about current usage of the modes and LUs, not about their definition; use QUERY_MODE_DEFINITION to obtain the definition of the modes and LUs.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_mode
{
   AP_UINT16       opcode;               /* verb operation code             */
   unsigned char   reserv2;              /* reserved                        */
   unsigned char   format;               /* reserved                        */
   AP_UINT16       primary_rc;           /* primary return code             */
   AP_UINT32       secondary_rc;         /* secondary return code           */
   unsigned char   *buf_ptr;             /* pointer to buffer               */
   AP_UINT32       buf_size;             /* buffer size                     */
   AP_UINT32       total_buf_size;       /* total buffer size required      */
   AP_UINT16       num_entries;          /* number of entries               */
   AP_UINT16       total_num_entries;    /* total number of entries         */
   unsigned char   list_options;         /* listing options                 */
   unsigned char   reserv3;              /* reserved                        */
   unsigned char   lu_name[8];           /* LU name                         */
   unsigned char   lu_alias[8];          /* LU alias                        */
   unsigned char   plu_alias[8];         /* partner LU alias                */
   unsigned char   fqplu_name[17];       /* fully qualified partner LU name */
   unsigned char   mode_name[8];         /* mode name                       */
   unsigned char   active_sessions;      /* active sessions only filter     */
} QUERY_MODE;

typedef struct mode_summary
{
   AP_UINT16       overlay_size;         /* size of returned entry          */
   unsigned char   mode_name[8];         /* mode name                       */
   unsigned char   description[32];      /* resource description            */
   unsigned char   reserv2[16];          /* reserved                        */
   AP_UINT16       sess_limit;           /* current session limit           */
   AP_UINT16       act_sess_count;       /* currently active sessions count */
   unsigned char   fqplu_name[17];       /* fully-qualified partner LU name */
   unsigned char   reserv1[3];           /* reserved                        */
} MODE_SUMMARY;

typedef struct mode_detail
{
   AP_UINT16       overlay_size;         /* size of returned entry          */
   unsigned char   mode_name[8];         /* mode name                       */
   unsigned char   description[32];      /* resource description            */
   unsigned char   reserv2[16];          /* reserved                        */
   AP_UINT16       sess_limit;           /* session limit                   */
   AP_UINT16       act_sess_count;       /* currently active sessions count */
   unsigned char   fqplu_name[17];       /* fully-qualified partner LU name */
   unsigned char   reserv1[3];           /* reserved                        */
   AP_UINT16       min_conwinners_source; /* minimum conwinner sess limit   */
   AP_UINT16       min_conwinners_target; /* minimum conloser sess limit    */
   unsigned char   drain_source;         /* drain source?                   */
   unsigned char   drain_partner;        /* drain partner?                  */
   AP_UINT16       auto_act;             /* auto activated conwinner        */
                                         /*  session limit                  */
   AP_UINT16       act_cw_count;         /* active conwinner sessions count */
   AP_UINT16       act_cl_count;         /* active conloser sessions count  */
   unsigned char   sync_level;           /* synchronization level           */
   unsigned char   default_ru_size;      /* default RU size to maximize     */
                                         /*  performance                    */
   AP_UINT16       max_neg_sess_limit;   /* maximum negotiated session limit*/
   AP_UINT16       max_rcv_ru_size;      /* maximum receive RU size         */
   AP_UINT16       pending_session_count; /* pending sess count for mode    */
```

```
   AP_UINT16       termination_count;     /* termination count for mode      */
   AP_UINT16       implicit;              /* implicit or explicit entry      */
   unsigned char   reserva[15];           /* reserved                        */
} MODE_DETAIL;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_MODE

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of modes for which data should be returned. To request data for a specific mode rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list (the first partner LU and mode for the specified local LU).

AP_LIST_INCLUSIVE
Start at the entry specified by the supplied partner LU name and mode name.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the supplied partner LU name and mode name.

For AP_FIRST_IN_LIST, the entry used as the index into the list is defined by the combination of *lu_name* (or *lu_alias*) and *fqplu_name* (or *plu_alias*). If *fqplu_name* or *plu_alias* is not specified, the entry used as the index is *lu_name* (or *lu_alias*).

For AP_LIST_INCLUSIVE or AP_LIST_FROM_NEXT, the entry used as the index into the list is defined by the combination of *lu_name* (or *lu_alias*), *fqplu_name* (or *plu_alias*) and *mode_name* specified. For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

lu_name
LU name. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters. To specify that the LU

is identified by its alias rather than its LU name, set this parameter to 8 binary zeros and specify the LU alias in the following parameter.

lu_alias

Locally defined LU alias. This parameter is used only if *lu_name* is set to 8 binary zeros; it is ignored otherwise.

The alias is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. To indicate the LU associated with the CP (the default LU), set both *lu_name* and *lu_alias* to binary zeros.

plu_alias

Partner LU alias. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. If *list_options* is set to AP_FIRST_IN_LIST, this parameter is ignored; otherwise you must specify either the LU alias or the fully qualified LU name for the partner LU. To specify that the LU is identified by its LU name rather than its alias, set this parameter to 8 binary zeros and specify the LU name in the following parameter.

fqplu_name

Fully qualified network name for the partner LU. If *list_options* is set to AP_FIRST_IN_LIST, this parameter is ignored; otherwise you must specify either the LU alias or the fully qualified LU name for the partner LU. This parameter is used only if *plu_alias* is set to 8 binary zeros; it is ignored otherwise.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

mode_name

Mode name which designates the network properties for a group of sessions. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters. This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST.

active_sessions

Specifies whether to return information only on modes for which sessions are active, or on all modes. Possible values are:

AP_YES Return information only on modes for which sessions are currently active.

AP_NO Return information about all modes for which sessions are active or have been active.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc

AP_OK

buf_size

Length of the information returned in the supplied buffer.

total_buf_size

Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

mode_summary.overlay_size
The size of the returned `mode_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `mode_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

mode_summary.mode_name
Mode name. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

mode_summary.description
A null-terminated text string describing the mode, as specified in the definition of the mode.

mode_summary.sess_limit
Current session limit.

mode_summary.act_sess_count
Total number of active sessions between the specified local LU and partner LU using the mode.

mode_summary.fqplu_name
Fully qualified name of the partner LU. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

mode_detail.overlay_size
The size of the returned `mode_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `mode_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

mode_detail.mode_name
Mode name. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

mode_detail.description
A null-terminated text string describing the mode, as specified in the definition of the mode.

mode_detail.sess_limit
Current session limit.

mode_detail.act_sess_count
Total number of active sessions between the specified local LU and partner LU using the mode.

mode_detail.fqplu_name
Fully qualified name of the partner LU. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

mode_detail.min_conwinners_source
Specifies the minimum number of sessions on which the local LU is the contention winner.

mode_detail.min_conwinners_target
Specifies the minimum number of sessions on which the local LU is the contention loser.

mode_detail.drain_source
Specifies whether the local LU satisfies waiting session requests before deactivating a session when session limits are changed or reset. Possible values are:

AP_YES Waiting session requests will be satisfied before sessions are deactivated.

AP_NO Waiting session requests will not be satisfied.

mode_detail.drain_partner
Specifies whether the partner LU satisfies waiting session requests before deactivating a session when session limits are changed or reset. Possible values are:

AP_YES Waiting session requests will be satisfied before sessions are deactivated.

AP_NO Waiting session requests will not be satisfied.

mode_detail.auto_act
Number of contention winner sessions that are automatically activated following the CNOS exchange with the partner LU.

mode_detail.act_cw_count
Number of active contention winner sessions using this mode. (The local LU does not need to "bid" before using one of these sessions.)

mode_detail.act_cl_count
Number of active, contention loser sessions using this mode. (The local LU must "bid" before using one of these sessions.)

mode_detail.sync_level
Specifies the synchronization level supported by the mode. Possible values are:

AP_CONFIRM
The mode supports synchronization using the CONFIRM and CONFIRMED verbs.

AP_SYNCPT
The mode supports Syncpoint functions.

AP_NONE
The mode does not support synchronization.

mode_detail.default_ru_size
Specifies whether the default upper bound for the maximum RU size will be used. Possible values are:

AP_YES CS Linux ignores the maximum RU size specified in the definition of the mode, and sets the upper bound for the maximum RU size to the largest value that can be accommodated in the link BTU size.

AP_NO CS Linux uses the maximum RU size specified in the definition of the mode.

mode_detail.max_neg_sess_limit
Maximum negotiable session limit. Specifies the maximum session limit that a local LU can use with this mode name during its CNOS processing as the target LU.

mode_detail.max_rcv_ru_size
Maximum received RU size.

mode_detail.pending_session_count
Specifies the number of sessions pending (waiting for session activation to complete).

mode_detail.termination_count
If a previous CNOS verb has set the mode session limit to zero, but sessions are still active because conversations were using them or waiting to use them, this parameter specifies the number of sessions that have not yet been deactivated.

mode_detail.implicit
Specifies whether the entry was created by an implicit or explicit definition. Possible values are:

AP_YES The entry is an implicit entry.

AP_NO The entry is an explicit entry.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

AP_INVALID_LU_ALIAS
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *lu_alias* parameter was not valid.

AP_INVALID_LU_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *lu_name* parameter was not valid.

AP_INVALID_MODE_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *mode_name* parameter was not valid.

AP_INVALID_PLU_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but one of the following conditions applies:

- The *fqplu_name* parameter does not match the name of any of this local LU's partners.
- No sessions have been active (since the node was last started) for the specified combination of local LU, partner LU, and mode.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_MODE_DEFINITION

QUERY_MODE_DEFINITION returns information about modes defined using DEFINE_MODE, or about SNA-defined modes.

This verb can be used to obtain either summary or detailed information, about a specific mode or about multiple modes, depending on the options used. It returns information about the definition of the modes, not about their current usage; use QUERY_MODE to obtain information about the current usage of a mode by local and partner LUs.

This verb cannot be used to return information about the default COS name that will be used for any unrecognized mode names; use QUERY_MODE_TO_COS_MAPPING to do this.

VCB Structure

```
typedef struct query_mode_definition
{
   AP_UINT16         opcode;                 /* verb operation code        */
   unsigned char     reserv2;                /* reserved                   */
   unsigned char     format;                 /* reserved                   */
   AP_UINT16         primary_rc;             /* primary return code        */
   AP_UINT32         secondary_rc;           /* secondary return code      */
   unsigned char     *buf_ptr;               /* pointer to buffer          */
   AP_UINT32         buf_size;               /* buffer size                */
   AP_UINT32         total_buf_size;         /* total buffer size required */
   AP_UINT16         num_entries;            /* number of entries          */
   AP_UINT16         total_num_entries;      /* total number of entries    */
   unsigned char     list_options;           /* listing options            */
   unsigned char     reserv3;                /* reserved                   */
   unsigned char     mode_name[8];           /* mode name                  */
} QUERY_MODE_DEFINITION;

typedef struct mode_def_summary
{
   AP_UINT16         overlay_size;           /* size of returned entry     */
```

```
   unsigned char     mode_name[8];             /* mode name                 */
   unsigned char     description[32];          /* resource description      */
   unsigned char     reserv1[16];              /* reserved                  */
} MODE_DEF_SUMMARY;

typedef struct mode_def_detail
{
   AP_UINT16         overlay_size;             /* size of returned entry    */
   unsigned char     mode_name[8];             /* mode name                 */
   MODE_CHARS        mode_chars;               /* mode characteristics      */
} MODE_DEF_DETAIL;

typedef struct mode_chars
{
   unsigned char     description[32];          /* resource description      */
   unsigned char     reserv2[16];              /* reserved                  */
   AP_UINT16         max_ru_size_upp;          /* maximum RU size upper bound*/
   unsigned char     receive_pacing_win;       /* receive pacing window     */
   unsigned char     default_ru_size;          /* default RU size to        */
                                               /*  maximize performance     */
   AP_UINT16         max_neg_sess_lim;         /* maximum negotiable session */
                                               /*  limit                    */
   AP_UINT16         plu_mode_session_limit;   /* LU-mode session limit     */
   AP_UINT16         min_conwin_src;           /* minimum source contention  */
                                               /*  winner sessions          */
   unsigned char     cos_name[8];              /* class of service name     */
   unsigned char     cryptography;             /* cryptography (reserved)   */
   unsigned char   compression;               /* data compression supported? */
   AP_UINT16         auto_act;                 /* number of sessions to be  */
                                               /* activated automatically   */
   AP_UINT16         min_conloser_src;         /* minimum source contention  */
                                               /*  loser                    */
   AP_UINT16         max_ru_size_low;          /* maximum RU size lower bound*/
   AP_UINT16         max_receive_pacing_win;   /* maximum receive pacing    */
                                               /*  window                   */
   unsigned char   max_compress_lvl;      /* max level of data compression   */
   unsigned char   max_decompress_lvl;    /* max level of data decompression */
   unsigned char     comp_in_series;           /* reserved                  */
   unsigned char     reserv4[25];              /* reserved                  */
} MODE_CHARS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_MODE_DEFINITION

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of modes for which data should be returned. To request data for a specific mode rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *mode_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *mode_name* parameter.

For more information about how the application can obtain specific entries from the list, see "List Options For QUERY_* Verbs" on page 39. This verb differs from other QUERY_* verbs in that the modes are listed in the order they are created.

mode_name
Mode name which designates the network properties for a group of sessions. This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

mode_def_summary.overlay_size
The size of the returned mode_def_summary structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each mode_def_summary structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C sizeof() operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

mode_def_summary.mode_name
Mode name. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

mode_def_summary.description
A null-terminated text string describing the mode, as specified in the definition of the mode.

mode_def_detail.overlay_size
The size of the returned `mode_def_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `mode_def_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

mode_def_detail.mode_name
Mode name. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

mode_def_detail.mode_chars.description
A null-terminated text string describing the mode, as specified in the definition of the mode.

mode_def_detail.mode_chars.max_ru_size_upp
Upper boundary for the maximum RU size to be used on sessions with this mode name. The value is used when the maximum RU size is negotiated during session activation.

Range: `256`–`61,440`. This field is ignored if the *default_ru_size* parameter (see below) is set to `AP_YES`.

mode_def_detail.mode_chars.receive_pacing_win
Session pacing window for sessions using this mode. For fixed pacing, this is the maximum number of frames that can be received from the partner LU before the local LU must send a response; for adaptive pacing, this value is used as an initial receive window size. CS Linux always uses adaptive pacing unless the adjacent node specifies that it is not supported.

Range is `1`–`63`, or zero to specify no pacing window (that is, an unlimited number of frames can be received, and no response is required).

mode_def_detail.mode_chars.default_ru_size
Specifies whether a default upper bound for the maximum RU size will be used. Possible values are:

AP_YES CS Linux ignores the *max_ru_size_upp* parameter, and sets the upper bound for the maximum RU size to the largest value that can be accommodated in the link BTU size.

AP_NO CS Linux uses the *max_ru_size_upp* parameter to define the maximum RU size.

mode_def_detail.mode_chars.max_neg_sess_lim
Maximum number of sessions allowed on this mode between any local LU and partner LU. Range: `1`–`32,767`, or zero to specify no implicit CNOS exchange.

mode_def_detail.mode_chars.plu_mode_session_limit
Default session limit for this mode. This limits the number of sessions on

this mode between any one local LU and partner LU pair. This value is used when CNOS (Change Number of Sessions) exchange is initiated implicitly. Range: 1–32,767, or zero to specify no implicit CNOS exchange.

mode_def_detail.mode_chars.min_conwin_src
Minimum number of contention winner sessions that a local LU using this mode can activate. This value is used when CNOS (Change Number of Sessions) exchange is initiated implicitly. Range: 1–32,767, or zero to specify no implicit CNOS exchange.

mode_def_detail.mode_chars.cos_name
Name of the class of service to request when activating sessions on this mode. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

mode_def_detail.mode_chars.compression
Specifies whether sessions activated using this mode can use compression. Possible values are:

AP_COMP_PROHIBITED
Compression is not supported for sessions using this mode.

AP_COMP_REQUESTED
Compression is supported and requested for sessions using this mode. (It is not mandatory; compression will not be used if the BIND from the partner does not request it.)

mode_def_detail.mode_chars.auto_act
Specifies how many sessions will be activated automatically for this mode. This value is used when CNOS (Change Number of Sessions) exchange is initiated implicitly. This value is in the range 0–32,767.

mode_def_detail.mode_chars.min_conloser_src
Minimum number of contention loser sessions that can be activated by any one local LU that uses this mode. This value is used when CNOS (Change Number of Sessions) exchange is initiated implicitly. This value is in the range 0–32,767.

mode_def_detail.mode_chars.max_ru_size_low
Lower bound for the maximum size of RUs sent and received on sessions that use this mode.

This value is in the range 256–61,440 or zero, which means that there is no lower bound.

mode_def_detail.mode_chars.max_receive_pacing_win
Maximum session pacing window for sessions in this mode. For adaptive pacing, this value is used to limit the receive pacing window that the session will grant. For fixed pacing, this parameter is not used. (CS Linux always uses adaptive pacing unless the adjacent node specifies that it does not support it.)

This value is in the range 0–32,767 or zero, which means there is no limit for the pacing window.

mode_def_detail.mode_chars.max_compress_lvl
Specifies the maximum level of compression that CS Linux will attempt to negotiate for data flowing from the local node. Possible values are:

- AP_NONE
- AP_RLE_COMPRESSION
- AP_LZ9_COMPRESSION

- AP_LZ10_COMPRESSION

If compression is negotiated using a non-extended BIND, which does not specify a maximum compression level, RLE compression will be used.

mode_def_detail.mode_chars.max_decompress_lvl
Specifies the maximum level of decompression that CS Linux will attempt to negotiate for data flowing into the local node. Possible values are:

- AP_NONE
- AP_RLE_COMPRESSION
- AP_LZ9_COMPRESSION
- AP_LZ10_COMPRESSION

If compression is negotiated using a non-extended BIND, which does not specify a maximum compression level, RLE compression will be used.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_MODE_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *mode_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_MODE_TO_COS_MAPPING

QUERY_MODE_TO_COS_MAPPING returns information about the COS (class of service) associated with a particular mode. This verb can be used to obtain information about a specific mode or about multiple modes, depending on the options used.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_mode_to_cos_mapping
{
   AP_UINT16        opcode;                 /* verb operation code         */
   unsigned char    reserv2;                /* reserved                    */
   unsigned char    format;                 /* reserved                    */
   AP_UINT16        primary_rc;             /* primary return code         */
   AP_UINT32        secondary_rc;           /* secondary return code       */
```

```
   unsigned char    *buf_ptr;               /* pointer to buffer          */
   AP_UINT32        buf_size;               /* buffer size                */
   AP_UINT32        total_buf_size;         /* total buffer size required */
   AP_UINT16        num_entries;            /* number of entries          */
   AP_UINT16        total_num_entries;      /* total number of entries    */
   unsigned char    list_options;           /* listing options            */
   unsigned char    reserv3;                /* reserved                   */
   unsigned char    mode_name[8];           /* mode name                  */
} QUERY_MODE_TO_COS_MAPPING;

typedef struct mode_to_cos_mapping_data
{
   AP_UINT16        overlay_size;           /* size of returned entry     */
   unsigned char    mode_name[8];           /* mode name                  */
   unsigned char    cos_name[8];            /* cos name                   */
   unsigned char    reserva[20];            /* reserved                   */
} MODE_TO_COS_MAPPING_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_MODE_TO_COS_MAPPING

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of modes for which data should be returned. To request data for a specific mode rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of modes from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *mode_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *mode_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

mode_name
Mode name for which information is required, or the name to be used as an index into the list. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST.

The mode name is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters. To return information about the default COS that is used for any unrecognized mode names, set this parameter to 8 binary zeros.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

mode_to_cos_mapping_data.overlay_size
The size of the returned mode_to_cos_mapping_data structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each mode_to_cos_mapping_data structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C sizeof() operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

mode_to_cos_mapping_data.mode_name
Mode name. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

mode_to_cos_mapping_data.cos_name
Class of service name associated with the mode name. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_MODE_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *mode_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_NMVT_APPLICATION

QUERY_NMVT_APPLICATION returns a list of applications that have registered for NMVT-level messages by issuing the MS verb REGISTER_NMVT_APPLICATION. For more information about this verb, see the *IBM Communications Server for Data Center Deployment on AIX or Linux MS Programmer's Guide*.

This verb can be used to obtain information about a specific application or about multiple applications, depending on the options used.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_nmvt_application
{
   AP_UINT16         opcode;                 /* Verb operation code       */
   unsigned char     reserv2;                /* reserved                  */
   unsigned char     format;                 /* reserved                  */
   AP_UINT16         primary_rc;             /* primary return code       */
   AP_UINT32         secondary_rc;           /* secondary return code     */
   unsigned char     *buf_ptr;               /* pointer to buffer         */
   AP_UINT32         buf_size;               /* buffer size               */
   AP_UINT32         total_buf_size;         /* total buffer size required*/
   AP_UINT16         num_entries;            /* number of entries         */
   AP_UINT16         total_num_entries;      /* total number of entries   */
   unsigned char     list_options;           /* listing options           */
   unsigned char     reserv3;                /* reserved                  */
   unsigned char     application[8];         /* application               */
} QUERY_NMVT_APPLICATION;

typedef struct nmvt_application_data
{
   AP_UINT16         overlay_size;           /* size of returned entry    */
   unsigned char     application[8];         /* application name          */
   AP_UINT16         ms_vector_key_type;     /* MS vector key accepted    */
                                             /*  by appl                  */
   unsigned char     conversion_required;    /* is conversion to MDS_MU   */
                                             /*  required                 */
   unsigned char     reserv[5];              /* reserved                  */
   unsigned char     reserva[20];            /* reserved                  */
} NMVT_APPLICATION_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_NMVT_APPLICATION

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of applications for which data should be returned. To request data for a specific application rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of applications from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the application parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the application parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

application
Application name. This parameter is ignored if *list_options* is set to `AP_FIRST_IN_LIST`. The name is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

nmvt_application_data.overlay_size
The size of the returned `nmvt_application_data` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `nmvt_application_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may

increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

nmvt_application_data.application
Name of the registered application. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

nmvt_application_data.ms_vector_key_type
MS vector key accepted by the application. When the application registers for NMVT messages, it specifies which MS vector keys it will accept.

nmvt_application_data.conversion_required
Specifies whether the registered application requires incoming messages to be converted from NMVT to MDS_MU format. When the application registers for NMVT messages, it specifies whether this conversion is required. Possible values are:

AP_YES Incoming messages are converted to MDS_MU format.

AP_NO Incoming messages are not converted.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_APPLICATION_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the application parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_NN_TOPOLOGY_NODE

Each network node maintains a network topology database which holds information about all the network nodes, virtual routing nodes (VRNs), and network node to network node TGs in the network.
QUERY_NN_TOPOLOGY_NODE returns information about the network node and VRN entries in this database.

This verb can be used to obtain either summary or detailed information, about a specific node or about multiple nodes, depending on the options used. It can be issued only to a network node; it is not valid at an end node or a LEN node.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_nn_topology_node
{
   AP_UINT16        opcode;               /* verb operation code            */
   unsigned char    reserv2;              /* reserved                       */
   unsigned char    format;               /* reserved                       */
   AP_UINT16        primary_rc;           /* primary return code            */
   AP_UINT32        secondary_rc;         /* secondary return code          */
   unsigned char    *buf_ptr;             /* pointer to buffer              */
   AP_UINT32        buf_size;             /* buffer size                    */
   AP_UINT32        total_buf_size;       /* total buffer size required     */
   AP_UINT16        num_entries;          /* number of entries              */
   AP_UINT16        total_num_entries;    /* total number of entries        */
   unsigned char    list_options;         /* listing options                */
   unsigned char    reserv3;              /* reserved                       */
   unsigned char    node_name[17];        /* network qualified node name    */
   unsigned char    node_type;            /* node type                      */
   AP_UINT32        frsn;                 /* flow reduction sequence number */
} QUERY_NN_TOPOLOGY_NODE;
```

If the *frsn* field is set to a non-zero value then only node entries with FRSNs equal to or greater than the one specified will be returned. If it is set to zero then all node entries are returned.

```
typedef struct nn_topology_node_summary
{
   AP_UINT16        overlay_size;         /* size of returned entry         */
   unsigned char    node_name[17];        /* network qualified node name    */
   unsigned char    node_type;            /* node type                      */
} NN_TOPOLOGY_NODE_SUMMARY;

typedef struct nn_topology_node_detail
{
   AP_UINT16        overlay_size;         /* size of returned entry         */
   unsigned char    node_name[17];        /* network qualified node name    */
   unsigned char    node_type;            /* node type                      */
   AP_UINT16        days_left;            /* days left until entry purged   */
   unsigned char    reserv1[2];           /* reserved                       */
   AP_UINT32        frsn;                 /* flow reduction sequence number */
   AP_UINT32        rsn;                  /* resource sequence number       */
   unsigned char    rar;                  /* route additional resistance    */
   unsigned char    status;               /* node status                    */
   unsigned char    function_support;     /* function support               */
   unsigned char    reserv2;              /* reserved                       */
   unsigned char    branch_aware;         /* is the node branch aware?      */
   unsigned char    reserva[19];          /* reserved                       */
} NN_TOPOLOGY_NODE_DETAIL;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_NN_TOPOLOGY_NODE

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of nodes for which data should be returned. To request data for a specific node rather than a range, specify the value 1. To return

as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of the *node_name*, *node_type*, and *frsn* parameters.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of the *node_name*, *node_type*, and *frsn* parameters.

The list is ordered by *node_name*, then by *node_type* (in the order AP_NETWORK_NODE, AP_VRN), and lastly in numerical order of *frsn*. For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

node_name
Fully qualified name of the node for which information is required, or the name to be used as an index into the list of nodes. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

node_type
Type of the node. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. Possible values are:

AP_NETWORK_NODE
Network node.

AP_VRN Virtual routing node.

AP_LEARN_NODE
Node type is unknown.

frsn Flow Reduction Sequence Number (FRSN). Specify zero to return information about all nodes, or a nonzero value to return information about nodes with a FRSN greater than or equal to this value.

This parameter can be used to ensure that consistent information is obtained when the application needs to issue several verbs to obtain all the information. The application should take the following steps:

To Obtain Consistent Information Using the frsn Parameter

1. Issue QUERY_NODE to get the node's current FRSN.
2. Issue as many QUERY_NN_TOPOLOGY_NODE verbs as necessary to get all the database entries, with the *frsn* parameter set to zero.
3. Issue QUERY_NODE again and compare the new FRSN with the one returned in step 1.
4. If the two FRSNs are different, the database has changed. Add 1 to the FRSN obtained in step 1, and issue further QUERY_NN_TOPOLOGY_NODE verbs with the *frsn* parameter set to this new value. These verbs will return only the entries that have changed.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

nn_topology_node_summary.overlay_size
The size of the returned `nn_topology_node_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `nn_topology_node_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

nn_topology_node_summary.node_name
Fully qualified name of the node. This is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

nn_topology_node_summary.node_type
Type of the node. This is one of the following:

AP_NETWORK_NODE
Network node.

AP_END_NODE
End node.

AP_VRN Virtual routing node.

nn_topology_node_detail.node_name
Fully qualified name of the node. This is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

nn_topology_node_detail.node_type
Type of the node. This is one of the following:

AP_NETWORK_NODE
Network node.

AP_END_NODE
End node.

AP_VRN Virtual routing node.

nn_topology_node_detail.overlay_size
The size of the returned `nn_topology_node_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `nn_topology_node_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

nn_topology_node_detail.days_left
Number of days before this node entry will be deleted from the Topology Database. For the local node entry, this value is set to zero, indicating that this entry is never deleted.

nn_topology_node_detail.frsn
Flow Reduction Sequence Number (FRSN). Indicates the last time that this resource was updated at the local node.

nn_topology_node_detail.rsn
Resource Sequence Number. This is assigned by the network node that owns this resource.

nn_topology_node_detail.rar
The node's route additional resistance. Values are in the range `0–255`.

nn_topology_node_detail.status
Specifies the status of the node. This parameter may be set to `AP_UNCONGESTED`, to any one of the other values listed, or to two or more of the other values combined using a logical `OR`. Possible values are:

AP_UNCONGESTED
The number of ISR sessions is below the *isr_sessions_upper_threshold* value in the node's configuration.

AP_CONGESTED
The number of ISR sessions exceeds the threshold value.

AP_IRR_DEPLETED
The number of ISR sessions has reached the maximum specified for the node.

AP_ERR_DEPLETED
The number of endpoint sessions has reached the maximum specified.

AP_QUIESCING
A STOP_NODE of type AP_QUIESCE or AP_QUIESCE_ISR has been issued.

nn_topology_node_detail.function_support
Specifies which functions are supported. This may be one or more of the following, combined using a logical OR.

AP_BORDER_NODE
Border Node

AP_EXTENDED_BORDER_NODE
Return border node function is supported.

AP_CDS Central Directory server

AP_GATEWAY
Gateway Node

AP_INTERCHANGE_NODE
Interchange node function is supported.

AP_ISR Intermediate Session Routing.

AP_HPR Node supports the base functions of High Performance Routing (HPR).

AP_RTP_TOWER
Node supports the Rapid Transport Protocol tower of HPR.

AP_CONTROL_OVER_RTP_TOWER
Node supports HPR control flows over the Rapid Transport Protocol tower.

nn_topology_node_detail.branch_aware
Specifies whether the node supports branch awareness, APPN Option Set 1120.

AP_NO The node does not support option set 1120.

AP_YES The node supports option set 1120.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_NODE
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *node_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node is not a network node, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node is not a network node. This verb can be used only at a network node.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_NN_TOPOLOGY_STATS

QUERY_NN_TOPOLOGY_STATS returns statistical information about the topology database. It can be used only if the CS Linux node is a network node, and is not valid if it is an end node.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_nn_topology_stats
{
  AP_UINT16       opcode;               /* verb operation code             */
  unsigned char   reserv2;              /* reserved                        */
  unsigned char   format;               /* reserved                        */
  AP_UINT16       primary_rc;           /* primary return code             */
  AP_UINT32       secondary_rc;         /* secondary return code           */
  AP_UINT32       max_nodes;            /* max number of nodes in database */
  AP_UINT32       cur_num_nodes;        /* current number of nodes in      */
                                        /*  database                       */
  AP_UINT32       node_in_tdus;         /* number of TDUs received         */
  AP_UINT32       node_out_tdus;        /* number of TDUs sent             */
  AP_UINT32       node_low_rsns;        /* node updates received with low  */
                                        /*  RSNs                           */
  AP_UINT32       node_equal_rsns;      /* node updates in with equal RSNs */
  AP_UINT32       node_good_high_rsns;  /* node updates in with high RSNs  */
  AP_UINT32       node_bad_high_rsns;   /* node updates in with high and   */
                                        /*  odd RSNs                       */
  AP_UINT32       node_state_updates;   /* number of node updates sent     */
  AP_UINT32       node_errors;          /* number of node entry errors found*/
  AP_UINT32       node_timer_updates;   /* number of node records built    */
                                        /*  due to timer updates           */
  AP_UINT32       node_purges;          /* number of node records purged   */
  AP_UINT32       tg_low_rsns;          /* TG updates received with low RSNs*/
  AP_UINT32       tg_equal_rsns;        /* TG updates in with equal RSNs   */
  AP_UINT32       tg_good_high_rsns;    /* TG updates in with high RSNs    */
  AP_UINT32       tg_bad_high_rsns;     /* TG updates in with high and     */
                                        /*  odd RSNs                       */
  AP_UINT32       tg_state_updates;     /* number of TG updates sent       */
  AP_UINT32       tg_errors;            /* number of TG entry errors found */
  AP_UINT32       tg_timer_updates;     /* number of node records built    */
                                        /*  due to timer updates           */
  AP_UINT32       tg_purges;            /* number of node records purged   */
  AP_UINT32       total_route_calcs;    /* number of routes calculated     */
                                        /*  for COS                        */
```

```
  AP_UINT32       total_route_rejs;      /* number of failed route          */
                                         /*  calculations                   */
  AP_UINT32       total_tree_cache_hits; /* total number of tree cache hits  */
  AP_UINT32       total_tree_cache_misses;   /* total number of tree cache   */
                                             /*  misses                      */
  AP_UINT32       total_tdu_wars;        /* total number TDU war detections  */
  unsigned char   reserva[16];           /* reserved                         */
} QUERY_NN_TOPOLOGY_STATS;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_NN_TOPOLOGY_STATS

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

max_nodes
Maximum number of node records in the Topology Database. This value was specified on DEFINE_NODE. A value of zero indicates no limit.

cur_num_nodes
Current number of nodes in this node's topology database. If this value exceeds the maximum number of nodes allowed, an Alert is issued.

node_in_tdus
Total number of Topology Database Updates (TDUs) received by this node.

node_out_tdus
Total number of Topology Database Updates (TDUs) built by this node to be sent to all adjacent network nodes since the last initialization.

node_low_rsns
Total number of topology node updates received by this node with RSN less than the current RSN. Both even and odd RSNs are included in this count. (These TDUs are not errors, but result when TDUs are broadcast to all adjacent network nodes. No update to this node's topology database occurs, but this node will send a TDU with its higher RSN to the adjacent node that sent this low RSN.)

node_equal_rsns
Total number of topology node updates received by this node with RSN equal to the current RSN. Both even and odd RSNs are included in this count. (These TDUs are not errors, but result when TDUs are broadcast to all adjacent network nodes. No update to this node's topology database occurs.)

node_good_high_rsns
Total number of topology node updates received by this node with RSN greater than the current RSN. The node updates its topology and broadcasts a TDU to all adjacent network nodes. It is not required to send a TDU to the sender of this update because that node already has the update.

node_bad_high_rsns
Total number of topology node updates received by this node with an odd RSN greater than the current RSN. These updates represent a topology

inconsistency detected by one of the APPN network nodes. The node updates its topology and broadcasts the TDU to all adjacent network nodes.

node_state_updates
Total number of topology node updates built as a result of internally detected node state changes that affect APPN topology and routing. Updates are sent via TDUs to all adjacent network nodes.

node_errors
Total number of topology node update inconsistencies detected by this node. This occurs when this node attempts to update its topology database and detects a data inconsistency. This node will create a TDU with the current RSN incremented to the next odd number and broadcast it to all adjacent network nodes.

node_timer_updates
Total number of topology node updates built for this node's resource due to timer updates. Updates are sent via TDUs to all adjacent network nodes. These updates ensure that other network nodes do not delete this node's resource from their topology database.

node_purges
Total number of topology node records purged from this node's topology database. This occurs when a node record has not been updated in a specified amount of time. The owning node is responsible for broadcasting updates for its resource that it wants kept in the network topology.

tg_low_rsns
Total number of topology TG updates received by this node with RSN less than the current RSN. Both even and odd RSNs are included in this count. (These TDUs are not errors, but result when TDUs are broadcast to all adjacent network nodes. No update to this node's topology database occurs, but this node will send a TDU with its higher RSN to the adjacent node that sent this low RSN.)

tg_equal_rsns
Total number of topology TG updates received by this node with RSN equal to the current RSN. Both even and odd RSNs are included in this count. (These TDUs are not errors, but result when TDUs are broadcast to all adjacent network nodes. No update to this node's topology database occurs.)

tg_good_high_rsns
Total number of topology TG updates received by this node with RSN greater than the current RSN. The node updates its topology and broadcasts a TDU to all adjacent network nodes.

tg_bad_high_rsns
Total number of topology TG updates received by this node with an odd RSN greater than the current RSN. These updates represent a topology inconsistency detected by one of the APPN network nodes. The node updates its topology and broadcasts the TDU to all adjacent network nodes.

tg_state_updates
Total number of topology TG updates built as a result of internally detected node state changes that affect APPN topology and routing. Updates are sent via TDUs to all adjacent network nodes.

tg_errors
Total number of topology TG update inconsistencies detected by this node. This occurs when this node attempts to update its topology database and detects a data inconsistency. This node will create a TDU with the current RSN incremented to the next odd number and broadcast it to all adjacent network nodes.

tg_timer_updates
Total number of topology TG updates built for this node's resource due to timer updates. Updates are sent via TDUs to all adjacent network nodes. These updates ensure that other network nodes do not delete this node's resource from their topology database.

tg_purges
Total number of topology TG records purged from this node's topology database. This occurs when a TG record has not been updated in a specified amount of time. The owning node is responsible for broadcasting updates for its resource that it wants kept in the network topology.

total_route_calcs
Number of routes calculated for all class of services since the last initialization.

total_route_rejs
Number of route requests for all class of services that could not be calculated since the last initialization.

total_tree_cache_hits
Number of route computations that were satisfied by a cached routing tree. This number may be greater than the total number of computed routes, since each route may require inspection of several trees.

total_tree_cache_misses
Number of route computations that were not satisfied by a cached routing tree, so that a new routing tree had to be built.

total_tdu_wars
Number of TDU wars the local node has detected and prevented.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node is not a network node, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node is not a network node. This verb can be used only at a network node.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_NN_TOPOLOGY_TG

Each network node maintains a network topology database which holds information about all the network nodes, VRNs and network node to network node TGs in the network. QUERY_NN_TOPOLOGY_TG returns information about the TG entries in this database.

This verb can be used to obtain either summary or detailed information, about a specific TG or about multiple TGs, depending on the options used. It can be issued only to a network node; it is not valid at an end node or a LEN node.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_nn_topology_tg
{
   AP_UINT16         opcode;               /* verb operation code            */
   unsigned char     reserv2;              /* reserved                       */
   unsigned char     format;               /* reserved                       */
   AP_UINT16         primary_rc;           /* primary return code            */
   AP_UINT32         secondary_rc;         /* secondary return code          */
   unsigned char     *buf_ptr;             /* pointer to buffer              */
   AP_UINT32         buf_size;             /* buffer size                    */
   AP_UINT32         total_buf_size;       /* total buffer size required     */
   AP_UINT16         num_entries;          /* number of entries              */
   AP_UINT16         total_num_entries;    /* total number of entries        */
   unsigned char     list_options;         /* listing options                */
   unsigned char     reserv3;              /* reserved                       */
   unsigned char     owner[17];            /* node that owns the TG          */
   unsigned char     owner_type;           /* type of node that owns the TG  */
   unsigned char     dest[17];             /* TG destination node            */
   unsigned char     dest_type;            /* TG destination node type       */
   unsigned char     tg_num;               /* TG number                      */
   unsigned char     reserv1;              /* reserved                       */
   AP_UINT32         frsn;                 /* flow reduction sequence number */
} QUERY_NN_TOPOLOGY_TG;

typedef struct topology_tg_summary
{
   AP_UINT16         overlay_size;         /* size of returned entry         */
   unsigned char     owner[17];            /* node that owns the TG          */
   unsigned char     owner_type;           /* type of node that owns the TG  */
   unsigned char     dest[17];             /* TG destination node            */
   unsigned char     dest_type;            /* TG destination node type       */
   unsigned char     tg_num;               /* TG number                      */
   unsigned char     reserv3[1];           /* reserved                       */
   AP_UINT32         frsn;                 /* flow reduction sequence number */
} TOPOLOGY_TG_SUMMARY;

typedef struct topology_tg_detail
{
   AP_UINT16         overlay_size;         /* size of returned entry         */
   unsigned char     owner[17];            /* node that owns the TG          */
   unsigned char     owner_type;           /* type of node that owns the TG  */
   unsigned char     dest[17];             /* TG destination node            */
   unsigned char     dest_type;            /* TG destination node type       */
   unsigned char     tg_num;               /* TG number                      */
   unsigned char     reserv3[1];           /* reserved                       */
   AP_UINT32         frsn;                 /* flow reduction sequence number */
   AP_UINT16         days_left;            /* days left until entry purged   */
   LINK_ADDRESS      dlc_data;             /* DLC signalling data            */
   AP_UINT32         rsn;                  /* resource sequence number       */
   unsigned char     status;               /* tg status                      */
   TG_DEFINED_CHARS  tg_chars;             /* TG characteristics             */
   unsigned char     subarea_number;       /* subarea number                 */
   unsigned char     tg_type;              /* TG type                        */
   unsigned char     intersubnet_tg;       /* TG between subnets             */
   unsigned char     cp_cp_session_active; /* Are CP-CP sessions active?     */
   unsigned char     branch_tg;            /* TG branch aware?               */
   unsigned char     multilink_tg;         /* reserved                       */
```

```
   unsigned char     appended_data_format; /* format of appended data        */
   unsigned char     appended_data_len;    /* length of appended data        */
   unsigned char     reserva[9];           /* reserved                       */
} TOPOLOGY_TG_DETAIL;

typedef struct link_address
{
  unsigned char   format;                 /* type of link address           */
  unsigned char   reserve1;               /* reserved                       */
  AP_UINT16       length;                 /* length                         */
  unsigned char   address[32];            /* address                        */
} LINK_ADDRESS;
```

For details of the TG_DEFINED_CHARS structure, see "DEFINE_LS" on page 117.

If the *frsn* field is set to a non-zero value then only node entries with that FRSN or greater will be returned. If it is set to zero then all node entries are returned.

If the *list_options* parameter specifies detailed information, a TG Descriptor CV may be appended to the returned information. See the descriptions of the parameters *topology_tg_detail.appended_data_format* and *topology_tg_detail.appended_data_len* for more information.

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_NN_TOPOLOGY_TG

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of TGs for which data should be returned. To request data for a specific TG rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of owner, destination, TG number, and FRSN.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of owner, destination, TG number, and FRSN.

The combination of the *owner*, *owner_type*, *dest*, *dest_type*, *tg_num*, and *frsn* parameters specified is used as an index into the list of TGs if the *list_options* parameter is set to AP_LIST_INCLUSIVE or AP_LIST_FROM_NEXT.

The list is ordered by *owner*, *owner_type* (in the order AP_NETWORK_NODE, AP_VRN), *dest*, *dest_type* (in the order AP_NETWORK_NODE, AP_VRN), *tg_num* (numerically), and lastly *frsn* (numerically). For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

owner Name of the node that owns the TG. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

owner_type
Type of the node that owns the TG. This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST. Possible values are:

AP_NETWORK_NODE
Network node.

AP_VRN Virtual routing node.

AP_LEARN_NODE
Node type is unknown.

dest Name of the destination node for the TG. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

dest_type
Type of the destination node for the TG. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. Possible values are:

AP_NETWORK_NODE
Network node.

AP_VRN Virtual routing node.

AP_LEARN_NODE
Node type is unknown.

tg_num
Number associated with the TG.

frsn Flow Reduction Sequence Number (FRSN). Specify zero to return information about all TGs, or a nonzero value to return information about TGs with a FRSN greater than or equal to this value.

This parameter can be used to ensure that consistent information is obtained when the application needs to issue several verbs to obtain all the information. The application should take the following steps:

To Obtain Consistent Information Using the frsn Parameter

1. Issue QUERY_NODE to get the node's current FRSN.

2. Issue as many QUERY_NN_TOPOLOGY_TG verbs as necessary to get all the database entries, with the *frsn* parameter set to zero.
3. Issue QUERY_NODE again and compare the new FRSN with the one returned in step 1.
4. If the two FRSNs are different, the database has changed. Add 1 to the FRSN obtained in step 1, and issue further QUERY_NN_TOPOLOGY_TG verbs with the *frsn* parameter set to this new value. These verbs will return only the entries that have changed.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

topology_tg_summary.overlay_size
The size of the returned `topology_tg_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `topology_tg_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

topology_tg_summary.owner
Name of the node that owns the TG. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

topology_tg_summary.owner_type
Type of the node that owns the TG. Possible values are:

AP_NETWORK_NODE
Network node.

AP_END_NODE
End node.

AP_VRN Virtual routing node.

topology_tg_summary.dest
Name of the destination node for the TG. The name is a 17-byte EBCDIC

string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

topology_tg_summary.dest_type
Type of the destination node for the TG. Possible values are:

AP_NETWORK_NODE
Network node.

AP_END_NODE
End node.

AP_VRN Virtual routing node.

topology_tg_summary.tg_num
Number associated with the TG.

topology_tg_summary.frsn
Flow Reduction Sequence Number (FRSN), indicating the last time that this resource was updated at the local node.

topology_tg_detail.overlay_size
The size of the returned `topology_tg_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `topology_tg_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

topology_tg_detail.owner
Name of the node that owns the TG. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

topology_tg_detail.owner_type
Type of the node that owns the TG. Possible values are:

AP_NETWORK_NODE
Network node.

AP_END_NODE
End node.

AP_VRN Virtual routing node.

topology_tg_detail.dest
Name of the destination node for the TG. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

topology_tg_detail.dest_type
Type of the destination node for the TG. Possible values are:

AP_NETWORK_NODE
Network node.

AP_END_NODE
End node.

AP_VRN Virtual routing node.

topology_tg_detail.tg_num
Number associated with the TG.

topology_tg_detail.frsn
Flow Reduction Sequence Number (FRSN), indicating the last time that this resource was updated at the local node.

topology_tg_detail.days_left
Number of days before this TG entry will be deleted from the Topology Database.

topology_tg_detail.dlc_data.length
If *dest_type* or *owner_type* is AP_VRN, this field specifies the length of the DLC address in the following field. Otherwise, this field is not used.

topology_tg_detail.dlc_data.address
If *dest_type* or *owner_type* is AP_VRN, this field specifies the DLC address (in hexadecimal) of the connection to the VRN. The number of bytes in the address is given by the preceding field, length; the remaining bytes in the field are undefined. Otherwise, this field is not used.

For Token Ring or Ethernet, the address is in two parts: a 6-byte MAC address and a 1-byte local SAP address. The bit ordering of the MAC address may not be in the expected format; for information about converting between the two address formats, see "Bit Ordering in MAC Addresses" on page 141.

For Enterprise Extender (HPR/IP), see "QUERY_LS" on page 414 for details of the address format.

topology_tg_detail.rsn
Resource Sequence Number. This is assigned by the network node that owns this resource.

topology_tg_detail.status
Specifies the status of the TG. This may be one or more of the following, combined using a logical OR operation.

AP_NONE

AP_TG_OPERATIVE

AP_TG_QUIESCING

AP_TG_CP_CP_SESSIONS

AP_HPR

AP_RTP

topology_tg_detail.tg_chars
TG characteristics. For details of these parameters, see "DEFINE_LS" on page 117.

topology_tg_detail.subarea_number
If the owner of the destination of the TG is subarea capable, this parameter contains the subarea number of the type-4 or type-5 node that owns the link station associated with the TG on the subarea capable node. Otherwise, this parameter is set to all binary zeros.

topology_tg_detail.tg_type
Type of the TG. Possible values are:

AP_APPN_OR_BOUNDARY_TG
APPN TG or boundary function based TG.

AP_INTERCHANGE_TG
Interchange TG.

AP_VIRTUAL_ROUTE_BASED_TG
Virtual route based TG.

AP_UNKNOWN
The TG type is unknown.

topology_tg_detail.intersubnet_tg
Specifies whether the TG is an intersubnetwork TG. Possible values are:

AP_YES The TG is an intersubnetwork TG.

AP_NO The TG is not an intersubnetwork TG.

topology_tg_detail.cp_cp_session_active
Specifies whether the owning node's contention winner CP-CP session is active. Possible values are:

AP_YES The CP-CP session is active.

AP_NO The CP-CP session is not active.

AP_UNKNOWN
The CP-CP session status is unknown.

topology_tg_detail.branch_tg
Specifies whether the TG is a branch TG. Possible values are:

AP_YES The TG is a branch TG.

AP_NO The TG is not a branch TG.

AP_UNKNOWN
The TG type is unknown.

topology_tg_detail.appended_data_format
Specifies the format of data appended to this NOF VCB structure.

If the parameter *topology_tg_detail.appended_data_len* is set to a non-zero value, indicating that appended data is included, this parameter is set to the following value:

AP_TG_DESCRIPTOR_CV
The appended data contains a TG Descriptor CV, as defined by SNA Formats.

If *topology_tg_detail.appended_data_len* is zero, indicating that no appended data is included, this parameter is reserved.

topology_tg_detail.appended_data_len
Specifies the length of the TG Descriptor CV data appended to this NOF VCB structure. If this parameter is set to zero, no appended data is included.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

Possible values are:

AP_INVALID_TG
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *tg_num* parameter was not valid.

AP_INVALID_ORIGIN_NODE
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *owner* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node is not a network node, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node is not a network node. This verb can be used only at a network node.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_NODE

QUERY_NODE returns information about the definition of a CS Linux node, and on its status if it is active.

VCB Structure

```
typedef struct query_node
{
  AP_UINT16        opcode;                  /* verb operation code        */
  unsigned char    reserv2;                 /* reserved                   */
  unsigned char    format;                  /* reserved                   */
  AP_UINT16        primary_rc;              /* primary return code        */
  AP_UINT32        secondary_rc;            /* secondary return code      */
  CP_CREATE_PARMS  cp_create_parms;         /* create parameters          */
  AP_UINT32        up_time;                 /* time since node started    */
  AP_UINT32        mem_size;                /* reserved                   */
  AP_UINT32        mem_used;                /* reserved                   */
  AP_UINT32        mem_warning_threshold;   /* reserved                   */
  AP_UINT32        mem_critical_threshold;  /* reserved                   */
  unsigned char    nn_functions_supported;  /* NN functions supported     */
  unsigned char    functions_supported;     /* functions supported        */
  unsigned char    en_functions_supported;  /* EN functions supported     */
  unsigned char    nn_status;               /* node status                */
  AP_UINT32        nn_frsn;                 /* NN flow reduction sequence */
                                            /*  number                    */
  AP_UINT32        nn_rsn;                  /* Resource sequence number   */
  AP_UINT16        def_ls_good_xids;        /* Good XIDS for defined link */
```

```
                                          /*  stations                */
  AP_UINT16        def_ls_bad_xids;       /* Bad XIDS for defined link  */
                                          /*  stations                */
  AP_UINT16        dyn_ls_good_xids;      /* Good XIDS for dynamic link */
                                          /*  stations                */
  AP_UINT16        dyn_ls_bad_xids;       /* Bad XIDS for dynamic link  */
                                          /*  stations                */
  unsigned char    dlur_release_level;    /* Current DLUR release level */
  unsigned char    nns_dlus_served_lu_reg_supp; /* NNS supports DLUS-served  */
                                           /* LU registration?          */
  unsigned char    nns_en_reg_diff_owning_cp;   /* NNS supports option 1123? */
  unsigned char    reserva[17];           /* reserved                   */
  unsigned char    fq_nn_server_name[17]; /* fully qualified NN server  */
                                          /*  name                    */
  AP_UINT32        current_isr_sessions;  /* number of ISR sessions     */
  unsigned char    nn_functions2;         /* further NN fns supported   */
  unsigned char    branch_ntwk_arch_version;   /* level of BrNN support      */
  unsigned char    reservb[28];           /* reserved                   */
} QUERY_NODE;

typedef struct cp_create_parms
{
  AP_UINT16       crt_parms_len;          /* length of CP_CREATE_PARMS       */
  unsigned char   description[32];        /* resource description            */
  unsigned char   reserv1[2];             /* reserved                        */
  unsigned char   ms_support;             /* reserved                        */
  unsigned char   queue_nmvts;            /* reserved                        */
  unsigned char   reserv3[12];            /* reserved                        */
  unsigned char   node_type;              /* node type                       */
  unsigned char   fqcp_name[17];          /* fully qualified CP name         */
  unsigned char   cp_alias[8];            /* CP alias                        */
  unsigned char   mode_to_cos_map_supp;   /* mode to COS mapping support     */
  unsigned char   mds_supported;          /* MDS and MS capabilities         */
  unsigned char   node_id[4];             /* node ID                         */
  AP_UINT16       max_locates;            /* maximum locates node can process*/
  AP_UINT16       dir_cache_size;         /* directory cache size            */
  AP_UINT16       max_dir_entries;        /* maximum directory entries       */
                                          /*  (0 means unlimited)            */
  AP_UINT16       locate_timeout;         /* locate timeout in seconds       */
  unsigned char   reg_with_nn;            /* register resources with NNs     */
  unsigned char   reg_with_cds;           /* register resources with CDS     */
  AP_UINT16       mds_send_alert_q_size;  /* size of MDS send alert queue    */
  AP_UINT16       cos_cache_size;         /* number of cos definitions       */
  AP_UINT16       tree_cache_size;        /* Topology Database routing tree  */
                                          /*  cache size                     */
  AP_UINT16       tree_cache_use_limit;   /* number of times a tree can be   */
                                          /*  used                           */
  AP_UINT16       max_tdm_nodes;          /* max number of nodes that can be */
                                          /*  stored in Topology Database    */
  AP_UINT16       max_tdm_tgs;            /* max number of TGs that can be   */
                                          /*  stored in Topology Database    */
  AP_UINT32       max_isr_sessions;       /* maximum ISR sessions            */
  AP_UINT32       isr_sessions_upper_threshold;  /* upper threshold for ISR  */
                                                 /*  sessions                */
  AP_UINT32       isr_sessions_lower_threshold;  /* lower threshold for ISR  */
                                                 /*  sessions                */
  AP_UINT16       isr_max_ru_size;        /* max RU size for ISR             */
  AP_UINT16       isr_rcv_pac_window;     /* ISR receive pacing window size  */
  unsigned char   store_endpt_rscvs;      /* endpoint RSCV storage           */
  unsigned char   store_isr_rscvs;        /* ISR RSCV storage                */
  unsigned char   store_dlur_rscvs;       /* DLUR RSCV storage               */
  unsigned char   dlur_support;           /* is DLUR supported?              */
  unsigned char   pu_conc_support;        /* is PU conc supported?           */
  unsigned char   nn_rar;                 /* route additional resistance     */
  unsigned char   hpr_support;            /* level of HPR support            */
  unsigned char   mobile;                 /* reserved                        */
  unsigned char   discovery_support;      /* reserved                        */
  unsigned char   discovery_group_name[8];/* reserved                        */
```

```
  unsigned char   implicit_lu_0_to_3;     /* reserved                        */
  unsigned char   default_preference;     /* reserved                        */
  unsigned char   anynet_supported;       /* reserved                        */
  AP_UINT16       max_ls_exception_events; /* max # exception entries        */
  unsigned char   reserv2[1];             /* reserved                        */
  unsigned char   max_compress_lvl;       /* Max compressson level (reserved)*/
  unsigned char   node_spec_data_len;     /* reserved                        */
  unsigned char   ptf[64];                /* program temporary fix array     */
  unsigned char   cos_table_version;      /* version of COS tables to use    */
  unsigned char   send_term_self;         /* default PLU-SLU session term    */
  unsigned char   disable_branch_awareness; /* disable BrNN awareness        */
  unsigned char   cplu_syncpt_support;    /* syncpoint support on CP LU?     */
  unsigned char   cplu_attributes;        /* attributes for CP LU            */
  unsigned char   reserved[95];           /* reserved                        */
} CP_CREATE_PARMS;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_NODE

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

cp_create_parms.crt_parms_len
Length of create parameters structure.

cp_create_parms.description
A null-terminated text string describing the node, as specified in the definition of the node.

cp_create_parms.node_type
Type of node. Possible values are:

AP_NETWORK_NODE

AP_BRANCH_NETWORK_NODE

AP_END_NODE

AP_LEN_NODE

cp_create_parms.fqcp_name
Fully qualified name of the node. This is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

cp_create_parms.cp_alias
Locally used CP alias. This is an 8-byte ASCII string. All 8 bytes are significant.

cp_create_parms.mode_to_cos_map_supp
Specifies whether mode-to-COS mapping is supported by the node. This parameter is ignored for a network node; mode-to-COS mapping is always supported. For a LEN node, mode-to-COS mapping is not supported. Possible values are:

AP_YES Mode-to-COS mapping is supported.

AP_NO Mode-to-COS mapping is not supported.

cp_create_parms.mds_supported
Specifies whether Management Services supports Multiple Domain Support and MS Capabilities. Possible values are:

AP_YES MDS is supported.

AP_NO MDS is not supported.

cp_create_parms.node_id
Node identifier used in XID exchange. This is a 4-byte hexadecimal string.

cp_create_parms.max_locates
Maximum number of locates that the node can process.

cp_create_parms.dir_cache_size
Network node only: Size of the directory cache.

cp_create_parms.max_dir_entries
Maximum number of directory entries. Zero indicates no limit.

cp_create_parms.locate_timeout
Specifies the time in seconds before a network search will time out. Zero indicates no timeout.

cp_create_parms.reg_with_nn
End node only: Specifies whether to register the node's resources with the network node server when the node is started. Possible values are:

AP_YES Register resources with the NN. The end node's network node server will only forward directed locates to it.

AP_NO Do not register resources. The network node server will forward all broadcast searches to the end node.

cp_create_parms.reg_with_cds
End node: Specifies whether the network node server is allowed to register end node resources with a Central Directory server. This field is ignored if *reg_with_nn* is set to AP_NO.

Network node: Specifies whether local or domain resources can be optionally registered with Central Directory server (AP_YES or AP_NO).

Possible values are:

AP_YES Register resources with the CDS.

AP_NO Do not register resources.

cp_create_parms.mds_send_alert_q_size
Size of the MDS send alert queue. If the number of queued alerts reaches this limit, CS Linux deletes the oldest alert on the queue.

cp_create_parms.cos_cache_size
Network node: Size of the COS Database weights cache (the maximum number of COS definitions required). For an end node or LEN node, this parameter is reserved.

cp_create_parms.tree_cache_size
Network node: Size of the Topology Database routing tree cache. The minimum is 8. For an end node or LEN node, this parameter is reserved.

cp_create_parms.tree_cache_use_limit
Network node: Maximum number of uses of a cached tree. When this number is exceeded, the tree is discarded and recomputed. This enables the node to balance sessions among equal weight routes. A low value

provides better load balancing at the expense of increased activation latency. The minimum number of uses is 1. For an end nodeor LEN node, this parameter is reserved.

cp_create_parms.max_tdm_nodes
Network node: Maximum number of nodes that can be stored in Topology Database. A value of 0 (zero) indicates an unlimited number of nodes. For an end nodeor LEN node, this parameter is reserved.

cp_create_parms.max_tdm_tgs
Network node: Maximum number of TGs that can be stored in Topology Database. A value of 0 (zero) indicates an unlimited number of nodes. For an end nodeor LEN node, this parameter is reserved.

cp_create_parms.max_isr_sessions
Network node: Maximum number of ISR sessions the node can participate in at once. CS Linux uses the value 100 unless a larger number has been specified. For an end nodeor LEN node, this parameter is reserved.

cp_create_parms.isr_sessions_upper_threshold **and**
cp_create_parms.isr_sessions_lower_threshold
Network node: These thresholds control the node's congestion status, which is reported to other nodes in the network for use in route calculations. The node state changes from uncongested to congested if the number of ISR sessions exceeds the upper threshold. The node state changes back to uncongested when the number of ISR sessions dips below the lower threshold. For an end node or LEN node, these parameters are reserved.

cp_create_parms.isr_max_ru_size
Network node or BrNN: Maximum RU size supported for intermediate or DLUR LU-LU sessions.

End node: Maximum RU size supported for DLUR LU-LU sessions.

For a LEN node, this parameter is reserved.

cp_create_parms.isr_rcv_pac_window
Network node: Suggested receive pacing window size for intermediate sessions, in the range 1–63. This value is only used on the secondary hop of intermediate sessions if the adjacent node does not support adaptive pacing. For an end node or LEN node, this parameter is reserved.

cp_create_parms.store_endpt_rscvs
Specifies whether RSCVs should be stored for diagnostic purposes. Possible values are:

AP_YES Store RSCVs.

AP_NO Do not store RSCVs.

If this field is set to AP_YES, then an RSCV will be returned on the QUERY_SESSION verb. (Setting this value to AP_YES means an RSCV will be stored for each endpoint session. This extra storage can be up to 256 bytes per session.)

cp_create_parms.store_isr_rscvs
Network node: Specifies whether RSCVs should be stored for diagnostic purposes (AP_YES or AP_NO). If this field is set to AP_YES, then an RSCV will be returned on the QUERY_ISR_SESSION verb. (Setting this value to

AP_YES means an RSCV will be stored for each ISR session. This extra storage can be up to 256 bytes per session.) For an end nodeor LEN node, this parameter is reserved.

cp_create_parms.store_dlur_rscvs
Specifies whether RSCVs should be stored for diagnostic purposes (AP_YES or AP_NO). If this field is set to AP_YES, then an RSCV will be returned on the QUERY_DLUR_LU verb. (Setting this value to AP_YES means an RSCV will be stored for each PLU-SLU session. This extra storage can be up to 256 bytes per session.)

cp_create_parms.dlur_support
Specifies whether DLUR is supported. For a LEN node, this parameter is reserved. Possible values are:

AP_YES DLUR is supported.

AP_LIMITED_DLUR_MULTI_SUBNET | AP_YES
End Node or Branch Network Node: DLUR is supported, but will not be used to connect to a DLUS in another subnet.

This value is not supported for a Network Node.

AP_NO DLUR is not supported.

cp_create_parms.pu_conc_support
Specifies whether SNA gateway is supported (AP_YES or AP_NO).

cp_create_parms.nn_rar
The network node's route additional resistance.

cp_create_parms.hpr_support
Specifies the level of HPR (High Performance Routing) support provided by the node. Possible values are:

AP_NONE
No support for HPR.

AP_BASE
This node can perform automatic network routing (ANR) but cannot act as an RTP (Rapid Transport Protocol) end point for HPR sessions.

AP_RTP This node can perform automatic network routing (ANR) and can act as an RTP (Rapid Transport Protocol) end point for HPR sessions.

AP_CONTROL_FLOWS
This node can perform all HPR functions including control flows.

cp_create_parms.max_ls_exception_events
The maximum number of LS exception events recorded by the node.

cp_create_parms.ptf
Array for configuring and controlling future program temporary fix (ptf) operation, as follows:

cp_create_parms.ptf[0]
REQDISCONT support and Mandatory Search Status support.

CS Linux normally uses REQDISCONT to deactivate limited resource host links that are no longer required by session traffic. This byte can be used to suppress use of REQDISCONT, or to modify the settings used on REQDISCONT requests sent by CS Linux. Possible values:

AP_NONE
Use the normal REQDISCONT support.

AP_SUPPRESS_REQDISCONT
Do not use REQDISCONT.

AP_OVERRIDE_REQDISCONT
Use a modified version of REQDISCONT support. If REQDISCONT is specified, it must be combined with one or both of the following values, using a logical OR operation:

AP_REQDISCONT_TYPE
Use type "immediate" on REQDISCONT; if this value is not specified, CS Linux uses type "normal".

AP_REQDISCONT_RECONTACT
Use type "immediate recontact" on REQDISCONT; if this value is not specified, CS Linux uses type "no immediate recontact".

AP_ALLOW_BB_RQE
CS Linux normally rejects, with sense code 2003, any begin bracket (BB) exception (RQE) request from a host unless the host follows the SNA protocol that the request must also indicate change direction (CD). Setting this flag enables CS Linux to continue sessions with hosts that do not follow this protocol.

When CS Linux is running as an End Nodeor as a Branch Network Node, it may choose whether or not to invite network searches from its Network Node Server (NNS). Requesting network searches slows broadcast search processing for the network as a whole, so is undesirable. However, if the local node cannot register all its resources (LUs) with its NNS, requesting searches is the only way to make these resources visible to the network.

Normally, CS Linux determines whether all LUs can be registered, then intelligently requests network searches from its NNS. If this node makes LUs accessible to the network in an unusual manner (for example, if it is acting as a gateway for other nodes), the value above is combined with the following value to override the standard operation:

AP_SET_SEARCH_STATUS
Unconditionally request network searches from the NNS.

cp_create_parms.ptf[1]
ERP support. CS Linux normally processes an ACTPU(ERP) as an ERP; this resets the PU-SSCP session, but does not implicitly deactivate the subservient LU-SSCP and PLU-SLU sessions. SNA implementations may legally process ACTPU(ERP) as if it were ACTPU(cold), implicitly deactivating the subservient LU-SSCP and PLU-SLU sessions. Possible values:

AP_NONE
Use the normal processing.

AP_OVERRIDE_ERP
Process all ACTPU requests as ACTPU(cold).

cp_create_parms.ptf[2]
LU 6.2 session activation and deactivation. CS Linux normally does not include the ENQUEUE parameter on the INIT_SELF message when

activating a dependent LU 6.2 session, and uses the BIS protocol prior to deactivating a limited resource LU 6.2 session. Possible values:

AP_NONE
Use the normal processing.

AP_SUPPRESS_BIS
Do not use the BIS protocol. Limited resource LU 6.2 sessions are deactivated immediately using UNBIND(cleanup).

AP_LU62_INIT_SELF_ENQUEUE
Use the old format of the INIT_SELF message, which includes the ENQUEUE parameter.

cp_create_parms.ptf[3]
APINGD support. CS Linux normally includes a partner program for the APING connectivity tester. This byte allows you to disable the APING Daemon within the node, so that requests by an APING program arriving at the node will not be processed automatically. Possible values:

AP_NONE
Include APINGD support within the node (the normal processing).

AP_EXTERNAL_APINGD
Disable APINGD within the node.

cp_create_parms.ptf[4]
LU 0–3 RU checks. This byte is used to provide workarounds for host systems that send non-standard SNA data; it should be set to AP_NONE unless you have encountered the specific problem described below.

The value AP_NONE indicates CS Linux's normal checking on LU 0–3 RUs.

If specific checks on LU 0–3 RUs have been relaxed, the following value is returned:

AP_ALLOW_BB_RQE
The SNA protocols state that BB !EB RUs on LU 0–3 PLU-SLU sessions must be RQD. Several hosts send RQE BB !EB CD - a protocol violation which CS Linux always tolerates. If this value is set, CS Linux will tolerate RQE BB !EB !CD EC RUs as well.

cp_create_parms.ptf[5]
Security checking for received Attaches.

If a local invokable TP is defined not to require conversation security, or is not defined and therefore defaults to not requiring conversation security, the invoking TP need not send a user ID and password to access it. If the invoking TP supplies these parameters and they are included in the Attach message that CS Linux receives, CS Linux normally checks the parameters (and rejects the Attach if they are not valid) even though the invokable TP does not require conversation security. This parameter allows you to disable the checking. Possible values:

AP_NONE
Always check security parameters if they are included on a received Attach, regardless of the security requirements of the invokable TP (the normal processing).

AP_LIMIT_TP_SECURITY
Do not check security parameters on a received Attach if the invokable TP does not require it.

cp_create_parms.ptf[6]
RTP options for HPR.

The value AP_NONE indicates CS Linux's normal RTP processing.

For customized RTP operation, one of the following values is returned:

AP_NO_PROGRESSIVE_ARB
If this value is set, CS Linux will advertise support for the standard and responsive mode ARB algorithms but not for the progressive mode algorithm.

cp_create_parms.ptf[7]
DLUR unbind on DACTLU. CS Linux does not normally end the PLU-SLU session when it receives a DACTLU from the host for a session using DLUR. This parameter allows you to force ending of the PLU-SLU session. Possible values:

AP_NONE
Use the normal processing.

AP_DLUR_UNBIND_ON_DACTLU
When DACTLU is received on a session using DLUR, end the PLU-SLU session.

cp_create_parms.ptf[8]
Suppress PU name on REQACTPU. CS Linux normally identifies the PU name in the REQACTPU message when activating DLUR PUs. Possible values:

AP_NONE
Use the normal processing.

AP_SUPPRESS_PU_NAME_ON_REQACTPU
Suppress PU name when activating DLUR PUs.

cp_create_parms.ptf[9]
RUI bracket race options, limited resource override options for connection networks, and TCP/IP Information Control Vector options.

If an RUI application is using bracket protocols, and the host sends a BB (Begin Bracket) after the RUI application has already sent one, CS Linux normally rejects this with sense data of 0813 and does not pass it to the application. Possible values:

AP_NONE
Use the normal processing.

AP_LUA_PASSTHRU_BB_RACE
Pass the BB through to the RUI application. The application should send a negative response with sense data of either 0813 or 0814.

A link in CS Linux that uses a connection network is normally a limited resource. The following value overrides this default:

AP_CN_OVERRIDE_LIM_RES
Use the *implicit_limited_resource* parameter in the port associated with each connection network link to determine whether it is a limited resource.

CS Linux normally includes the TCP/IP Information Control Vector (0x64) in a NOTIFY request to the host for a TN3270 or LUA session. This vector contains information that can be displayed on the host console or used by the host (for example in billing): the TCP/IP address and port number

used by the client, and the IP name corresponding to the client address. For TN3270, the TN3270 server normally performs a Domain Name Server (DNS) lookup to determine the client IP name.

If the client address is an IPv6 address but the host is running a back-level version of VTAM that cannot interpret IPv6 addresses, the client address may be displayed incorrectly on the host console.

The following flags allow you to override this behavior.

AP_NO_TCPIP_VECTOR
Do not include the TCP/IP Information Control Vector (0x64) in NOTIFY requests to the host for either TN3270 or LUA.

Use this value if the host is running an older version of VTAM that does not support this control vector.

AP_NO_TCPIP_NAME
Do not perform the DNS lookup, and send the CV64 control vector with the client IP address but no IP name.

This value applies only to TN3270; no DNS lookup is required for LUA clients. Use this value if the DNS environment is slow, or if you know that the clients are not included in the DNS data (for example if they are DHCP clients without DDNS).

cp_create_parms.ptf[10]
Suppress Logical Unit of Work Identifiers (LUWIDs) in FMH-5 Attach messages. CS Linux normally includes the LUWID in the FMH-5 Attach message that it sends to start an APPC conversation.

The following flag allows you to override this behavior.

AP_DONT_SEND_LUWIDS
Do not include the LUWID in the FMH-5 Attach; specify the field length for this field as zero.

cp_create_parms.ptf[11]
LU management options. Possible values:

AP_NONE
Use the normal processing.

AP_DLUR_USE_REX_PACING
When the BIND from an upstream LU requests adaptive pacing with an unlimited pacing window,CS Linux normally indicates this by specifying a window size of 0 (zero). If the downstream LU does not support adaptive pacing, it may incorrectly interpret this zero value as “no pacing”, so CS Linux must specify a non-zero pacing window size instead. This option indicates that CS Linux uses the REX stage pacing value from the ACTLU as the pacing window size specified to the downstream LU.

AP_CLI_OVERWRITE_SYS_NAME
This option indicates that CS Linux maintains the association between an APPC application running on a client and the pooled LU that it uses, so that subsequent conversations started by the partner application can be routed to the correct client. When a client application accesses an LU in a pool, CS Linux changes the *sys_name* parameter on the LU to the hostname of the client computer where the application is running. For more information

about managing clients, refer to the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

cp_create_parms.cos_table_version
Specifies the version of the COS tables used by the node. Possible values:

AP_VERSION_0_COS_TABLES
Use the COS tables originally defined in the APPN Architecture Reference.

AP_VERSION_1_COS_TABLES
Use the COS tables originally defined for HPR over ATM.

cp_create_parms.send_term_self
Specifies the default method for ending a PLU-SLU session to a host. The value you specify is used for all type 0–3 LUs on the node, unless you override it by specifying a different value in the LU definition. Possible values:

AP_YES Send a TERM_SELF on receipt of a CLOSE_PLU_SLU_SEC_RQ.

AP_NO Send an UNBIND on receipt of a CLOSE_PLU_SLU_SEC_RQ.

cp_create_parms.disable_branch_awareness
This parameter applies only if *node_type* is AP_NETWORK_NODE; it is reserved for other node types.

Specifies whether the local node supports branch awareness, APPN Option Set 1120. Possible values:

AP_YES The local node does not support branch awareness. TGs between this node and served Branch Network Nodes do not appear in the network topology, and the local node does not report itself as being branch aware.

AP_NO The local node supports branch awareness.

cp_create_parms.cplu_syncpt_support
Specifies whether the node's Control Point LU supports Syncpoint functions. This parameter is equivalent to the *syncpt_support* parameter on DEFINE_LOCAL_LU, but applies only to the node's Control Point LU (which does not have an explicit LU definition).

Set this parameter to AP_YES only if you have a Sync Point Manager (SPM) and Conversation Protected Resource Manager (C-PRM) in addition to the standard CS Linux product. Possible values are:

AP_YES Syncpoint is supported.

AP_NO Syncpoint is not supported.

cp_create_parms.cplu_attributes
Identifies additional information about the node's Control Point LU. This parameter is equivalent to the *lu_attributes* parameter on DEFINE_LOCAL_LU, but applies only to the node's Control Point LU (which does not have an explicit LU definition).

Possible values are:

AP_NONE
No additional information identified.

AP_DISABLE_PWSUB
Disable password substitution support for the control point LU. Password substitution means that passwords are encrypted before

transmission between the local and remote LUs, rather than being sent as clear text. CS Linux normally uses password substitution if the remote system supports it.

This value is provided as a work-around for communications with some remote systems that do not implement password substitution correctly. If you use this option, you should be aware that this involves sending and receiving passwords in clear text (which may represent a security risk). The option should not be set unless there are problems with the remote system's implementation of password substitution.

up_time
Time (in hundredths of a second) since the node was started (or restarted). A value of zero indicates that the node is not running.

nn_functions_supported
Network node only: Specifies the network node functions supported. This may be one or more of the following, combined using a logical OR.

AP_RCV_REG_CHAR
Node supports receiving registered characteristics.

AP_GATEWAY
Node is a gateway node.

AP_CDS Node supports Central Directory server function.

AP_TREE_CACHING
Node supports route tree cache.

AP_TREE_UPDATES
Node supports incremental tree updates. If this is supported, tree caching must also be supported.

AP_ISR Node supports Intermediate Session Routing.

functions_supported
Specifies the functions supported. This may be one or more of the following, combined using a logical OR.

AP_NEGOTIABLE_LS

AP_SEGMENT_REASSEMBLY

AP_BIND_REASSEMBLY

AP_PARALLEL_TGS

AP_CALL_IN

AP_ADAPTIVE_PACING

AP_TOPOLOGY_AWARENESS

en_functions_supported
End node only: Specifies the end node functions supported. This may be one or more of the following, combined using a logical OR.

AP_SEGMENT_GENERATION
Node supports segment generation.

AP_MODE_TO_COS_MAP
Node supports mode name to COS name mapping.

AP_LOCATE_CDINIT
Node supports generation of locates and cross-domain initiate GDS variables for locating remote LUs.

AP_REG_WITH_NN
Node will register its LUs with the adjacent serving network node.

AP_REG_CHARS_WITH_NN
Node supports send register characteristics. If this function is supported, send registered names must also be supported.

nn_status
Network node only: Specifies the status of the node. This parameter may be set to AP_UNCONGESTED, to any one of the other values listed, or to two or more of the other values combined using a logical OR. Possible values are:

AP_UNCONGESTED
The number of ISR sessions is below the *isr_sessions_upper_threshold* value in the node's configuration.

AP_CONGESTED
The number of ISR sessions exceeds the threshold value.

AP_IRR_DEPLETED
The number of ISR sessions has reached the maximum specified for the node.

AP_ERR_DEPLETED
The number of endpoint sessions has reached the maximum specified.

AP_QUIESCING
A STOP_NODE of type AP_QUIESCE or AP_QUIESCE_ISR has been issued.

nn_frsn
Network node only: The network node's current Flow Reduction Sequence Number (FRSN).

nn_rsn Network node only: Resource sequence number.

def_ls_good_xids
Total number of successful XID exchanges that have occurred on all defined link stations since the node was last started.

def_ls_bad_xids
Total number of unsuccessful XID exchanges that have occurred on all defined link stations since the node was last started.

dyn_ls_good_xids
Total number of successful XID exchanges that have occurred on all dynamic link stations since the node was last started.

dyn_ls_bad_xids
Total number of unsuccessful XID exchanges that have occurred on all dynamic link stations since the node was last started.

dlur_release_level
Release level of the DLUR architecture supported by the node. This is set to the value 1 (the only release level of DLUR currently defined); future versions may incorporate later release levels of the DLUR architecture, and so may return different values.

nns_dlus_served_lu_reg_supp
This parameter applies only if the local node is an end node or a Branch Network Node; it is reserved otherwise.

Specifies whether the network node server supports DLUS-served LU registration. Possible values are:

AP_YES The network node server supports registration of DLUS-served LUs.

AP_NO The network node server does not support registration of DLUS-served LUs.

AP_UNKNOWN
The node does not have a network node server.

nns_en_reg_diff_owning_cp
This parameter applies only if the local node is a Branch Network Node; it is reserved otherwise.

Specifies whether the network node server supports option set 1123 - End Node Resource Registration With Different Owning CP Name NNS(BrNN) Support.

AP_YES The network node server supports option set 1123.

AP_NO The network node server does not support option set 1123.

AP_UNKNOWN
The node does not have a network node server.

fq_nn_server_name
End node only. Name of the network node server for the node.

current_isr_sessions
This parameter applies only if the local node is a Network Nodeor a Branch Network Node; it is reserved otherwise.

Number of ISR sessions routed through this node.

nn_functions_2
This parameter applies only if the local node is a Network Node; it is reserved otherwise.

Specifies whether the node supports branch awareness, APPN Option Set 1120.

AP_NONE
The network node server does not support option set 1120.

AP_BRANCH_AWARENESS
The node supports option set 1120.

branch_ntwk_arch_version
This parameter applies only if the local node is a Network Node or a Branch Network Node; it is reserved otherwise.

Specifies the version of the Branch Network Architecture supported. This is set to `1`, or `0` (zero) if the node does not support the Branch Network Architecture.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_NODE_ALL

QUERY_NODE_ALL returns information about nodes on the CS Linux LAN. This verb returns only each node's name and configuration file role, and does not provide detailed information about the node's configuration. The application can use QUERY_NODE for a particular node name to obtain detailed information about that node.

This verb must be issued with a null target handle.

VCB Structure

```
typedef struct query_node_all
{
   AP_UINT16       opcode;                /* verb operation code            */
   unsigned char   reserv2;               /* reserved                       */
   unsigned char   format;                /* reserved                       */
   AP_UINT16       primary_rc;            /* primary return code            */
   AP_UINT32       secondary_rc;          /* secondary return code          */
   unsigned char   *buf_ptr;              /* pointer to buffer              */
   AP_UINT32       buf_size;              /* buffer size                    */
   AP_UINT32       total_buf_size;        /* total buffer size required     */
   AP_UINT16       num_entries;           /* number of entries              */
   AP_UINT16       total_num_entries;     /* total number of entries        */
   unsigned char   list_options;          /* listing options                */
   unsigned char   reserv3;               /* reserved                       */
   unsigned char   node_name[128];        /* node name                      */
} QUERY_NODE_ALL;

typedef struct node_summary
{
   AP_UINT16       overlay_size;          /* size of returned entry         */
   unsigned char   node_name[128];        /* node name                      */
   unsigned char   config_role;           /* server's config file role      */
   unsigned char   reserv3[12];           /* reserved                       */
} NODE_SUMMARY;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_NODE_ALL

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of nodes for which data should be returned. To request data for a specific node rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list of nodes.

AP_LIST_INCLUSIVE
Start at the entry specified by the *node_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *node_name* parameter.

The list is not ordered by node name. However, the order remains the same for subsequent QUERY_NODE_ALL verbs, so the application can obtain a complete list in several sections by using multiple verbs in the normal way. For more information about how the application can obtain specific entries from the list, see "List Options For QUERY_* Verbs" on page 39.

node_name
Name of the node to be used as an index into the list. This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST.

This is an ASCII string of 1–128 characters, padded on the right with spaces if the name is shorter than 128 characters.

If the computer name includes a . (period) character, CS Linux assumes that it is a fully-qualified name; otherwise it performs a DNS lookup to determine the computer name.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

node_summary.overlay_size
The size of the returned node_summary structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each node_summary structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C sizeof() operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

node_summary.node_name
The name of the CS Linux node.

node_summary.config_role
The configuration file role of the server where the node is running. For

more information about configuration file roles, refer to the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*. Possible values are:

AP_ROLE_MASTER
The server holds the master configuration file.

AP_ROLE_BACKUP
The server holds a backup configuration file.

AP_ROLE_NONE
The server does not share its copy of the configuration file.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_NODE_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *node_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_NODE_LIMITS

QUERY_NODE_LIMITS returns information about the functions that your CS Linux license allows you to use on a particular node, and about your usage of these functions. These are divided into the following categories:

- Node options, which specify the CS Linux features that you can use
- Node resource usage, which specifies the current and peak usage of CS Linux resources.

You can use the information returned by this verb to check whether your usage of CS Linux resources is within the limits permitted by your license. For more information about licensing requirements, see *IBM Communications Server for Data Center Deployment on Linux Quick Beginnings*.

The information returned by this verb is also written to the usage log file at intervals. For more information about this file, see *IBM Communications Server for Data Center Deployment on Linux Diagnostics Guide*.

VCB Structure

```
typedef struct query_node_limits
{
  AP_UINT16             opcode;        /* verb operation code               */
  unsigned char         reserv2;       /* reserved                          */
  unsigned char         format;        /* reserved                          */
  AP_UINT16             primary_rc;    /* primary return code               */
  AP_UINT32             secondary_rc;  /* secondary return code             */
  NODE_RESOURCE_LIMITS  max_limits;    /* reserved                          */
  NODE_RESOURCE_LIMITS  curr_usage;    /* current usage of LUs/sessions/users*/
  NODE_OPTIONS          node_options;  /* permitted functions               */
  unsigned char         reserv4[4];    /* reserved                          */
  NODE_RESOURCE_LIMITS  max_usage;     /* highest usage counts              */
} QUERY_NODE_LIMITS;

typedef struct node_resource_limits
{
  AP_INT32     lu62_tps;                    /* APPC/CPI-C applications      */
  AP_INT32     lua_tps;                     /* LUA applications             */
  AP_INT32     fmapi_tps;                   /* reserved                     */
  AP_INT32     link_stations;               /* Active link stations         */
  AP_INT32     tn3270_connections;          /* TN3270 server connections    */
  AP_INT32     tn_redirector_connections;   /* TN redirector connections    */
  AP_INT32     v4_sna_channels;             /* reserved                     */
  AP_INT32     v4_gsna_channels;            /* reserved                     */
  AP_INT32     data_sessions;               /* Active PLU-SLU sessions      */
  AP_INT32     reserv1[11];                 /* Reserved                     */
} NODE_RESOURCE_LIMITS;

typedef struct node_options
{
   unsigned char   network_node;         /* is Network Node supported?      */
   unsigned char   end_node;             /* is End Node supported?          */
   unsigned char   len_node;             /* is LEN Node supported?          */
   unsigned char   dlur_support;         /* is DLUR supported?              */
   unsigned char   pu_conc_support;      /* is PU Conc supported?           */
   unsigned char   tn_server_support;    /* is TN Server supported?         */
   unsigned char   hpr_support;          /* level of HPR support            */
   unsigned char   back_level_client;    /* reserved                        */
   unsigned char   reserv2;              /* reserved                        */
   unsigned char   ssl_support;          /* is SSL supported?               */
   unsigned char   branch_network_node;  /* is BrNN supported?              */
   unsigned char   reserv1[21];          /* reserved                        */
} NODE_OPTIONS;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_NODE_LIMITS

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

curr_usage.lu62_tps
The number of APPC and CPI-C applications currently active on this node.

curr_usage.lua_tps
The number of LUA applications currently active on this node.

curr_usage.link_stations
The number of link stations currently active on this node.

curr_usage.tn3270_connections
The number of connections from TN3270 clients currently active on this node.

curr_usage.tn_redirector_connections
The number of connections from TN Redirector clients currently active on this node.

curr_usage.data_sessions
The number of PLU-SLU sessions currently active on this node.

If full-duplex APPC conversations are being used, note that each full-duplex conversation requires two sessions.

max_usage.lu62_tps
The maximum number of APPC and CPI-C applications that have been active on this node at any time since the Linux computer was restarted.

max_usage.lua_tps
The maximum number of LUA applications that have been active on this node at any time since the Linux computer was restarted.

max_usage.link_stations
The maximum number of link stations that have been active on this node at any time since the Linux computer was restarted.

max_usage.tn3270_connections
The maximum number of connections from TN3270 clients that have been active on this node at any time since the Linux computer was restarted.

max_usage.tn_redirector_connections
The maximum number of connections from TN Redirector clients that have been active on this node at any time since the Linux computer was restarted.

max_usage.data_sessions
The maximum number of PLU-SLU sessions that have been active on this node at any time since the Linux computer was restarted.

If full-duplex APPC conversations are being used, note that each full-duplex conversation requires two sessions.

node_options.network_node
Specifies whether your license allows you to define this node as a network node. Possible values are:

AP_YES Network node is supported.

AP_NO Network node is not supported.

node_options.end_node
Specifies whether your license allows you to define this node as an end node. Possible values are:

AP_YES End node is supported.

AP_NO End node is not supported.

node_options.len_node
Specifies whether your license allows you to define this node as a LEN node. Possible values are:

AP_YES LEN node is supported.

AP_NO LEN node is not supported.

node_options.dlur_support
This parameter is reserved.

Specifies whether your license allows you to use Dependent LU Requester (DLUR) on this node. Possible values are:

AP_YES DLUR is supported.

AP_NO DLUR is not supported.

node_options.pu_conc_support
Specifies whether your license allows you to use SNA gateway on this node. Possible values are:

AP_YES SNA gateway is supported.

AP_NO SNA gateway is not supported.

node_options.tn_server_support
Specifies whether your license allows you to use TN server on this node. Possible values are:

AP_YES TN server is supported.

AP_NO TN server is not supported.

node_options.hpr_support
Specifies whether your license allows you to use HPR (High Performance Routing) on this node. Possible values are:

AP_YES HPR is supported.

AP_NO HPR is not supported.

node_options.ssl_support
Specifies whether the Secure Sockets Layer software is installed on the node (for use with TN Server). Possible values are:

AP_YES The SSL software is installed.

AP_NO The SSL software is not installed.

node_options.branch_network_node
Specifies whether your license allows you to define this node as a branch network node. Possible values are:

AP_YES Branch network node is supported.

AP_NO Branch network node is not supported.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_PARTNER_LU

QUERY_PARTNER_LU returns information about partner LUs that a local LU is currently using, or has used. This verb returns information about usage of the partner LUs, not about their definition; use QUERY_PARTNER_LU_DEFINITION to obtain the definition of the partner LUs.

This verb can be used to obtain either summary or detailed information, about a specific LU or about multiple LUs, depending on the options used.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_partner_lu
{
   AP_UINT16       opcode;               /* verb operation code             */
   unsigned char   reserv2;              /* reserved                        */
   unsigned char   format;               /* reserved                        */
   AP_UINT16       primary_rc;           /* primary return code             */
   AP_UINT32       secondary_rc;         /* secondary return code           */
   unsigned char   *buf_ptr;             /* pointer to buffer               */
   AP_UINT32       buf_size;             /* buffer size                     */
   AP_UINT32       total_buf_size;       /* total buffer size required      */
   AP_UINT16       num_entries;          /* number of entries               */
   AP_UINT16       total_num_entries;    /* total number of entries         */
   unsigned char   list_options;         /* listing options                 */
   unsigned char   reserv3;              /* reserved                        */
   unsigned char   lu_name[8];           /* LU name                         */
   unsigned char   lu_alias[8];          /* LU alias                        */
   unsigned char   plu_alias[8];         /* partner LU alias                */
   unsigned char   fqplu_name[17];       /* fully qualified partner LU name */
   unsigned char   active_sessions;      /* active sessions only filter     */
} QUERY_PARTNER_LU;

typedef struct plu_summary
{
   AP_UINT16       overlay_size;         /* size of returned entry          */
   unsigned char   plu_alias[8];         /* partner LU alias                */
   unsigned char   fqplu_name[17];       /* fully qualified partner LU name */
   unsigned char   reserv1;              /* reserved                        */
   unsigned char   description[32];      /* resource description            */
   unsigned char   reserv2[16];          /* reserved                        */
   AP_UINT16       act_sess_count;       /* currently active sessions count */
   unsigned char   partner_cp_name[17];  /* partner LU CP name              */
   unsigned char   partner_lu_located;   /* CP name resolved?               */
} PLU_SUMMARY;

typedef struct plu_detail
{
   AP_UINT16       overlay_size;         /* size of returned entry          */
   unsigned char   plu_alias[8];         /* partner LU alias                */
   unsigned char   fqplu_name[17];       /* fully qualified partner LU name */
   unsigned char   reserv1;              /* reserved                        */
   unsigned char   description[32];      /* resource description            */
   unsigned char   reserv2[16];          /* reserved                        */
   AP_UINT16       act_sess_count;       /* currently active sessions count */
   unsigned char   partner_cp_name[17];  /* partner LU CP name              */
   unsigned char   partner_lu_located;   /* CP name resolved?               */
   unsigned char   plu_un_name[8];       /* partner LU uninterpreted name   */
   unsigned char   parallel_sess_supp;   /* parallel sessions supported?    */
   unsigned char   conv_security;        /* conversation security           */
   AP_UINT16       max_mc_ll_send_size;  /* maximum send LL size for mapped */
                                         /*  conversations                  */
   unsigned char   implicit;             /* implicit or explicit entry      */
   unsigned char   security_details;     /* session security details        */
   unsigned char   duplex_support;       /* full-duplex support             */
   unsigned char   preference;           /* reserved                        */
  unsigned char    reserva[16];          /* reserved                        */
} PLU_DETAIL;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_PARTNER_LU

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of LUs for which data should be returned. To request data for a specific LU rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list of partner LUs associated with the specified local LU.

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of local and partner LU names.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of local and partner LU names.

AP_LIST_BY_ALIAS
The list is returned in order of LU alias rather than LU name. This option is only valid if AP_FIRST_IN_LIST is also specified. (For AP_LIST_FROM_NEXT or AP_LIST_INCLUSIVE, the list is in order of LU alias or LU name, depending on which was specified as the index into the list.)

The combination of the local LU (*lu_name* or *lu_alias*) and partner LU (*plu_alias* or *fqplu_name*) specified is used as an index into the list of partner LUs if the *list_options* parameter is set to AP_LIST_INCLUSIVE or AP_LIST_FROM_NEXT.

The list is ordered by *fqplu_name*. For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

lu_name
LU name of the local LU. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters. To indicate that the LU is identified by its LU alias instead of its LU name, set this parameter to 8 binary zeros and specify the LU alias in the following parameter.

lu_alias
LU alias of the local LU. This parameter is used only if the *lu_name* field is set to 8 binary zeros, and is ignored otherwise. The alias is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. To indicate the LU associated with the local CP (the default LU), set both *lu_name* and *lu_alias* to binary zeros.

plu_alias
Partner LU alias. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. If *list_options* is set to AP_FIRST_IN_LIST, this parameter is ignored; otherwise you must specify either the LU alias or the fully qualified LU name for the partner LU. To indicate that the LU is identified by its fully qualified name instead of its alias, set this parameter to 8 binary zeros and specify the LU name in the following parameter.

fqplu_name
17-byte fully qualified network name for the partner LU. If *list_options* is set to AP_FIRST_IN_LIST, this parameter is ignored; otherwise you must specify either the LU alias or the fully qualified LU name for the partner LU. This parameter is used only if the *plu_alias* field is set to 8 binary zeros, and is ignored otherwise.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

active_sessions
Specifies whether to return information only on partner LUs for which sessions are active, or on all partner LUs. Possible values are:

AP_YES Return information only on partner LUs for which sessions are currently active.

AP_NO Return information about all partner LUs for which sessions are active or have been active.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

plu_summary.overlay_size
The size of the returned `plu_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `plu_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

plu_summary.plu_alias
Partner LU alias. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

plu_summary.fqplu_name
17-byte fully qualified network name for the partner LU. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

plu_summary.description
A null-terminated text string describing the partner LU, as specified in the definition of the partner LU.

plu_summary.act_sess_count
Total number of active sessions between the local LU and the partner LU.

plu_summary.partner_cp_name
17-byte fully qualified network name for the CP associated with the partner LU. This parameter is not used if *partner_lu_located* below is set to `AP_NO`.

The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

plu_summary.partner_lu_located
Specifies whether the local node has located the CP where the partner LU is located. Possible values are:

AP_YES The partner LU has been located. The *partner_cp_name* parameter contains the CP name of the partner LU.

AP_NO The partner LU has not yet been located. The *partner_cp_name* parameter should not be checked.

plu_detail.overlay_size
The size of the returned `plu_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `plu_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

plu_detail.plu_alias
Partner LU alias. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

plu_detail.fqplu_name
17-byte fully qualified network name for the partner LU. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

plu_detail.description
A null-terminated text string describing the partner LU, as specified in the definition of the partner LU.

plu_detail.act_sess_count
Total number of active sessions between the local LU and the partner LU.

plu_detail.partner_cp_name
17-byte fully qualified network name for the CP associated with the partner LU. This parameter is not used if *partner_lu_located* below is set to AP_NO.

The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

plu_detail.partner_lu_located
Specifies whether the local node has located the CP where the partner LU is located. Possible values are:

AP_YES The partner LU has been located. The *partner_cp_name* parameter contains the CP name of the partner LU.

AP_NO The partner LU has not yet been located. The *partner_cp_name* parameter should not be checked.

plu_detail.plu_un_name
Uninterpreted name of the partner LU. This is an 8-byte type-A EBCDIC character string.

plu_detail.parallel_sess_supp
Specifies whether parallel sessions are supported. Possible values are:

AP_YES Parallel sessions are supported.

AP_NO Parallel sessions are not supported.

plu_detail.conv_security
Specifies whether conversation security information can be sent to this partner LU. Possible values are:

AP_YES Conversation security information supplied by a local TP is sent to the partner LU.

AP_NO Conversation security information supplied by a local TP is not sent to the partner LU.

AP_UNKNOWN
No sessions are active with the partner LU.

plu_detail.max_mc_ll_send_size
Maximum logical record size, in bytes, that can be sent to the partner LU. This may be in the range 1–32,767, or zero to indicate no limit (in which case the maximum is 32,767). Data records that are larger than this are broken down into several LL records before being sent to the partner LU.

plu_detail.implicit
Specifies whether the entry was created by an implicit or explicit definition. Possible values are:

AP_YES The entry is an implicit entry.

AP_NO The entry is an explicit entry.

plu_detail.security_details
Returns the conversation security support as negotiated on the BIND. Possible values are:

AP_CONVERSATION_LEVEL_SECURITY
Conversation security information will be accepted on requests to or from the partner LU to allocate a conversation. The specific types of conversation security support are described by the following values.

AP_ALREADY_VERIFIED
Both the local and partner LU agree to accept Already Verified requests to allocate a conversation. An Already Verified request needs to carry only a user ID. It does not need to carry a password.

AP_PERSISTENT_VERIFICATION
Persistent Verification is supported on the session between the local and partner LUs. Once the initial request (carrying a user ID and usually a password) for a conversation has been verified, subsequent requests for a conversation need to carry only the user ID.

AP_PASSWORD_SUBSTITUTION
The local and partner LU support Password Substitution conversation security. When a request to allocate a conversation is issued, the request carries an encrypted form of the password. If Password Substitution is not supported, the password is carried in clear text (nonencrypted) format. If the session does not support Password Substitution, an Allocate or Send_Conversation with security type set to `AP_PGM_STRONG` will fail.

AP_UNKNOWN
No sessions are active with the partner LU.

plu_detail.duplex_support
Returns the conversation duplex support as negotiated on the BIND. Possible values are:

AP_HALF_DUPLEX
Only half-duplex conversations are supported.

AP_FULL_DUPLEX
Both full-duplex and half-duplex sessions are supported. Expedited data is also supported.

AP_UNKNOWN
The conversation duplex support is not known because no sessions are active with the partner LU.

preference
This parameter is reserved.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_ALIAS
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *lu_alias* parameter was not valid.

AP_INVALID_LU_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *lu_name* parameter was not valid.

AP_INVALID_PLU_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but one of the following conditions applies:

- The *fqplu_name* parameter does not match the name of any of this local LU's partners.
- No sessions have been active (since the node was last started) for the specified combination of local LU and partner LU.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_PARTNER_LU_DEFINITION

QUERY_PARTNER_LU_DEFINITION returns information about partner LUs for a local LU. This verb returns information about the definition of the LUs, not about their current usage; use QUERY_PARTNER_LU to obtain the usage information.

This verb can be used to obtain either summary or detailed information, about a specific LU or about multiple LUs, depending on the options used.

VCB Structure

```
typedef struct query_partner_lu_definition
{
   AP_UINT16       opcode;              /* verb operation code             */
   unsigned char   reserv2;             /* reserved                        */
   unsigned char   format;              /* reserved                        */
   AP_UINT16       primary_rc;          /* primary return code             */
   AP_UINT32       secondary_rc;        /* secondary return code           */
   unsigned char   *buf_ptr;            /* pointer to buffer               */
   AP_UINT32       buf_size;            /* buffer size                     */
```

```
   AP_UINT32       total_buf_size;       /* total buffer size required       */
   AP_UINT16       num_entries;          /* number of entries                */
   AP_UINT16       total_num_entries;    /* total number of entries          */
   unsigned char   list_options;         /* listing options                  */
   unsigned char   reserv3;              /* reserved                         */
   unsigned char   plu_alias[8];         /* partner LU alias                 */
   unsigned char   fqplu_name[17];       /* fully qualified partner LU name  */
} QUERY_PARTNER_LU_DEFINITION;

typedef struct partner_lu_def_summary
{
   AP_UINT16       overlay_size;         /* size of returned entry           */
   unsigned char   plu_alias[8];         /* partner LU alias                 */
   unsigned char   fqplu_name[17];       /* fully qualified partner LU name  */
   unsigned char   description[32];      /* resource description             */
   unsigned char   reserv1[16];          /* reserved                         */
} PARTNER_LU_DEF_SUMMARY;

typedef struct partner_lu_def_detail
{
   AP_UINT16       overlay_size;         /* size of returned entry           */
   unsigned char   plu_alias[8];         /* partner LU alias                 */
   unsigned char   fqplu_name[17];       /* fully qualified partner LU name  */
   unsigned char   reserv1;              /* reserved                         */
   PLU_CHARS       plu_chars;            /* partner LU characteristics       */
} PARTNER_LU_DEF_DETAIL;

typedef struct plu_chars
{
   unsigned char   fqplu_name[17];       /* fully qualified partner LU name  */
   unsigned char   plu_alias[8];         /* partner LU alias                 */
   unsigned char   description[32];      /* resource description             */
   unsigned char   reserv2[16];          /* reserved                         */
   unsigned char   plu_un_name[8];       /* partner LU uninterpreted name    */
   unsigned char   preference;           /* reserved                         */
   AP_UINT16       max_mc_ll_send_size;  /* maximum MC send LL size          */
   unsigned char   conv_security_ver;    /* already-verified security        */
                                         /*  supported?                      */
   unsigned char   parallel_sess_supp;   /* parallel sessions supported?     */
   unsigned char   reserv3[8];           /* reserved                         */
} PLU_CHARS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_PARTNER_LU_DEFINITION

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of LUs for which data should be returned. To request data for a specific LU rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *plu_alias* or *fqplu_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *plu_alias* or *fqplu_name* parameter.

If AP_FIRST_IN_LIST is specified, you can also include the following option, using a logical OR operation:

AP_LIST_BY_ALIAS
The list is returned in order of LU alias rather than LU name. This option is only valid if AP_FIRST_IN_LIST is also specified. (For AP_LIST_FROM_NEXT or AP_LIST_INCLUSIVE, the list is in order of LU alias or LU name, depending on which was specified as the index into the list.)

For more information about how the application can obtain specific entries from the list, see "List Options For QUERY_* Verbs" on page 39.

plu_alias
Partner LU alias. The name is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. If *list_options* is set to AP_FIRST_IN_LIST, this parameter is ignored; otherwise you must specify either the LU alias or the fully qualified LU name for the partner LU. To indicate that the partner LU is defined by its fully qualified name instead of its alias, set this parameter to 8 binary zeros and specify the name in the following parameter.

fqplu_name
Fully qualified name of the partner LU for which information is required, or the name to be used as an index into the list of LUs. If *list_options* is set to AP_FIRST_IN_LIST, this parameter is ignored; otherwise you must specify either the LU alias or the fully qualified LU name for the partner LU. This parameter is used only if the *plu_alias* parameter is set to zeros, and is ignored otherwise.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required

to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

partner_lu_def_summary.overlay_size
The size of the returned `partner_lu_def_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `partner_lu_def_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

partner_lu_def_summary.plu_alias
Partner LU alias. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

partner_lu_def_summary.fqplu_name
Fully qualified network name for the partner LU. This name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

partner_lu_def_summary.description
A null-terminated text string describing the partner LU, as specified in the definition of the partner LU.

partner_lu_def_detail.overlay_size
The size of the returned `partner_lu_def_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `partner_lu_def_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

partner_lu_def_detail.plu_alias
Partner LU alias. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

partner_lu_def_detail.fqplu_name
Fully qualified network name for the partner LU. This name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

partner_lu_def_detail.plu_chars.fqplu_name
Fully qualified network name for the partner LU. This name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a

network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

partner_lu_def_detail.plu_chars.plu_alias
Partner LU alias. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

partner_lu_def_detail.plu_chars.description
A null-terminated text string describing the partner LU, as specified in the definition of the partner LU.

partner_lu_def_detail.plu_chars.plu_un_name
Uninterpreted name of the partner LU. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

partner_lu_def_detail.plu_chars.preference
This parameter is reserved.

partner_lu_def_detail.plu_chars.max_mc_ll_send_size
Maximum logical record length, in bytes, that can be sent to the partner LU. This may be in the range 1–32,767, or zero to indicate no limit (in which case the maximum is 32,767). Data records that are larger than this are broken down into several LL records before being sent to the partner LU.

partner_lu_def_detail.plu_chars.conv_security_ver
Specifies whether the partner LU is authorized to validate user IDs on behalf of local LUs; that is, whether the partner LU may set the already-verified indicator in an Attach request. Possible values are:

AP_YES The partner LU is authorized to validate user IDs.

AP_NO The partner LU is authorized to validate user IDs.

partner_lu_def_detail.plu_chars.parallel_sess_supp
Specifies whether parallel sessions are supported. Possible values are:

AP_YES Parallel sessions are supported.

AP_NO Parallel sessions are not supported.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_PLU_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *plu_alias* or *fqplu_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_PORT

QUERY_PORT returns a list of information about a node's ports. This information is structured as “determined data” (data gathered dynamically during execution) and “defined data” (the data supplied by the application on DEFINE_PORT).

This verb can be used to obtain either summary or detailed information, about a specific port or about multiple ports, depending on the options used.

VCB Structure

```
typedef struct query_port
{
  AP_UINT16        opcode;                 /* verb operation code          */
  unsigned char    reserv2;                /* reserved                     */
  unsigned char    format;                 /* reserved                     */
  AP_UINT16        primary_rc;             /* primary return code          */
  AP_UINT32        secondary_rc;           /* secondary return code        */
  unsigned char    *buf_ptr;               /* pointer to buffer            */
  AP_UINT32        buf_size;               /* buffer size                  */
  AP_UINT32        total_buf_size;         /* total buffer size required   */
  AP_UINT16        num_entries;            /* number of entries            */
  AP_UINT16        total_num_entries;      /* total number of entries      */
  unsigned char    list_options;           /* listing options              */
  unsigned char    reserv3;                /* reserved                     */
  unsigned char    port_name[8];           /* port name                    */
  unsigned char    dlc_name[8];            /* DLC name filter              */
} QUERY_PORT;

typedef struct port_summary
{
  AP_UINT16        overlay_size;           /* size of returned entry       */
  unsigned char    port_name[8];           /* port name                    */
  unsigned char    description[32];        /* resource description         */
  unsigned char    reserv2[16];            /* reserved                     */
  unsigned char    port_state;             /* port state                   */
  unsigned char    reserv1[1];             /* reserved                     */
  unsigned char    dlc_name[8];            /* name of DLC                  */
} PORT_SUMMARY;

typedef struct port_detail
{
  AP_UINT16        overlay_size;           /* size of returned entry       */
  unsigned char    port_name[8];           /* port name                    */
  unsigned char    reserv1[2];             /* reserved                     */
  PORT_DET_DATA    det_data;               /* determined data              */
  PORT_DEF_DATA    def_data;               /* defined data                 */
} PORT_DETAIL;

typedef struct port_det_data
{
  unsigned char    port_state;             /* port state                   */
  unsigned char    dlc_type;               /* DLC type                     */
  unsigned char    port_sim_rim;           /* port initialization options  */
  unsigned char    reserv1;                /* reserved                     */
  AP_UINT16        def_ls_good_xids;       /* number of successful XIDs    */
  AP_UINT16        def_ls_bad_xids;        /* number of unsuccessful XIDs  */
  AP_UINT16        dyn_ls_good_xids;       /* successful XIDs on dynamic   */
                                           /*  LS count                    */
  AP_UINT16        dyn_ls_bad_xids;        /* failed XIDs on dynamic LS    */
                                           /*  count                       */
  AP_UINT16        num_implicit_links;     /* number of implicit links     */
```

```
  unsigned char    neg_ls_supp;             /* negotiable?                   */
  unsigned char    abm_ls_supp;             /* ABM support?                  */
  AP_UINT32        start_time;              /* Start time of the port        */
  unsigned char    reserva[12];             /* reserved                      */
} PORT_DET_DATA;

typedef struct port_def_data
{
  unsigned char    description[32];         /* resource description          */
  unsigned char    initially_active;        /* is the port initially active? */
  unsigned char    reserv2[15];             /* reserved                      */
  unsigned char    dlc_name[8];             /* DLC name associated with port */
  unsigned char    port_type;               /* port type                     */
  unsigned char    port_attributes[4];      /* port attributes               */
  unsigned char    implicit_uplink_to_en;   /* implicit EN links up or down? */
  unsigned char    implicit_appn_links_len; /* reserved                      */
  unsigned char    reserv3;                 /* reserved                      */
  AP_UINT32        port_number;             /* port number                   */
  AP_UINT16        max_rcv_btu_size;        /* max receive BTU size          */
  AP_UINT16        tot_link_act_lim;        /* total link activation limit   */
  AP_UINT16        inb_link_act_lim;        /* inbound link activation limit */
  AP_UINT16        out_link_act_lim;        /* outbound link activation limit*/
  unsigned char    ls_role;                 /* initial link station role     */
  unsigned char    retry_flags;             /* reserved                      */
  AP_UINT16        max_activation_attempts; /* reserved                      */
  AP_UINT16        activation_delay_timer;  /* reserved                      */
  unsigned char    mltg_pacing_algorithm;   /* reserved                      */
  unsigned char    implicit_tg_sharing_prohibited; /* reserved               */
  unsigned char    link_spec_data_format;   /* reserved                      */
  unsigned char    limit_enable;            /* reserved                      */
  unsigned char    reserv1[6];              /* reserved                      */
  unsigned char    implicit_dspu_template[8];      /* implicit dspu template */
  AP_UINT16        implicit_ls_limit;       /* implicit ls limit             */
  unsigned char    reserv4;                 /* reserved                      */
  unsigned char    implicit_dspu_services;  /* reserved                      */
  unsigned char    implicit_deact_timer;    /* deact timer for implicit LSs  */
  AP_UINT16        act_xid_exchange_limit;  /* activation XID exchange limit */
  AP_UINT16        nonact_xid_exchange_limit;     /* non-act. XID exchange   */
                                                  /*  limit                  */
  unsigned char    ls_xmit_rcv_cap;         /* LS transmit-receive capability*/
  unsigned char    max_ifrm_rcvd;           /* maximum number of I-frames    */
                                            /*  that can be received         */
  AP_UINT16        target_pacing_count;     /* target pacing count           */
  AP_UINT16        max_send_btu_size;       /* maximum send BTU size         */
  LINK_ADDRESS     dlc_data;                /* DLC data                      */
  LINK_ADDRESS     hpr_dlc_data;            /* reserved                      */
  unsigned char    implicit_cp_cp_sess_support;   /* implicit links allow    */
                                                  /*  CP-CP sessions         */
  unsigned char    implicit_limited_resource;     /* implicit links are      */
                                                  /*  limited resource       */
  unsigned char   implicit_hpr_support;     /* Implicit links support HPR    */
  unsigned char   implicit_link_lvl_error;  /* Send HPR traffic on implicit  */
                                            /*  links using link-level error */
                                            /*  recovery?                    */
  unsigned char   retired1;                 /* reserved                      */
  TG_DEFINED_CHARS default_tg_chars;        /* default TG chars              */
  unsigned char   discovery_supported;      /* reserved                      */
  AP_UINT16       port_spec_data_len;       /* length of port specific data  */
  AP_UINT16       link_spec_data_len;       /* length of link specific data  */
} PORT_DEF_DATA;
```

For more details of the `link_address` structure, see "QUERY_LS" on page 414; for more details of the port-specific and link-specific data, see "DEFINE_PORT" on page 179 and "DEFINE_LS" on page 117. The data structure for the port-specific

data follows the port_def_data structure, and the data structure for the link-specific data follows this; both structures are padded to start on a 4-byte boundary.

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_PORT

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of ports for which data should be returned. To request data for a specific port rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *port_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *port_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

port_name
Name of port being queried. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST.

dlc_name
DLC name filter. To return information only on ports associated with a specific DLC, specify the DLC name. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. To return information about all ports without filtering on the DLC name, set this parameter to 8 binary zeros.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
: `AP_OK`

buf_size
: Length of the information returned in the supplied buffer.

total_buf_size
: Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
: Number of entries returned in the data buffer.

total_num_entries
: Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

  Each entry in the data buffer consists of the following parameters:

port_summary.overlay_size
: The size of the returned `port_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

  When your application needs to go through the returned buffer to find each `port_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

port_summary.port_name
: Name of the port. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

port_summary.description
: A null-terminated text string describing the port, as specified in the definition of the port.

port_summary.port_state
: Specifies the current state of the port. Possible values are:

  AP_ACTIVE
  : The port is active.

  AP_NOT_ACTIVE
  : The port is not active.

  AP_PENDING_ACTIVE
  : START_PORT is in progress.

  AP_PENDING_INACTIVE
  : STOP_PORT is in progress.

port_summary.dlc_name
: Name of the DLC associated with this port. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

port_detail.overlay_size
: The size of the returned `port_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `port_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

port_detail.port_name
Name of the port. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

port_detail.det_data.port_state
Specifies the current state of the port. Possible values are:

AP_ACTIVE
The port is active.

AP_NOT_ACTIVE
The port is not active.

AP_PENDING_ACTIVE
START_PORT is in progress.

AP_PENDING_INACTIVE
STOP_PORT is in progress.

port_detail.det_data.dlc_type
DLC type for the port. This is one of the following:

AP_SDLC
SDLC

AP_X25 QLLC

AP_TR Token Ring

AP_ETHERNET
Ethernet

AP_MPC Multipath Channel (MPC), CS Linux for System z only

AP_IP Enterprise Extender (HPR/IP)

port_detail.det_data.port_sim_rim
Specifies whether Set Initialization Mode (SIM) and Receive Initialization Mode (RIM) are supported. Possible values are:

AP_YES SIM and RIM are supported.

AP_NO SIM and RIM are not supported.

port_detail.det_data.def_ls_good_xids
Total number of successful XID exchanges that have occurred on all defined link stations on this port since the last time this port was started.

port_detail.det_data.def_ls_bad_xids
Total number of unsuccessful XID exchanges that have occurred on all defined link stations on this port since the last time this port was started.

port_detail.det_data.dyn_ls_good_xids
Total number of successful XID exchanges that have occurred on all dynamic link stations on this port since the last time this port was started.

port_detail.det_data.dyn_ls_bad_xids
Total number of unsuccessful XID exchanges that have occurred on all dynamic link stations on this port since the last time this port was started.

port_detail.det_data.num_implicit_links
Total number of implicit links currently active on this port. This includes dynamic links and implicit links created following use of Discovery. The number of such links allowed on this port is limited by the *implicit_ls_limit* parameter of `port_def_data`.

port_detail.det_data.neg_ls_supp
Support for negotiable link stations. Possible values are:

AP_YES Link stations can be negotiated.

AP_NO Link stations cannot be negotiated.

port_detail.det_data.abm_ls_supp
Support for ABM link stations. Possible values are:

AP_YES ABM link stations are supported.

AP_NO ABM link stations are not supported.

AP_UNKNOWN
Support for ABM link stations cannot be determined because the DLC associated with this port has not yet been started.

port_detail.det_data.start_time
The elapsed time, in hundredths of a second, between the time the node was started and the last time this port was started. If this port has not yet been started, this parameter is set to zero.

port_detail.def_data.description
A null-terminated text string describing the port, as specified in the definition of the port.

port_detail.def_data.dlc_name
Name of the DLC associated with this port. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

port_detail.def_data.port_type
The type of line used by the port.

For SDLC, the following values may be returned:

AP_PORT_SWITCHED
Switched line.

AP_PORT_NONSWITCHED
Nonswitched line.

For QLLC, this is set to `AP_PORT_SWITCHED`.

For Token Ring / Ethernet, this is set to `AP_PORT_SATF` (shared access transport facility).

For Enterprise Extender (HPR/IP), this is set to `AP_PORT_SATF` (shared access transport facility).

port_detail.def_data.port_attributes
This is a bit field. It can take the value `AP_NO`, or the following:

AP_RESOLVE_BY_LINK_ADDRESS
This value specifies that an attempt is made to resolve incoming calls by using the link address on CONNECT_IN before using the CP name (or node ID) carried on the received XID3 to resolve them. This is ignored if the *port_type* parameter is not set to `AP_PORT_SWITCHED`.

def_data.implicit_uplink_to_en
This parameter applies only if the local node is a Branch Network Node; it is reserved if the local node is any other type.

If the adjacent node is an end node, this parameter specifies whether implicit link stations off this port are uplink or downlink. This parameter is ignored if there are existing links to the same adjacent node, because in this case the existing links are used to determine the link type. Possible values are:

AP_YES Implicit links to an End Node are uplinks.

AP_NO Implicit links to an End Node are downlinks.

port_detail.def_data.port_number
Port number.

port_detail.def_data.max_rcv_btu_size
Maximum BTU size that can be received.

port_detail.def_data.tot_link_act_lim
Total link activation limit.

port_detail.def_data.inb_link_act_lim
Inbound link activation limit.

port_detail.def_data.out_link_act_lim
Outbound link activation limit.

port_detail.def_data.ls_role
Link station role.

For SDLC or QLLC, the following values may be returned:

AP_LS_PRI
Primary

AP_LS_SEC
Secondary

AP_LS_NEG
Negotiable

For Token Ring / Ethernet, this is set to AP_LS_NEG (negotiable).

port_detail.def_data.implicit_dspu_template
Specifies the DSPU template, defined with the DEFINE_DSPU_TEMPLATE verb, that will be used for definitions if the local node is to provide SNA gateway for an implicit link activated on this port. If the template specified does not exist (or is already at its instance limit) when the link is activated, activation will fail. This is an 8-byte string in a locally displayable character set. All eight bytes are significant and must be set.

If the *def_data.implicit_dspu_services* parameter is not set to AP_PU_CONCENTRATION, this parameter is reserved.

port_detail.def_data.implicit_ls_limit
The maximum number of implicit link stations which can be active on this port simultaneously, including dynamic links and links activated for Discovery. A value of zero indicates that there is no limit; a value of AP_NO_IMPLICIT_LINKS indicates that no implicit links are allowed.

port_detail.def_data.implicit_deact_timer
Limited resource link deactivation timer, in seconds.

If *implicit_limited_resource* is set to AP_YES or AP_NO_SESSIONS, then an HPR-capable implicit link is automatically deactivated if no data flows on the link for the duration of this timer, and no sessions are using the link.

If *implicit_limited_resource* is set to AP_INACTIVITY, then an implicit link is automatically deactivated if no data flows on the link for the duration of this timer.

port_detail.def_data.act_xid_exchange_limit
Activation XID exchange limit.

port_detail.def_data.nonact_xid_exchange_limit
Non-activation XID exchange limit.

port_detail.def_data.ls_xmit_rcv_cap
Specifies the link station transmit/receive capability. Possible values are:

AP_LS_TWS
Two-way simultaneous

AP_LS_TWA
Two-way alternating

port_detail.def_data.max_ifrm_rcvd
Maximum number of I-frames that can be received by local link stations before an acknowledgment is sent. Range: 1–127.

port_detail.def_data.target_pacing_count
Numeric value between 1 and 32,767 inclusive indicating the desired pacing window size. (The current version of CS Linux does not make use of this value.)

port_detail.def_data.max_send_btu_size
Maximum BTU size that can be sent.

port_detail.def_data.dlc_data
Port address. For more information on the dlc_data structure, see "QUERY_LS" on page 414.

def_data.implicit_cp_cp_sess_support
Specifies whether CP-CP sessions are permitted for implicit link stations using this port. Possible values are:

AP_YES CP-CP sessions are permitted for implicit LSs.

AP_NO CP-CP sessions are not permitted for implicit LSs.

def_data.implicit_limited_resource
Specifies whether implicit link stations off this port are defined as limited resources. Possible values are:

AP_NO Implicit links are not limited resources, and will not be deactivated automatically.

AP_NO_SESSIONS
Implicit links are limited resources, and will be deactivated automatically when no active sessions are using them.

AP_INACTIVITY
Implicit links are limited resources, and will be deactivated automatically when no active sessions are using them or when no data has flowed for the time period specified by the *implicit_deact_timer* field.

def_data.implicit_hpr_support
Specifies whether High Performance Routing (HPR) is supported on implicit links. Possible values are:

AP_YES HPR is supported on implicit links.

AP_NO HPR is not supported on implicit links.

def_data.implicit_link_lvl_error
For SDLC, this parameter is not used.

For other link types, this parameter specifies whether HPR traffic should be sent on implicit links using link-level error recovery (AP_YES or AP_NO). The parameter is reserved if *implicit_hpr_support* is set to AP_NO.

def_data.default_tg_chars
Default TG characteristics. These are used for implicit link stations using this port, and as the default TG characteristics for defined link stations that do not have TG characteristics explicitly defined. For details of these parameters, see "DEFINE_LS" on page 117.

port_detail.def_data.port_spec_data_len
Unpadded length, in bytes, of the port-specific data. The data structure for this data follows the port_def_data structure, but is padded to start on a 4-byte boundary. For more details of the port-specific data, see "DEFINE_PORT" on page 179.

port_detail.def_data.link_spec_data_len
Unpadded length, in bytes, of the link-specific data. The data structure for the link-specific data follows the data structure for the port-specific data, but is padded to start on a 4-byte boundary. For more details of the link-specific data, see "DEFINE_PORT" on page 179.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_PORT_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *port_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_PU

QUERY_PU returns information about local PUs and the links associated with them. This verb can be used to obtain information about a specific PU or about multiple PUs, depending on the options used.

VCB Structure

```
typedef struct query_pu
{
   AP_UINT16       opcode;               /* verb operation code             */
   unsigned char   reserv2;              /* reserved                        */
   unsigned char   format;               /* reserved                        */
   AP_UINT16       primary_rc;           /* primary return code             */
   AP_UINT32       secondary_rc;         /* secondary return code           */
   unsigned char   *buf_ptr;             /* pointer to buffer               */
   AP_UINT32       buf_size;             /* buffer size                     */
   AP_UINT32       total_buf_size;       /* total buffer size required      */
   AP_UINT16       num_entries;          /* number of entries               */
   AP_UINT16       total_num_entries;    /* total number of entries         */
   unsigned char   list_options;         /* listing options                 */
   unsigned char   reserv3;              /* reserved                        */
   unsigned char   pu_name[8];           /* PU name                         */
   unsigned char   host_attachment;      /* host attachment filter          */
} QUERY_PU;

typedef struct pu_data
{
   AP_UINT16       overlay_size;         /* size of returned entry          */
   unsigned char   pu_name[8];           /* PU name                         */
   unsigned char   description[32];      /* resource description            */
   unsigned char   reserv1[16];          /* reserved                        */
   unsigned char   ls_name[8];           /* LS name                         */
   unsigned char   pu_sscp_sess_active;  /* Is PU-SSCP session active       */
   unsigned char   host_attachment;      /* Host attachment                 */
   SESSION_STATS   pu_sscp_stats;        /* PU-SSCP session statistics      */
   unsigned char   sscp_id[6];           /* SSCP ID                         */
   unsigned char   conventional_lu_compression; /* compression for LU 0-3?  */
   unsigned char   conventional_lu_cryptography;   /* reserved             */
   unsigned char   dddlu_supported;      /* does the host support DDDLU?    */
   unsigned char   tcpcv_supported;      /* does the host support TCPCVs?   */
   unsigned char   dddlu_offline_supported;  /* does the PU support sending */
                                         /*  NMVT (power off) to host?      */
   unsigned char   reserva[9];           /* reserved                        */
} PU_DATA;

typedef struct session_stats
{
   AP_UINT16       rcv_ru_size;          /* session receive RU size         */
   AP_UINT16       send_ru_size;         /* session send RU size            */
   AP_UINT16       max_send_btu_size;    /* maximum send BTU size           */
   AP_UINT16       max_rcv_btu_size;     /* maximum rcv BTU size            */
   AP_UINT16       max_send_pac_win;     /* maximum send pacing window size */
   AP_UINT16       cur_send_pac_win;     /* current send pacing window size */
   AP_UINT16       max_rcv_pac_win;      /* maximum receive pacing window   */
                                         /*  size                           */
   AP_UINT16       cur_rcv_pac_win;      /* current receive pacing window   */
                                         /*  size                           */
   AP_UINT32       send_data_frames;     /* number of data frames sent      */
   AP_UINT32       send_fmd_data_frames; /* num fmd data frames sent        */
   AP_UINT32       send_data_bytes;      /* number of data bytes sent       */
   AP_UINT32       rcv_data_frames;      /* number of data frames received  */
   AP_UINT32       rcv_fmd_data_frames;  /* num fmd data frames received    */
   AP_UINT32       rcv_data_bytes;       /* number of data bytes received   */
   unsigned char   sidh;                 /* session ID high byte (from      */
                                         /*  LFSID)                         */
   unsigned char   sidl;                 /* session ID low byte (from LFSID)*/
```

```
   unsigned char   odai;                /* ODAI bit set                 */
   unsigned char   ls_name[8];          /* Link station name            */
   unsigned char   pacing_type;         /* type of pacing in use        */
} SESSION_STATS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_PU

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of PUs for which data should be returned. To request data for a specific PU rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data. Specify one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *pu_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *pu_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

pu_name
Name of the PU for which information is required, or the name to be used as an index into the list of PUs. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

host_attachment
Specifies whether to filter the returned information by whether the PUs are attached to the host directly or using DLUR. Possible values are:

AP_DIRECT_ATTACHED
Return information only on PUs directly attached to the host system.

AP_DLUR_ATTACHED
Return information only on PUs supported by DLUR.

AP_NONE
Return information about all PUs regardless of host attachment.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

pu_data.overlay_size
The size of the returned pu_data structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each pu_data structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C sizeof() operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

pu_data.pu_name
PU Name. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

pu_data.description
A null-terminated text string describing the PU, as specified in the definition of the LS or of the internal PU.

pu_data.ls_name
Name of the link station associated with this PU. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

pu_data.pu_sscp_sess_active
Specifies whether the PU-SSCP session is active. Possible values are:

AP_YES The PU-SSCP session is active.

AP_NO The PU-SSCP session is inactive.

pu_data.host_attachment
Local PU host attachment type.

Possible values are:

AP_DIRECT_ATTACHED
PU is directly attached to the host system.

AP_DLUR_ATTACHED
PU is supported by DLUR.

pu_data.pu_sscp_stats.rcv_ru_size
Reserved (always set to zero).

pu_data.pu_sscp_stats.send_ru_size
Reserved (always set to zero).

pu_data.pu_sscp_stats.max_send_btu_size
Maximum BTU size that can be sent.

pu_data.pu_sscp_stats.max_rcv_btu_size
Maximum BTU size that can be received.

pu_data.pu_sscp_stats.max_send_pac_win
Reserved (always set to zero).

pu_data.pu_sscp_stats.cur_send_pac_win
Reserved (always set to zero).

pu_data.pu_sscp_stats.max_rcv_pac_win
Reserved (always set to zero).

pu_data.pu_sscp_stats.cur_rcv_pac_win
Reserved (always set to zero).

pu_data.pu_sscp_stats.send_data_frames
Number of normal flow data frames sent.

pu_data.pu_sscp_stats.send_fmd_data_frames
Number of normal flow FMD data frames sent.

pu_data.pu_sscp_stats.send_data_bytes
Number of normal flow data bytes sent.

pu_data.pu_sscp_stats.rcv_data_frames
Number of normal flow data frames received.

ppu_data.pu_sscp_stats.rcv_fmd_data_frames
Number of normal flow FMD data frames received.

pu_data.pu_sscp_stats.rcv_data_bytes
Number of normal flow data bytes received.

pu_data.pu_sscp_stats.sidh
Session ID high byte.

pu_data.pu_sscp_stats.sidl
Session ID low byte.

pu_data.pu_sscp_stats.odai
Origin Destination Assignor Indicator. When bringing up a session, the sender of the BIND sets this field to zero if the local node contains the primary link station, and sets it to one if the BIND sender is the node containing the secondary link station.

pu_data.pu_sscp_stats.ls_name
Link station name associated with statistics. This is an 8-byte ASCII character string, right-padded with spaces if the name is shorter than 8 characters.

pu_data.pu_sscp_stats.pacing_type
The type of receive pacing in use on the PU-SSCP session. This parameter is set to `AP_NONE`.

pu_data.sscp_id
For dependent LU sessions, this parameter is the SSCP ID received in the ACTPU from the host for the PU to which the local LU is mapped. For independent LU sessions, this parameter is set to `0` (zero). This value is an array of six bytes displayed as hexadecimal values.

pu_data.conventional_lu_compression
Specifies whether data compression is requested for LU 0–3 sessions using this PU. Possible values are:

AP_YES Data compression should be used for LU 0–3 sessions using this PU if the host requests it.

AP_NO Data compression should not be used for LU 0–3 sessions using this PU.

pu_data.dddlu_supported
Specifies whether the host system supports DDDLU (Dynamic Definition of Dependent LUs). Possible values are:

AP_YES The host supports DDDLU.

AP_NO The host does not support DDDLU.

pu_data.tcpcv_supported
Specifies whether the host system supports receiving the TCP/IP Information Control Vector (0x64). CS Linux can use this vector to send TCP/IP addressing information for TN3270 or LUA clients to the host. Possible values are:

AP_YES The host supports TCP CVs.

AP_NO The host does not support TCP CVs.

pu_data.dddlu_offline_supported
Specifies whether the local PU supports sending NMVT (power off) messages to the host. If the host system supports DDDLU (Dynamic Definition of Dependent LUs), CS Linux sends NMVT (power off) to the host when it has finished using a dynamically defined LU. This allows the host to save resources by removing the definition when it is no longer required.

Possible values are:

AP_YES The local PU sends NMVT (power off) messages to the host.

AP_NO The local PU does not send NMVT (power off) messages to the host.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_PU_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *pu_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_INVALID_PU_TYPE
The PU specified by the *pu_name* parameter is a remote PU and not a local PU.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_RAPI_CLIENTS

QUERY_RAPI_CLIENTS returns information about Remote API Clients (on AIX, Linux, or Windows)for which a particular server on the CS Linux LAN is currently acting as the master.

This verb must be issued to a server. It does not matter whether the node is started on that server.

Note: If a client is connected to the server through a Web server, and the client software is stopped, there may be a delay of a minute or two before the Web server ends the connection to the CS Linux master server. This means that a QUERY_RAPI_CLIENTS verb may still include the client for a short time after it has stopped using the server.

VCB Structure

```
typedef struct query_rapi_clients
{
   AP_UINT16              opcode;            /* verb operation code           */
   unsigned char          reserv2;           /* reserved                      */
   unsigned char          format;            /* reserved                      */
   AP_UINT16              primary_rc;        /* primary return code           */
   AP_UINT32              secondary_rc;      /* secondary return code         */
   unsigned char          *buf_ptr;          /* pointer to buffer             */
   AP_UINT32              buf_size;          /* buffer size                   */
   AP_UINT32              total_buf_size;    /* total buffer size required    */
   AP_UINT16              num_entries;       /* number of entries             */
   AP_UINT16              total_num_entries; /* total number of entries       */
   unsigned char          list_options;      /* listing options               */
   AP_UINT16              max_clients;       /* maximum number of clients     */
   unsigned char          sys_name[128];     /* RAPI Client to start query    */
} QUERY_RAPI_CLIENTS;

typedef struct rapi_client_info
{
   AP_UINT16       overlay_size;             /* overlay size                  */
   unsigned char   sys_name[128];            /* RAPI Client System name       */
```

```
   SNA_IP_ADDR      rapi_client_origin_ip_addr;  /* IP addr client sends us    */
   SNA_IP_ADDR      rapi_client_adj_ip_addr;  /* IP addr client comes in on    */
   AP_UINT16        rapi_client_adj_port;     /* port IP client comes in on    */
} RAPI_CLIENT_INFO;

typedef struct sna_ip_addr
{
   AP_UINT16        family;                   /* IPv4 or IPv6                  */
   union
   {
     unsigned char  ipv4_addr[4];
     unsigned char  ipv6_addr[16];
   } ip_addr;
} SNA_IP_ADDR;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_RAPI_CLIENTS

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of clients for which data should be returned. To request data for a specific client rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list of clients.

AP_LIST_INCLUSIVE
Start at the entry specified by the *sys_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *sys_name* parameter.

sys_name
Fully-qualified system name of the client to be used as an index into the list (such as newbox.this.co.uk). This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST.

This is an ASCII string of 1–128 characters, padded on the right with spaces if the name is shorter than 128 characters.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

max_clients
The maximum number of clients using the server as their master server at any time since the CS Linux software was started.

rapi_client_info.overlay_size
The size of the returned `rapi_client_info` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `rapi_client_info` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

rapi_client_info.sys_name
The fully-qualified system name of the client (such as `newbox.this.co.uk`).

rapi_client_info.rapi_client_origin_ip_addr
The IP address of the client.

rapi_client_info.rapi_client_origin_ip_addr.family
The type of TCP/IP address specified for the client. Possible values are as follows.

`AF_INET`
IPv4 address, specified as a dotted-decimal address (such as `193.1.11.100`).

`AF_INET6`
IPv6 address, specified as a colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).

Note: The values `AF_INET` and `AF_INET6` are taken from a system header file, and are not standard `AP_*` values defined by CS Linux. The system header file is **/usr/include/linux/socket.h** on a Linux server or client, and **/usr/include/sys/socket.h** on an AIX client.

If your NOF application needs to test against these values, you should use `#include` to include this system file in addition to the **nof_c.h** header file.

rapi_client_info.rapi_client_origin_ip_addr.ip_addr.ipv4_addr
This field is used only if the *family* parameter is set to `AF_INET`. The IPv4 (dotted-decimal) address of the client computer.

rapi_client_info.rapi_client_origin_ip_addr.ip_addr.ipv6_addr
This field is used only if the *family* parameter is set to AF_INET6. The IPv6 (colon-hexadecimal) address of the client computer.

rapi_client_info.rapi_client_adj_ip_addr
The IP address through which the client attaches to CS Linux. This may not be the same as *rapi_client_origin_ip_addr* if one of the following is true.

- The client connects through a Web server.
- The client connects through a TCP/IP proxy or NAT router, such as the Linux iptables tool.
- The client has multiple IP addresses.

rapi_client_info.rapi_client_adj_ip_addr.family
The type of TCP/IP address through which the client attaches to CS Linux. Possible values are as follows.

AF_INET
IPv4 address, specified as a dotted-decimal address (such as 193.1.11.100).

AF_INET6
IPv6 address, specified as a colon-hexadecimal address (such as 2001:0db8:0000:0000:0000:0000:1428:57ab or 2001:db8::1428:57ab).

Note: The values AF_INET and AF_INET6 are taken from a system header file, and are not standard AP_* values defined by CS Linux. The system header file is **/usr/include/linux/socket.h** on a Linux server or client, and **/usr/include/sys/socket.h** on an AIX client.

If your NOF application needs to test against these values, you should use #include to include this system file in addition to the **nof_c.h** header file.

rapi_client_info.rapi_client_adj_ip_addr.ip_addr.ipv4_addr
This field is used only if the *family* parameter is set to AF_INET. The IPv4 (dotted-decimal) address through which the client attaches to CS Linux.

rapi_client_info.rapi_client_adj_ip_addr.ip_addr.ipv6_addr
This field is used only if the *family* parameter is set to AF_INET6. The IPv6 (colon-hexadecimal) address through which the client attaches to CS Linux.

rapi_client_info.rapi_client_adj_port
The IP port number through which the client attaches to CS Linux.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

AP_INVALID_NODE_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE or

AP_LIST_FROM_NEXT to list all entries starting from the supplied node name, but the *sys_name* parameter was not specified or was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_RCF_ACCESS

QUERY_RCF_ACCESS returns information about the permitted access to the CS Linux Remote Command Facility (RCF): the user ID used to run UNIX Command Facility (UCF) commands, and the restrictions on which administration commands can be issued using the Service Point Command Facility (SPCF). This information was previously set up using DEFINE_RCF_ACCESS. For more information about SPCF and UCF, see the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

This verb must be issued to the domain configuration file.

VCB Structure

```
typedef struct query_rcf_access
{
   AP_UINT16         opcode;                 /* Verb operation code      */
   unsigned char     reserv2;                /* reserved                 */
   unsigned char     format;                 /* reserved                 */
   AP_UINT16         primary_rc;             /* primary return code      */
   AP_UINT32         secondary_rc;           /* secondary return code    */
   unsigned char     ucf_username[32];       /* UCF username             */
   AP_UINT32         spcf_permissions;       /* SPCF permissions         */
   unsigned char     reserv3[8];             /* Reserved                 */
} QUERY_RCF_ACCESS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_RCF_ACCESS

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

ucf_username
Specifies the Linux user name of the UCF user. This parameter is a null-terminated ASCII string.

All UCF commands will be run using this user's user ID, using the default shell and access permissions defined for this user.

If this parameter is set to a null string, this indicates that UCF access is prohibited.

spcf_permissions
Specifies the types of CS Linux administration commands that can be

accessed using SPCF. This is set to AP_NONE to indicate that SPCF access is prohibited, or to one or more of the following values (combined using a logical OR):

AP_ALLOW_QUERY_LOCAL
QUERY_* verbs are permitted.

AP_ALLOW_DEFINE_LOCAL
DEFINE_*, SET_*, DELETE_*, ADD_*, and REMOVE_* verbs, and also INIT_NODE, are permitted.

AP_ALLOW_ACTION_LOCAL
"Action" verbs are permitted: START_*, STOP_*, ACTIVATE_*, DEACTIVATE_*, and also APING, INITIALIZE_SESSION_LIMIT, CHANGE_SESSION_LIMIT, and RESET_SESSION_LIMIT.

AP_ALLOW_QUERY_REMOTE
The QUERY_* verbs are allowed to provide access to a remote CS Linux node.

AP_ALLOW_DEFINE_REMOTE
The DEFINE_*, SET_*, DELETE_*, ADD_*, REMOVE_*, and INIT_NODE verbs are allowed to provide access to a remote CS Linux node.

AP_ALLOW_ACTION_REMOTE
The START_*, STOP_*, ACTIVATE_*, DEACTIVATE_*, APING, INITIALIZE_SESSION_LIMIT, CHANGE_SESSION_LIMIT, and RESET_SESSION_LIMIT verbs are allowed to provide access to a remote CS Linux node.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_RTP_CONNECTION

The QUERY_RTP_CONNECTION verb returns a list of information about Rapid Transport Protocol (RTP) connections for which the node is an endpoint. This verb can be used to obtain summary or detailed information about a specific RTP connection or about multiple RTP connections, depending on the options used.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_rtp_connection
{
   AP_UINT16       opcode;              /* verb operation code              */
   unsigned char   reserv2;             /* reserved                         */
   unsigned char   format;              /* reserved                         */
   AP_UINT16       primary_rc;          /* primary return code              */
   AP_UINT32       secondary_rc;        /* secondary return code            */
   unsigned char   *buf_ptr;            /* pointer to buffer                */
   AP_UINT32       buf_size;            /* buffer size                      */
   AP_UINT32       total_buf_size;      /* total buffer size required       */
   AP_UINT16       num_entries;         /* number of entries                */
   AP_UINT16       total_num_entries;   /* total number of entries          */
```

```
   unsigned char   list_options;         /* listing options                 */
   unsigned char   reserv3;              /* reserved                        */
   unsigned char   rtp_name[8];          /* name of RTP connection          */
} QUERY_RTP_CONNECTION;

typedef struct rtp_connection_summary
{
   AP_UINT16       overlay_size;         /* size of returned entry          */
   unsigned char   rtp_name[8];          /* RTP connection name             */
   unsigned char   first_hop_ls_name[8]; /* LS name of first hop            */
   unsigned char   dest_node_name[17];   /* fully qualified name of         */
                                         /*  destination node               */
   unsigned char   connection_type;      /* LU-LU or CP-CP connection?      */
   unsigned char   cos_name[8];          /* class of service name           */
   AP_UINT16       num_sess_active;      /* number of active sessions       */
} RTP_CONNECTION_SUMMARY;

typedef struct rtp_connection_detail
{
   AP_UINT16       overlay_size;         /* size of returned entry          */
   unsigned char   rtp_name[8];          /* RTP connection name             */
   unsigned char   first_hop_ls_name[8]; /* LS name of first hop            */
   unsigned char   dest_node_name[17];   /* fully qualified name of         */
                                         /*  destination node               */
   unsigned char   isr_boundary_fn;      /* is conn used for Boundary Func? */
   unsigned char   connection_type;      /* LU-LU or CP-CP connection?      */
   unsigned char   reserv1;              /* reserved                        */
   unsigned char   cos_name[8];          /* class of service name           */
   AP_UINT16       max_btu_size;         /* maximum BTU size                */
   AP_UINT32       liveness_timer;       /* liveness timer                  */
   unsigned char   local_tcid[8];        /* local tcid                      */
   unsigned char   remote_tcid[8];       /* remote tcid                     */
   RTP_STATISTICS  rtp_stats;            /* RTP statistics                  */
   AP_UINT16       num_sess_active;      /* number of active sessions       */
   unsigned char   arb_mode;             /* ARB-S, ARB-R, ARB-P?            */
   unsigned char   refifo;               /* refifo support?                 */
   AP_UINT32       refifo_timer;         /* last refifo timer in ms         */
   AP_UINT32       path_switch_time;     /* time since last path switch secs */
   AP_UINT16       path_switch_atts;     /* number of path switch attempts  */
   unsigned char   reserv2[4];           /* reserved                        */
   AP_UINT16       rscv_len;             /* length of appended RSCV         */
 } RTP_CONNECTION_DETAIL;
```

The session detail structure may be followed by a Route Selection Control Vector (RSCV) as defined by SNA Formats. This control vector defines the session route through the network and is carried on the BIND. This RSCV is included only if the node's configuration (specified using DEFINE_NODE) indicates that endpoint RSCVs should be stored.

```
typedef struct rtp_statistics
{
   AP_UINT32       bytes_sent;           /* total number of bytes sent      */
   AP_UINT32       bytes_received;       /* total number of bytes received  */
   AP_UINT32       bytes_resent;         /* total number of bytes resent    */
   AP_UINT32       bytes_discarded;      /* total number of bytes discarded */
   AP_UINT32       packets_sent;         /* total number of packets sent    */
   AP_UINT32       packets_received;     /* total number of packets received */
   AP_UINT32       packets_resent;       /* total number of packets resent  */
   AP_UINT32       packets_discarded;    /* total number of packets discarded*/
   AP_UINT32       gaps_detected;        /* gaps detected                   */
   AP_UINT32       send_rate;            /* current send rate               */
   AP_UINT32       max_send_rate;        /* maximum send rate               */
   AP_UINT32       min_send_rate;        /* minimum send rate               */
   AP_UINT32       receive_rate;         /* current send rate               */
   AP_UINT32       max_receive_rate;     /* maximum receive rate            */
   AP_UINT32       min_receive_rate;     /* minimum receive rate            */
   AP_UINT32       burst_size;           /* current burst size              */
   AP_UINT32       up_time;              /* total uptime of connection      */
```

```
    AP_UINT32       smooth_rtt;           /* smoothed round-trip time         */
    AP_UINT32       last_rtt;             /* last round-trip time             */
    AP_UINT32       short_req_timer;      /* SHORT_REQ timer duration         */
    AP_UINT32       short_req_timeouts;   /* number of SHORT_REQ timeouts     */
    AP_UINT32       liveness_timeouts;    /* number of liveness timeouts      */
    AP_UINT32       in_invalid_sna_frames; /* number of invalid SNA frames    */
    AP_UINT32       in_sc_frames;         /* number of SC frames received     */
    AP_UINT32       out_sc_frames;        /* number of SC frames sent         */
    AP_INT32        delay_change_sum;     /* delay change sum                 */
    AP_UINT32       current_receiver_threshold;
                                          /* current ARB-R receiver threshold */
    AP_UINT32       minimum_receiver_threshold;
                                          /* minimum ARB-R receiver threshold */
    AP_UINT32       maximum_receiver_threshold;
                                          /* maximum ARB-R receiver threshold */
    AP_UINT32       sent_normals_count;   /* number of NORMALs sent           */
    AP_UINT32       sent_slowdowns_count; /* number of SLOWDOWNs sent         */
    AP_UINT32       rcvd_normals_count;   /* number of NORMALs received       */
    AP_UINT32       rcvd_slowdowns_count; /* number of SLOWDOWNs received     */
    AP_UINT32       dcs_reset_count_non_heal;
                                          /* number of non-healing resets     */
    AP_UINT16       dcs_reset_count_healing;
                                          /* number of self-healing resets    */
    unsigned char   arb_mode;             /* ARB mode (GREEN, YELLOW, RED)    */
    unsigned char   reserve[1];           /* reserved                         */
} RTP_STATISTICS;
```

Supplied Parameters

Supplied parameters are:

opcode AP_QUERY_RTP_CONNECTION

buf_ptr Pointer to a buffer into which list information can be written. The application can append data to the end of the VCB in which case, *buf_ptr* must be set to NULL.

buf_size
Size of the buffer supplied.

num_entries
Maximum number of RTP connections for which data should be returned. To request data for a specific connection rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The level of information required for each entry and the position in the list from which CS Linux begins to return data.

Specify the level of information required with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *rtp_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *rtp_name* parameter.

rtp_name
Name of the RTP connection. This value is ignored if the *list_options* parameter is set to `AP_FIRST_IN_LIST`. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. This may be higher than *buf_size*.

num_entries
The number of entries actually returned.

total_num_entries
Total number of entries that could have been returned. This may be higher than *num_entries*.

rtp_connection_summary.overlay_size
The size of the returned `rtp_connection` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `rtp_connection_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

rtp_connection_summary.rtp_name
Name of the RTP connection. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

rtp_connection_summary.first_hop_ls_name
Name of the link station of the first hop of the RTP connection. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

rtp_connection_summary.dest_node_name
Fully qualified name of the destination control point for the RTP portion of the session. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

rtp_connection_summary.connection_type
Specifies the type of sessions on the RTP connection. Possible values are:

AP_RTP_CP_CP_SESSION
The RTP connection carries CP-CP sessions.

AP_RTP_LU_LU_SESSION
The RTP connection carries LU-LU sessions.

AP_RTP_ROUTE_SETUP
The RTP connection is used for route setup.

rtp_connection_summary.cos_name
Name of the class of service used by the RTP connection. This name is an EBCDIC string padded on the right with EBCDIC spaces.

rtp_connection_summary.num_sess_active
Number of sessions active on this RTP connection.

rtp_connection_detail.overlay_size
The size of the returned `rtp_connection` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `rtp_connection_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

rtp_connection_detail.rtp_name
Name of the RTP connection. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

rtp_connection_detail.first_hop_ls_name
Name of the link station of the first hop of the RTP connection. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

rtp_connection_detail.dest_node_name
Fully qualified name of the destination control point for the RTP portion of the session. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

rtp_connection_detail.isr_boundary_fn
Specifies whether the RTP Connection is being used for any ISR session for which the local node is providing HPR-APPN Boundary Function. Possible values are:

AP_YES The RTP connection is being used for an ISR session for which the local node is providing HPR-APPN Boundary Function.

AP_NO The RTP connection is not being used for an ISR session for which the local node is providing HPR-APPN Boundary Function.

rtp_connection_detail.connection_type
Specifies the type of sessions on the RTP connection. Possible values are:

AP_RTP_CP_CP_SESSION
The RTP connection carries CP-CP sessions.

AP_RTP_LU_LU_SESSION
The RTP connection carries LU-LU sessions.

AP_RTP_ROUTE_SETUP
The RTP connection is used for route setup.

rtp_connection_detail.cos_name
Name of the class of service used by the RTP connection. This name is an EBCDIC string padded on the right with EBCDIC spaces.

rtp_connection_detail.max_btu_size
Maximum size, in bytes, of the basic transmission unit (BTU) used on the RTP connection.

rtp_connection_detail.liveness_timer
Liveness timer, measured in seconds, for the RTP connection. If no traffic flows on a connection during a liveness timer interval, RTP starts a status exchange to check if its partner is still there. A short liveness timer interval provides quick detection of line failures and rapid path switching when a line fails. However, if the interval is too short, performance is slightly degraded by the frequent checks on the status of the line.

rtp_connection_detail.local_tcid
Local TCID (transport control identifier) for the RTP connection.

rtp_connection_detail.remote_tcid
Remote TCID for the RTP connection.

rtp_connection_detail.rtp_stats.bytes_sent
Total number of bytes that the local node has sent on this RTP connection.

rtp_connection_detail.rtp_stats.bytes_received
Total number of bytes that the local node has received on this RTP connection.

rtp_connection_detail.rtp_stats.bytes_resent
Total number of bytes that the local node has resent on this RTP connection because bytes were lost in transit.

rtp_connection_detail.rtp_stats.bytes_discarded
Total number of bytes sent by the other end of the RTP connection that were discarded as duplicates of data already received.

rtp_connection_detail.rtp_stats.packets_sent
Total number of packets that the local node has sent on this RTP connection.

rtp_connection_detail.rtp_stats.packets_received
Total number of packets that the local node has received on this RTP connection.

rtp_connection_detail.rtp_stats.packets_resent
Total number of packets that the local node has resent on this RTP connection because packets were lost in transit.

rtp_connection_detail.rtp_stats.packets_discarded
Total number of packets sent by the other end of the RTP connection that were discarded as duplicates of data already received.

rtp_connection_detail.rtp_stats.gaps_detected
Total number of gaps detected by the local node. Each gap corresponds to one or more lost frames.

rtp_connection_detail.rtp_stats.send_rate
Current send rate on this RTP connection, measured in Kbits/second. This rate is the maximum allowed send rate as calculated by the ARB (adaptive

rate-based) algorithm. RTP uses the ARB algorithm to calculate how fast it can send data based on an analysis of the amount of time it takes for the partner to respond.

rtp_connection_detail.rtp_stats.max_send_rate
Maximum send rate on this RTP connection, measured in Kbits/second.

rtp_connection_detail.rtp_stats.min_send_rate
Minimum send rate on this RTP connection, measured in Kbits/second.

rtp_connection_detail.rtp_stats.receive_rate
Current receive rate on this RTP connection, measured in Kbits/second. This rate is the actual rate calculated over the last measurement interval.

rtp_connection_detail.rtp_stats.max_receive_rate
Maximum receive rate on this RTP connection, measured in Kbits/second.

rtp_connection_detail.rtp_stats.min_receive_rate
Minimum receive rate on this RTP connection, measured in Kbits/second.

rtp_connection_detail.rtp_stats.burst_size
Current burst size on this RTP connection, measured in bytes.

rtp_connection_detail.rtp_stats.up_time
Total number of seconds this RTP connection has been active.

rtp_connection_detail.rtp_stats.smooth_rtt
Smoothed measure of round-trip time between the local node and the partner RTP node, measured in milliseconds.

rtp_connection_detail.rtp_stats.last_rtt
The last measured round-trip time between the local node and the partner RTP node, measured in milliseconds.

rtp_connection_detail.rtp_stats.short_req_timer
The amount of time to wait for a response to a request for a status exchange, measured in milliseconds. A short timer interval provides quick detection of failures but lowers performance.

rtp_connection_detail.rtp_stats.short_req_timeouts
Total number of times the *short_req_ timer* has expired for this RTP connection.

rtp_connection_detail.rtp_stats.liveness_timeouts
Total number of times the liveness timer has expired for this RTP connection. The liveness timer expires when the connection has been idle for the period specified in the *liveness_timer* parameter.

rtp_connection_detail.rtp_stats.in_invalid_sna_frames
Total number of SNA frames received and discarded on this RTP connection because they were not valid.

rtp_connection_detail.rtp_stats.in_sc_frames
Total number of session control frames received on this RTP connection.

rtp_connection_detail.rtp_stats.out_sc_frames
Total number of session control frames sent on this RTP connection.

rtp_connection_detail.rtp_stats.delay_change_sum
Value of the delay change sum currently held by the ARB-R algorithm on this RTP connection.

rtp_connection_detail.rtp_stats.current_receiver_threshold
Value of the receiver threshold currently held by the ARB-R algorithm on this RTP connection.

rtp_connection_detail.rtp_stats.minimum_receiver_threshold
Value of the minimum receiver threshold currently held by the ARB-R algorithm on this RTP connection.

rtp_connection_detail.rtp_stats.maximum_receiver_threshold
Value of the maximum receiver threshold currently held by the ARB-R algorithm on this RTP connection.

rtp_connection_detail.rtp_stats.sent_normals_count
Number of NORMAL feedback ARB-R segments sent by the ARB-R algorithm on this RTP connection.

rtp_connection_detail.rtp_stats.sent_slowdowns_count
Number of SLOWDOWN1 and SLOWDOWN2 feedback ARB-R segments sent by the ARB-R algorithm on this RTP connection.

rtp_connection_detail.rtp_stats.rcvd_normals_count
Number of NORMAL feedback ARB-R segments received by the ARB-R algorithm on this RTP connection.

rtp_connection_detail.rtp_stats.rcvd_slowdowns_count
Number of SLOWDOWN1 and SLOWDOWN2 feedback ARB-R segments received by the ARB-R algorithm on this RTP connection.

rtp_connection_detail.rtp_stats.dcs_reset_count_non_heal
Number of delay change sum resets made as a part of normal ARB-R processing on this RTP connection.

rtp_connection_detail.rtp_stats.dcs_reset_count_healing
Number of delay change sum resets made to self-heal the ARB-R algorithm on this RTP connection.

rtp_connection_detail.rtp_stats.arb_mode
The current ARB-R status mode on this RTP connection. Possible values are:

0 GREEN

1 YELLOW

2 RED

rtp_connection_detail.num_sess_active
Number of sessions active on this RTP connection.

rtp_connection_detail.arb_mode
Specifies the ARB mode in use on this RTP Connection. Possible values are:

AP_ARB_S
Standard mode ARB.

AP_ARB_R
Responsive mode ARB.

AP_ARB_P
Progressive mode ARB.

AP_UNKNOWN
The ARB mode has not yet been determined because the RTP connection is not yet established.

rtp_connection_detail.refifo
Specifies whether refifo is enabled on the RTP connection. Possible values are:

AP_YES Refifo is enabled. When CS Linux detects a gap in received data, it starts the refifo timer to allow time for out-of-sequence packets to arrive, and requests retransmission only if the packets are still missing when the timer expires.

AP_NO Refifo is not enabled. When CS Linux detects a gap in received data, it requests retransmission of the missing packets immediately.

rtp_connection_detail.refifo_timer
The most recent refifo timer duration, in milliseconds.

rtp_connection_detail.path_switch_time
The time in seconds since the most recent path switch attempt on this RTP connection. If there have been no path switch attempts (*path_switch_atts* is set to zero), this parameter is set to zero.

rtp_connection_detail.path_switch_atts
The total number of path switch attempts made on this RTP connection.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_RTP_CONNECTION
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *rtp_name* parameter was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_RTP_TUNING

QUERY_RTP_TUNING returns information about the parameters that will be used for future RTP connections. This information was previously set up using DEFINE_RTP_TUNING.

VCB Structure

```
typedef struct query_rtp_tuning
{
   AP_UINT16         opcode;                /* Verb operation code            */
   unsigned char     reserv2;               /* reserved                       */
   unsigned char     format;                /* reserved                       */
   AP_UINT16         primary_rc;            /* primary return code            */
   AP_UINT32         secondary_rc;          /* secondary return code          */
   unsigned char     path_switch_attempts;  /* number of path switch attempts */
```

```
   unsigned char     short_req_retry_limit;   /* short request timer retry limit */
   AP_UINT16         path_switch_times[4];    /* path switch times               */
   AP_UINT32         refifo_cap;              /* maximum for refifo timer        */
   AP_UINT32         srt_cap;                 /* maximum for short request timer */
   AP_UINT16         path_switch_delay;       /* minimum delay before path switch*/
   unsigned char     reserved[78];            /* reserved                        */
} QUERY_RTP_TUNING;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_RTP_TUNING

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

path_switch_attempts
Number of path switch attempts to set on new RTP connections.

short_req_retry_limit
Number of times a Status Request is sent before CS Linux determines that an RTP connection is disconnected and starts Path Switch processing.

path_switch_times
Length of time in seconds for which CS Linux attempts to path switch a disconnected RTP connection. This parameter is specified as four separate time limits for each of the valid transmission priorities in order: AP_LOW, AP_MEDIUM, AP_HIGH, and AP_NETWORK.

refifo_cap
The RTP protocol uses a timer called the Re-FIFO Timer. The value of this timer is calculated as part of the protocol, but this parameter specifies a maximum value in milliseconds beyond which the timer cannot increase. In some situations, setting this maximum value can improve performance. A value of 0 (zero) means that the timer is not limited and can take any value calculated by the protocol.

srt_cap The RTP protocol uses a timer called the Short Request Timer. The value of this timer is calculated as part of the protocol, but this parameter specifies a maximum value in milliseconds beyond which the timer cannot increase. In some situations, setting this maximum value can improve performance. A value of 0 (zero) means that the timer is not limited and can take any value calculated by the protocol.

path_switch_delay
Minimum delay in seconds before a path switch occurs. Specifying a delay avoids unnecessary path switch attempts caused by temporary resource shortages at the remote system, in particular when there is no other route available.

The default value for this parameter is zero, indicating that a path switch attempt can occur as soon as the protocol indicates it is required.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_SECURITY_ACCESS_LIST

QUERY_SECURITY_ACCESS_LIST returns information about security access lists defined in a CS Linux configuration file. It can return information about a single list or multiple lists, depending on the options used.

VCB Structure

```
typedef struct query_security_access_list
{
  AP_UINT16         opcode;                 /* verb operation code           */
  unsigned char     reserv2;                /* reserved                      */
  unsigned char     format;                 /* reserved                      */
  AP_UINT16         primary_rc;             /* primary return code           */
  AP_UINT32         secondary_rc;           /* secondary return code         */
  unsigned char     *buf_ptr;               /* pointer to buffer             */
  AP_UINT32         buf_size;               /* buffer size                   */
  AP_UINT32         total_buf_size;         /* total buffer size required    */
  AP_UINT16         num_entries;            /* number of entries             */
  AP_UINT16         total_num_entries;      /* total number of entries       */
  unsigned char     list_options;           /* listing options               */
  unsigned char     reserv3;                /* reserved                      */
  unsigned char     list_name[14];          /* Security Access List name     */
  unsigned char     user_name[10];          /* user name                     */
  AP_UINT32         num_init_users;         /* number of users for first     */
                                            /* list when starting in middle  */
  AP_UINT32         num_last_users;         /* number of users on last       */
                                            /* overlay if last list is       */
                                            /* incomplete                    */
  unsigned char     last_list_incomplete;   /* set to AP_YES if user data    */
                                            /* for last list is incomplete   */
} QUERY_SECURITY_ACCESS_LIST;

typedef struct security_access_detail
{
  AP_UINT16         overlay_size;         /* size of returned entry          */
  unsigned char     list_name[14];        /* list name                       */
  unsigned char     reserv1[2];           /* reserved                        */
  AP_UINT32         num_filtered_users;   /* number of users returned        */
  SECURITY_LIST_DEF def_data;             /* list definition                 */
} SECURITY_ACCESS_DETAIL;

typedef struct security_list_def
{
  unsigned char     description[32];      /* description                     */
  unsigned char     reserv3[16];          /* reserved                        */
  AP_UINT32         num_users;            /* number of users in list         */
  unsigned char     reserv2[16];          /* reserved                        */
} SECURITY_LIST_DEF;

typedef struct security_user_data
{
  AP_UINT16         sub_overlay_size;     /* reserved                        */
  unsigned char     user_name[10];        /* user name                       */
} SECURITY_USER_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_SECURITY_ACCESS_LIST

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of security access lists for which data should be returned. This number includes partial security access list entries (for which a user name is specified, so that the returned data does not include the first user name in the list).

To request data for a specific security access list rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data. Specify one of the following values:

AP_FIRST_IN_LIST
Start at the first user name for the first security access list.

AP_LIST_INCLUSIVE
Start at the entry specified by the supplied security access list name and user name, or start at the first user name for the specified security access list if no user name is specified.

AP_LIST_FROM_NEXT
If a user name is specified, start at the user immediately following the specified user. If no user name is specified, start at the first user for the specified security access list.

The list is ordered by security access list name, and then by user name within each security access list. For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

list_name
The name of the security access list for which information is required, or the name to be used as an index into the list of security access lists. This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST. The name is an ASCII string of 1–14 characters, padded on the right with spaces if the name is shorter than 14 characters.

user_name
To return information starting with a specific user name for the specified security access list, set this parameter to the user name. To return information starting at the first user name for the specified security access list, set this parameter to 10 binary zeros.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. This may be higher than *buf_size*.

total_num_entries
Total number of entries that could have been returned. This may be higher than *num_entries*.

num_entries
The number of entries actually returned. The last entry may be incomplete; this is indicated by the *last_list_incomplete* parameter.

num_init_users
If the *user_name* parameter was set to a nonzero value, so that the information for the first security access list in the returned data does not start with the first user in that list, this parameter indicates the number of user name structures for this list that are included in the returned data. Otherwise, this parameter is not used.

num_last_users
If the *last_list_incomplete* parameter indicates that the data for the last list is incomplete, this parameter indicates the number of user name structures for this list that are included in the returned data. (The *num_filtered_users* parameter returned for this list indicates the total number of user name structures that are available.) Otherwise, this parameter is not used.

last_list_incomplete
Specifies whether the information for the last security access list is incomplete. Possible values are:

AP_YES The complete data for the last security access list was too large to fit in the data buffer. At least one user name structure is included, but there are further user name structures that are not included in the data buffer. The *num_last_users* parameter indicates how many user name structures have been returned; the application can issue further verbs to obtain the remaining data.

AP_NO The data for the last list is complete.

Each entry in the data buffer consists of the following:

security_access_detail.list_name
The name of the security access list. This is an ASCII string of 1–14 characters.

security_access_detail.num_filtered_users
The total number of user names in this security access list.

security_access_detail.def_data.description
A null-terminated text string describing the security access list, as specified in the definition of the list.

security_access_detail.def_data.num_users
The total number of users in the security access list.

If this is the last list in the data buffer, and the *last_list_incomplete* parameter is set to `AP_YES`, the total number of user name structures returned for this list will be as specified by the *num_last_users* parameter; this will be less than *num_users*.

For each user name in the list, a `security_user_data` structure is returned with the following information:

user_name
Name of the user.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LIST_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, but the *list_name* parameter did not match the name of any defined security access list.

AP_INVALID_USER_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE, but the *user_name* parameter did not match a user name defined for the specified security access list.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_SESSION

QUERY_SESSION returns list information about sessions for a particular local LU.

This verb can be used to obtain either summary or detailed information, about a specific session or a range of sessions, depending on the options used.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_session
{
   AP_UINT16       opcode;              /* verb operation code             */
   unsigned char   reserv2;             /* reserved                        */
   unsigned char   format;              /* reserved                        */
   AP_UINT16       primary_rc;          /* primary return code             */
   AP_UINT32       secondary_rc;        /* secondary return code           */
   unsigned char   *buf_ptr;            /* pointer to buffer               */
   AP_UINT32       buf_size;            /* buffer size                     */
   AP_UINT32       total_buf_size;      /* total buffer size required      */
   AP_UINT16       num_entries;         /* number of entries               */
   AP_UINT16       total_num_entries;   /* total number of entries         */
   unsigned char   list_options;        /* listing options                 */
   unsigned char   reserv3;             /* reserved                        */
   unsigned char   lu_name[8];          /* LU name                         */
   unsigned char   lu_alias[8];         /* LU alias                        */
   unsigned char   plu_alias[8];        /* partner LU alias                */
```

```
   unsigned char   fqplu_name[17];       /* fully qualified partner LU name  */
   unsigned char   mode_name[8];         /* mode name                        */
   unsigned char   session_id[8];        /* session ID                       */
} QUERY_SESSION;

typedef struct session_summary
{
   AP_UINT16       overlay_size;         /* size of returned entry           */
   unsigned char   plu_alias[8];         /* partner LU alias                 */
   unsigned char   fqplu_name[17];       /* fully qualified partner LU name  */
   unsigned char   reserv3[1];           /* reserved                         */
   unsigned char   mode_name[8];         /* mode name                        */
   unsigned char   session_id[8];        /* session ID                       */
   FQPCID          fqpcid;               /* fully qualified procedure        */
                                         /*  correlator ID                   */
} SESSION_SUMMARY;

typedef struct session_detail
{
   AP_UINT16       overlay_size;         /* size of returned entry           */
   unsigned char   plu_alias[8];         /* partner LU alias                 */
   unsigned char   fqplu_name[17];       /* fully qualified partner LU name  */
   unsigned char   reserv3[1];           /* reserved                         */
   unsigned char   mode_name[8];         /* mode name                        */
   unsigned char   session_id[8];        /* session ID                       */
   FQPCID          fqpcid;               /* fully qualified procedure        */
                                         /*  correlator ID                   */
   unsigned char   cos_name[8];          /* Class of Service name            */
   unsigned char   trans_pri;            /* Transmission priority:           */
   unsigned char   ltd_res;              /* Session spans a limited resource */
   unsigned char   polarity;             /* Session polarity                 */
   unsigned char   contention;           /* Session contention               */
   SESSION_STATS   sess_stats;           /* Session statistics               */
   unsigned char   reserv3a;             /* reserved                         */
   unsigned char   sscp_id[6];           /* SSCP ID of host                  */
   unsigned char   reserva;              /* reserved                         */
   AP_UINT32       session_start_time;   /* start time of the session        */
   AP_UINT16       session_timeout;      /* session timeout                  */
   unsigned char   cryptography;         /* reserved                         */
   unsigned char   reservb[5];           /* reserved                         */
   unsigned char   comp_in_series;       /* reserved                         */
   unsigned char   plu_slu_comp_lvl;     /* PLU to SLU compression level     */
   unsigned char   slu_plu_comp_lvl;     /* SLU to PLU compression level     */
   unsigned char   rscv_len;             /* Length of following RSCV         */
} SESSION_DETAIL;
```

The session detail structure may be followed by a Route Selection Control Vector (RSCV) as defined by SNA Formats. This control vector defines the session route through the network and is carried on the BIND. This RSCV is included only if the node's configuration (specified using DEFINE_NODE) indicates that endpoint RSCVs should be stored.

```
typedef struct fqpcid
{
   unsigned char   pcid[8];              /* procedure correlator identifier  */
   unsigned char   fqcp_name[17];        /* originator's network qualified   */
                                         /*  CP name                         */
   unsigned char   reserve3[3];          /* reserved                         */
} FQPCID;

typedef struct session_stats
{
   AP_UINT16       rcv_ru_size;          /* session receive RU size          */
   AP_UINT16       send_ru_size;         /* session send RU size             */
   AP_UINT16       max_send_btu_size;    /* Maximum send BTU size            */
   AP_UINT16       max_rcv_btu_size;     /* Maximum rcv BTU size             */
   AP_UINT16       max_send_pac_win;     /* Maximum send pacing window size  */
   AP_UINT16       cur_send_pac_win;     /* Current send pacing window size  */
```

```
   AP_UINT16       max_rcv_pac_win;      /* Maximum receive pacing window    */
                                         /*  size                            */
   AP_UINT16       cur_rcv_pac_win;      /* Current receive pacing window    */
                                         /*  size                            */
   AP_UINT32       send_data_frames;     /* Number of data frames sent       */
   AP_UINT32       send_fmd_data_frames; /* Num fmd data frames sent         */
   AP_UINT32       send_data_bytes;      /* Number of data bytes sent        */
   AP_UINT32       rcv_data_frames;      /* Number of data frames received   */
   AP_UINT32       rcv_fmd_data_frames;  /* Num fmd data frames received     */
   AP_UINT32       rcv_data_bytes;       /* Number of data bytes received    */
   unsigned char   sidh;                 /* Session ID high byte (from LFSID)*/
   unsigned char   sidl;                 /* Session ID low byte (from LFSID) */
   unsigned char   odai;                 /* ODAI bit set                     */
   unsigned char   ls_name[8];           /* Link station name (or RTP name)  */
   unsigned char   pacing_type;          /* type of pacing in use            */
} SESSION_STATS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_SESSION

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of sessions for which data should be returned. To request data for a specific session rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *session_id* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *session_id* parameter.

The combination of the local LU (*lu_name* or *lu_alias*), partner LU (*plu_alias* or *fqplu_name*), and *mode_name* specified is used as an index into the list of sessions if the *list_options* parameter is set to AP_LIST_INCLUSIVE or AP_LIST_FROM_NEXT.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

lu_name
LU name. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters. To specify that the LU is identified by its alias rather than its LU name, set this parameter to 8 binary zeros and specify the LU alias in the following parameter. To specify the LU associated with the local CP (the default LU), set both *lu_name* and *lu_alias* to binary zeros.

lu_alias
Locally defined LU alias. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. This parameter is used only if *lu_name* is set to 8 binary zeros; it is ignored otherwise. To specify the LU associated with the local CP (the default LU), set both *lu_name* and *lu_alias* to binary zeros.

plu_alias
Partner LU alias. To return information only about sessions associated with a specific partner LU, specify the partner LU alias (in this parameter) or the partner LU fully qualified name (in the following parameter). To return information about all sessions without filtering on the partner LU, set both of these parameters to binary zeros.

This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. To specify that the LU is identified by its LU name rather than its alias, set this parameter to 8 binary zeros and specify the LU name in the following parameter.

fqplu_name
Fully qualified network name for the partner LU. This parameter is used only if *plu_alias* is set to 8 binary zeros; it is ignored otherwise.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

mode_name
Mode name filter. To return information only about sessions associated with a specific mode, specify the mode name; the partner LU must also be specified (using one of the two preceding parameters). To return information about all sessions without filtering on mode name, set this parameter to 8 binary zeros.

The mode name is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

session_id
8-byte identifier of the session. This parameter is ignored if *list_options* is set to `AP_FIRST_IN_LIST`.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

session_summary.overlay_size
The size of the returned `session_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `session_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

session_summary.plu_alias
Partner LU alias. This is an 8-byte ASCII character string, right-padded with ASCII spaces.

session_summary.fqplu_name
Fully qualified network name for the partner LU. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

session_summary.mode_name
Mode name. This is an 8-byte type-A EBCDIC string (starting with a letter), right-padded with EBCDIC spaces.

session_summary.session_id
8-byte identifier of the session.

session_summary.fqpcid.pcid
Procedure Correlator ID. This is an 8-byte hexadecimal string.

session_summary.fqpcid.fqcp_name
Fully qualified CP name. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

session_detail.overlay_size
The size of the returned `session_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `session_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

session_detail.plu_alias
Partner LU alias. This is an 8-byte ASCII character string, right-padded with ASCII spaces.

session_detail.fqplu_name
Fully qualified network name for the partner LU. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

session_detail.mode_name
Mode name. This is an 8-byte type-A EBCDIC string (starting with a letter), right-padded with EBCDIC spaces.

session_detail.session_id
8-byte identifier of the session.

session_detail.fqpcid.pcid
Procedure Correlator ID. This is an 8-byte hexadecimal string.

session_detail.fqpcid.fqcp_name
Fully qualified control point name. This is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

session_detail.cos_name
Class of service name. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

session_detail.trans_pri
Transmission priority. Possible values are:

`AP_LOW`

`AP_MEDIUM`

`AP_HIGH`

`AP_NETWORK`

session_detail.ltd_res
Specifies whether the session uses a limited resource link. Possible values are:

AP_YES Session uses a limited resource link.

AP_NO Session does not use a limited resource link.

session_detail.polarity
Specifies the polarity of the session. Possible values are:

`AP_PRIMARY`

`AP_SECONDARY`

session_detail.contention
Specifies whether the session is a contention winner or contention loser session for the local LU. Possible values are:

AP_CONWINNER
Contention winner session

AP_CONLOSER
Contention loser session

session_detail.sess_stats.rcv_ru_size
Maximum receive RU size.

session_detail.sess_stats.send_ru_size
Maximum send RU size.

session_detail.sess_stats.max_send_btu_size
Maximum BTU size that can be sent.

session_detail.sess_stats.max_rcv_btu_size
Maximum BTU size that can be received.

session_detail.sess_stats.max_send_pac_win
Maximum size of the send pacing window on this session.

session_detail.sess_stats.cur_send_pac_win
Current size of the send pacing window on this session.

session_detail.sess_stats.max_rcv_pac_win
Maximum size of the receive pacing window on this session.

session_detail.sess_stats.cur_rcv_pac_win
Current size of the receive pacing window on this session.

session_detail.sess_stats.send_data_frames
Number of normal flow data frames sent.

session_detail.sess_stats.send_fmd_data_frames
Number of normal flow FMD data frames sent.

session_detail.sess_stats.send_data_bytes
Number of normal flow data bytes sent.

session_detail.sess_stats.rcv_data_frames
Number of normal flow data frames received.

session_detail.sess_stats.rcv_fmd_data_frames
Number of normal flow FMD data frames received.

session_detail.sess_stats.rcv_data_bytes
Number of normal flow data bytes received.

session_detail.sess_stats.sidh
Session ID high byte.

session_detail.sess_stats.sidl
Session ID low byte.

session_detail.sess_stats.odai
Origin Destination Assignor Indicator. When bringing up a session, the sender of the BIND sets this field to zero if the local node contains the primary link station. It sets it to one if the BIND sender is the node containing the secondary link station.

session_detail.sess_stats.ls_name
Link station name associated with statistics. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. This field can be used to correlate the session statistics with the link over which session data flows.

session_detail.sess_stats.pacing_type
The type of receive pacing in use on this session. Possible values are:

```
AP_NONE
AP_FIXED
AP_ADAPTIVE
```

session_detail.duplex_support
Returns the conversation duplex support as negotiated on the BIND. Possible values are:

AP_HALF-DUPLEX
Only half-duplex conversations are supported.

AP_FULL_DUPLEX
Both full-duplex and half-duplex sessions are supported. Expedited data is also supported.

session_detail.sscp_id
For dependent LU sessions, this parameter is the SSCP ID received in the ACTPU from the host for the PU to which the local LU is mapped. For independent LU sessions, this parameter is set to `0` (zero).

session_detail.session_start_time
The time between the CP starting and this session becoming active, measured in one-hundredths of a second. If the session is not fully active when the query is processed, this parameter is set to `0` (zero).

session_detail.session_timeout
The timeout associated with this session This timeout is derived from:

- The LU 6.2 timeout associated with the local LU
- The LU 6.2 timeout associated with the remote LU
- The mode timeout
- The global timeout
- The limited resource timeout (if this session is running over a limited resource link)

session_detail.plu_slu_comp_lvl
Specifies the compression level for data sent from the primary LU (PLU) to the secondary LU (SLU). Possible values are:

AP_NONE
Compression is not used.

AP_RLE_COMPRESSION
Run-length encoding (RLE) compression is used.

AP_LZ9_COMPRESSION
LZ9 compression is used.

AP_LZ10_COMPRESSION
LZ10 compression is used.

session_detail.slu_plu_comp_lvl
Specifies the compression level for data sent from the secondary LU (SLU) to the primary LU (PLU). Possible values are:

AP_NONE
Compression is not used.

AP_RLE_COMPRESSION
Run-length encoding (RLE) compression is used.

AP_LZ9_COMPRESSION
LZ9 compression is used.

AP_LZ10_COMPRESSION
LZ10 compression is used.

session_detail.rscv_len
Length of the RSCV which is appended to the session_detail structure. (If none is appended, then the length is zero.)

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LU_ALIAS
The specified *lu_alias* parameter was not valid.

AP_INVALID_LU_NAME
The specified *lu_name* parameter was not valid.

AP_INVALID_SESSION_ID
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied value, but the *session_id* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_SNA_NET

QUERY_SNA_NET returns information about servers that can act as backup master servers, as defined in the **sna.net** file. It can be used to obtain information about a specific server or about multiple servers, depending on the options used.

The ordering of server names in this file is significant; the first server listed in the file will always be the master if it is active, the second will be the master if the first is inactive, the third will be the master if the first and second are both inactive, and so on. Because of this, the list of server names returned on QUERY_SNA_NET is in the same order as it is in the file; the returned names are not ordered by name length and lexicographical ordering, as with other QUERY_* verbs.

This verb must be issued to the **sna.net** file.

VCB Structure

```
typedef struct query_sna_net
{
   AP_UINT16        opcode;                /* Verb operation code          */
   unsigned char    reserv2;               /* reserved                     */
   unsigned char    format;                /* reserved                     */
   AP_UINT16        primary_rc;            /* Primary return code          */
```

```
   AP_UINT32        secondary_rc;           /* Secondary return code        */
   unsigned char    *buf_ptr;               /* pointer to buffer            */
   AP_UINT32        buf_size;               /* buffer size                  */
   AP_UINT32        total_buf_size;         /* total buffer size required   */
   AP_UINT16        num_entries;            /* number of entries            */
   AP_UINT16        total_num_entries;      /* total number of entries      */
   unsigned char    list_options;           /* listing options              */
   unsigned char    security;               /* reserved                     */
   unsigned char    domain_name[64];        /* domain name                  */
   unsigned char    server_name[128];       /* master or backup server name */
   unsigned char    reserv4[4];             /* reserved                     */
} QUERY_SNA_NET;

typedef struct backup_summary
{
   AP_UINT16        overlay_size;           /* size of returned entry       */
   unsigned char    reserv1[2];             /* reserved                     */
   unsigned char    server_name[128];       /* master or backup server name */
   unsigned char    reserv2[4];             /* reserved                     */
} BACKUP_SUMMARY;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_SNA_NET

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of server names for which data should be returned. To request a specific entry rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data.

Specify one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *server_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *server_name* parameter.

For more information about how the application can obtain specific entries from the list, see "List Options For QUERY_* Verbs" on page 39. The server names are listed in the same order as in the file, not in order of name length and/or lexicographical order as for other QUERY_* verbs.

server_name
Name of the server for which information is required, or the name to be used as an index into the list of servers. The server name is ignored if *list_options* is set to AP_FIRST_IN_LIST.

If the server name includes a . (period) character, CS Linux assumes that it is a fully-qualified name; otherwise it performs a DNS lookup to determine the server name.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

domain_name
The name of the TCP/IP domain containing the CS Linux LAN. This name was specified during installation of the master server.

Each entry in the data buffer consists of the following parameters:

backup_summary.overlay_size
The size of the returned backup_summary structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each backup_summary structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C sizeof() operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

backup_summary.server_name
Server name.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state check, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_RECORD_NOT_FOUND
The *list_options* parameter was set to AP_LIST_INCLUSIVE or AP_LIST_FROM_NEXT to list entries starting from the supplied server name, but the *backup_name* parameter did not match an entry in the file. If the supplied name was one returned on a previous QUERY_SNA_NET verb, this indicates that the list has been updated (by another administration program or NOF application) since the previous verb; the application should reissue QUERY_SNA_NET to obtain the complete list.

AP_INVALID_TARGET
The target handle on the NOF API call specified a configuration file or a node. This verb must be issued to the **sna.net** file.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_STATISTICS

QUERY_STATISTICS returns statistics on the usage of an LS or port. The MPC link type does not support link statistics; do not issue this verb for an MPC LS or port. The QLLC link type does not support link statistics; do not issue this verb for a QLLC LS or port.

The type of information returned depends on the DLC type:

For SDLC, the verb returns either statistics (counts of events such as particular frame types sent or received) or operational information (details of parameters currently being used), for either an LS or a port.

For Token Ringor Ethernet, the verb returns statistics information for either an LS or a port.

For Enterprise Extender, the verb returns statistics information for an LS.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_statistics
{
   AP_UINT16        opcode;                 /* verb operation code          */
   unsigned char    reserv2;                /* reserved                     */
   unsigned char    format;                 /* reserved                     */
```

```
   AP_UINT16        primary_rc;             /* primary return code          */
   AP_UINT32        secondary_rc;           /* secondary return code        */
   unsigned char    name[8];                /* LS name or port name         */
   unsigned char    stats_type;             /* LS or port statistics?       */
   unsigned char    table_type;             /* statistics table requested   */
   unsigned char    reset_stats;            /* reset the statistics?        */
   unsigned char    dlc_type;               /* type of DLC                  */
   unsigned char    statistics[256];        /* current statistics           */
   unsigned char    reserva[20];            /* reserved                     */
} QUERY_STATISTICS;
```

LS statistics for SDLC:

```
typedef struct sdl_ls_stats_table
{
  V0_MUX_INFO    mux_info;          /* streams config info                  */
  AP_UINT32      index;             /* index of port that owns LS           */
  unsigned int   address;           /* poll address of secondary link station*/
  unsigned char  reserv[3];         /* reserved                             */
  AP_UINT32      blus_in;           /* frames received from adjacent link   */
                                    /*  station                             */
  AP_UINT32      blus_out;          /* frames sent to adjacent link station */
  AP_UINT32      octets_in;         /* bytes received from adjacent link    */
                                    /*  station                             */
  AP_UINT32      octets_out;        /* bytes sent to adjacent link station  */
  AP_UINT32      polls_out;         /* polls sent to adjacent link station  */
  AP_UINT32      poll_rsps_out;     /* polls responded to by adjacent link  */
                                    /*  station                             */
  AP_UINT32      local_busies;      /* number of times local link station has*/
                                    /*  entered busy state (RNR)            */
  AP_UINT32      remote_busies;     /* number of times remote link station  */
                                    /*  has entered busy state (RNR)        */
  AP_UINT32      iframes_in;        /* I-frames rcvd from adjacent link     */
                                    /*  station                             */
  AP_UINT32      iframes_out;       /* I-frames sent to adjacent link station*/
  AP_UINT32      retransmits_in;    /* Total number of retransmitted        */
                                    /* I-frames received
  AP_UINT32      retransmits_out;   /* I-frames retransmitted since LS      */
                                    /*  start-up                            */
  AP_UINT32      ioctets_in;        /* bytes in I-frames received           */
  AP_UINT32      ioctets_out;       /* bytes in I-frames sent               */
  AP_UINT32      uiframes_in;       /* reserved                             */
  AP_UINT32      uiframes_out;      /* reserved                             */
  AP_UINT32      xids_in;           /* XIDs rcvd from adjacent link station */
  AP_UINT32      xids_out;          /* XIDs sent to adjacent link station   */
  AP_UINT32      tests_in;          /* TEST frames received                 */
  AP_UINT32      tests_out;         /* TEST frames sent                     */
  AP_UINT32      rejs_in;           /* REJ frames received                  */
  AP_UINT32      rejs_out;          /* REJ frames sent                      */
  AP_UINT32      frmrs_in;          /* FRMR frames received                 */
  AP_UINT32      frmrs_out;         /* FRMR frames sent                     */
  AP_UINT32      sims_in;           /* SIM frames received                  */
  AP_UINT32      sims_out;          /* SIM frames sent                      */
  AP_UINT32      rims_in;           /* RIM frames received                  */
  AP_UINT32      rims_out;          /* RIM frames sent                      */
  AP_UINT32      disc_in;           /* reserved                             */
  AP_UINT32      disc_out;          /* reserved                             */
  AP_UINT32      ua_in;             /* reserved                             */
  AP_UINT32      ua_out;            /* reserved                             */
  AP_UINT32      dm_in;             /* reserved                             */
  AP_UINT32      dm_out;            /* reserved                             */
  AP_UINT32      snrm_in;           /* SNRM frames received                 */
  AP_UINT32      snrm_out;          /* SNRM frames sent                     */
} SDL_LS_STATS_TABLE;
```

LS operational information for SDLC:

```
typedef struct sdl_ls_oper_table
{
  V0_MUX_INFO    mux_info;       /* streams config info                      */
  AP_UINT32      index;          /* index of port that owns LS               */
  unsigned char  address;        /* poll address of secondary link station   */
  unsigned char  reserve;        /* reserved                                 */
  AP_UINT16      role;           /* current role of link station             */
  unsigned char  name[8];        /* reserved                                 */
  AP_UINT16      state;          /* operational state of LS                  */
  AP_UINT16      maxdata;        /* current max PDU size for logical link    */
  AP_UINT32      replyto;        /* current reply timeout                    */
  AP_UINT32      maxin;          /* current max unack'd frames LS can receive*/
  AP_UINT32      maxout;         /* current max unack'd frames LS can send   */
  unsigned char  modulo;         /* sequence number modulus                  */
  unsigned char  reserv2[3];     /* reserved                                 */
  AP_UINT32      retries_m;      /* number of retries in a retry sequence    */
  AP_UINT32      retries_t;      /* interval between retry sequences         */
  AP_UINT32      retries_n;      /* number of times to repeat retry sequence */
  AP_UINT32      rnrlimit;       /* how long adjacent LS can be in RNR state */
                                 /*  before it is considered inoperative     */
  unsigned char  datmode;        /* communications mode with adjacent LS     */
  unsigned char  last_fail_cause;         /* reserved                        */
  unsigned char  last_fail_ctrl_in[2];    /* control field of last frame rcvd*/
                                 /*  before last failure                     */
  unsigned char  last_fail_ctrl_out[2];   /* control field of last frame sent*/
                                 /*  before last failure                     */
  unsigned char  last_fail_frmr_info[5];  /* info field of FRMR frame if     */
                                 /*  last failure was caused by             */
                                 /*  invalid frame                          */
  unsigned char  sdoppad1;               /* reserved                         */
  AP_UINT32      last_fail_replyto_s;    /* number of REPLYTO timeouts at    */
                                 /*  time of last failure                    */
  unsigned char  g_poll;         /* group poll address                       */
  unsigned char  sim_rim;        /* are SIM / RIM supported?                 */
  unsigned char  xmit_rcv_cap;   /* transmit / receive capability            */
} SDL_LS_OPER_TABLE;
```

Port statistics for SDLC:

```
typedef struct sdl_port_stats_table
{
  V0_MUX_INFO    mux_info;        /* streams config info                     */
  AP_UINT32      index;           /* index of port                           */
  AP_UINT32      dwarf_frames;    /* frames received too short to be valid   */
  AP_UINT32      polls_out;       /* polls sent to adjacent link stations    */
  AP_UINT32      poll_rsps_out;   /* polls responded to by adjacent link stns*/
  AP_UINT32      local_busies;    /* number of times local link station      */
                                  /*  has entered busy state (RNR)           */
  AP_UINT32      remote_busies;   /* number of times remote link stations    */
                                  /*  have entered busy state (RNR)          */
  AP_UINT32      iframes_in;      /* I-frames rcvd from adjacent link        */
                                  /*  stations                               */
  AP_UINT32      iframes_out;     /* I-frames sent to adjacent link stations */
  AP_UINT32      octets_in;       /* bytes received from adjacent link       */
                                  /*  stations                               */
  AP_UINT32      octets_out;      /* bytes sent to adjacent link stations    */
  AP_UINT32      protocol_errs;   /* link deactivations due to bad rcvd      */
                                  /*  frames                                 */
  AP_UINT32      activity_to_s;   /* link deactivations due to inactivity    */
  AP_UINT32      rnrlimit_s;      /* link deacts due to rem busy timer expiry*/
  AP_UINT32      retries_exps;    /* link deacts due to end of retry sequence*/
  AP_UINT32      retransmits_in;  /* retransmitted I-frames rcvd since       */
                                  /*  start-up                               */
  AP_UINT32      retransmits_out; /* I-frames retransmitted  since start-up  */
} SDL_PORT_STATS_TABLE;
```

Port operational information for SDLC:

```
typedef struct sdl_port_oper_table
{
  V0_MUX_INFO     mux_info;           /* streams config info               */
  AP_UINT32       index;              /* index of port                     */
  unsigned char   name[8];            /* reserved                          */
  unsigned char   role;               /* current role of link station(s)   */
                                      /*  using port                       */
  unsigned char   type;               /* line type - leased or switched    */
  unsigned char   topology;           /* can port be point-to-point or     */
                                      /*  multipoint                       */
  unsigned char   reserve;            /* reserved                          */
  AP_UINT32       activto;            /* how long switched line can be     */
                                      /*  inactive before port disconnects */
  AP_UINT32       pause;              /* time between poll cycles          */
  unsigned char   slow_poll_method;   /* slow poll method                  */
  unsigned char   reserv2[3];         /* reserved                          */
  AP_UINT32       slow_poll_timer;    /* slow poll timer                   */
  unsigned char   last_fail_cause;    /* reserved                          */
} SDL_PORT_OPER_TABLE;
```

LS statistics for Token Ring, Ethernet:

```
typedef struct llc2_ls_stats
{
   V0_MUX_INFO      mux_info;             /* streams config info           */
   unsigned char    local_mac[6];         /* MAC address of local port     */
   unsigned char    local_sap;            /* SAP number of local port      */
   unsigned char    reserve1;             /* reserved                      */
   unsigned char    remote_mac[6];        /* MAC address of remote port    */
   unsigned char    remote_sap;           /* SAP number of remote port     */
   unsigned char    reserve2;             /* reserved                      */
   AP_UINT16        rif_len;              /* length of RIF data for TR     */
   AP_UINT16        rif[8];               /* Routing Information Field     */
                                          /*  for TR                       */
   unsigned char    ls_fsm;               /* LLC2 FSM state                */
   unsigned char    reserve3;             /* reserved                      */
   AP_UINT16        mac_type;             /* LS MAC type                   */
   AP_UINT16        max_btu_size;         /* maximum BTU size              */
   AP_UINT16        send_window;          /* send window                   */
   AP_UINT16        receive_window;       /* receive window                */
   AP_UINT32        t1_expiry_count;      /* T1 expiry count               */
   AP_UINT32        t2_expiry_count;      /* T2 expiry count               */
   AP_UINT32        remote_busy;          /* remote busy state count       */
   AP_UINT32        local_busy;           /* local busy state count        */
   AP_UINT32        i_frames_sent;        /* count of I-frames sent        */
   AP_UINT32        i_bytes_sent;         /* count of bytes in I-frames sent*/
   AP_UINT32        i_frames_rcvd;        /* count of I-frames received    */
   AP_UINT32        i_bytes_rcvd;         /* count of bytes in I-frames    */
                                          /*  received                     */
   AP_UINT32        i_frames_rjctd;       /* count of I-frames rejected    */
   AP_UINT32        i_bytes_rjctd;        /* count of bytes in I-frames    */
                                          /*  rejected                     */
   AP_UINT32        i_frames_rexmit;      /* count of I-frames retransmitted*/
   AP_UINT32        i_bytes_rexmit;       /* count of bytes in I-frms      */
                                          /*  rexmitted                    */
   AP_UINT32        rej_frames_sent;      /* count of REJ frames sent      */
   AP_UINT32        rej_frames_rcvd;      /* count of REJ frames received  */
   AP_UINT32        xid_frames_sent;      /* count of XID frames sent      */
   AP_UINT32        xid_frames_rcvd;      /* count of XID frames received  */
   AP_UINT16        ack_timeout;          /* acknowledgment timeout        */
   AP_UINT16        p_bit_timeout;        /* poll bit timeout              */
   AP_UINT16        t2_timeout;           /* T2 timeout                    */
   AP_UINT16        rej_timeout;          /* REJ timeout                   */
   AP_UINT16        busy_state_timeout;   /* busy state timeout            */
   AP_UINT16        idle_timeout;         /* idle timeout                  */
   AP_UINT16        max_retry;            /* max retry count               */
} LLC2_LS_STATS;
```

Port statistics for Token Ring, Ethernet:

```
typedef struct llc2_port_stats
{
   V0_MUX_INFO      mux_info;              /* streams config info            */
   AP_UINT32        time_secs;             /* system time when port was      */
                                           /*  activated                     */
   AP_UINT16        time_ms;               /* system time when port was      */
                                           /*  activated                     */
   unsigned char    mac_addr[6];           /* MAC address of port            */
   AP_UINT16        ack_timeout;           /* reserved                       */
   AP_UINT16        p_bit_timeout;         /* reserved                       */
   AP_UINT16        t2_timeout;            /* reserved                       */
   AP_UINT16        rej_timeout;           /* reserved                       */
   AP_UINT16        busy_state_timeout;    /* reserved                       */
   AP_UINT16        idle_timeout;          /* reserved                       */
   AP_UINT16        max_retry;             /* reserved                       */
   AP_UINT16        max_btu_size;          /* max BTU size for port          */
   AP_UINT16        ls_count;              /* count of LSs using port        */
   AP_UINT16        reserve1;              /* reserved                       */
   AP_UINT32        ui_frames_sent;        /* count of UI frames sent        */
   AP_UINT32        ui_frames_rcvd;        /* count of UI frames received    */
   LLC2_DEV_STATS   device_stats;          /* device statistics              */
} LLC2_PORT_STATS;

typedef struct llc2_dev_stats
{
   unsigned char    adapter_number;        /* reserved                       */
   unsigned char    res1;                  /* reserved                       */
   unsigned char    line_error;            /* line error count               */
   unsigned char    internal_error;        /* internal error count           */
   unsigned char    burst_error;           /* burst error count              */
   unsigned char    ari_fci_error;         /* ARI/FCI error count            */
   unsigned char    end_delim;             /* end delimiter                  */
   unsigned char    res2;                  /* reserved                       */
   unsigned char    lost_frame;            /* lost frame count               */
   unsigned char    rcv_cngstn;            /* Receive congestion count       */
   unsigned char    frm_cpy_err;           /* Frame Copied error count       */
   unsigned char    freq_err;              /* frequency error count          */
   unsigned char    token_err;             /* token error count              */
   unsigned char    crc_err;               /* CRC error count                */
   unsigned char    res3;                  /* reserved                       */
   unsigned char    xmit_err;              /* transmit error count           */
   unsigned char    res4;                  /* reserved                       */
   unsigned char    collision_err;         /* collision error count          */
   unsigned char    res5[7];               /* reserved                       */
} LLC2_DEV_STATS;
```

LS statistics for Enterprise Extender:

```
typedef struct udp_ls_stats_table
{
   V0_MUX_INFO      mux_info;           /* streams config info               */
   AP_UINT32        udp_low_out;        /* Count of UDP datagrams sent       */
                                        /* containing low priority data      */
   AP_UINT32        udp_med_out;        /* Count of UDP datagrams sent       */
                                        /* containing medium priority data   */
   AP_UINT32        udp_high_out;       /* Count of UDP datagrams sent       */
                                        /* containing high priority data     */
   AP_UINT32        udp_network_out;    /* Count of UDP datagrams sent       */
                                        /* containing network priority data  */
   AP_UINT32        udp_llc_out;        /* Count of UDP datagrams sent       */
                                        /* containing LLC commands           */
} UDP_LS_STATS_TABLE;

typedef struct v0_mux_info
{
   AP_UINT16         dlc_type;              /* DLC implementation type     */
   unsigned char     need_vrfy_fixup;       /* reserved                    */
```

```
   unsigned char     num_mux_ids;            /* reserved                 */
   AP_UINT32         card_type;              /* type of adapter card     */
   AP_UINT32         adapter_number;         /* DLC adapter number       */
   AP_UINT32         oem_data_length;        /* reserved                 */
   AP_INT32          mux_ids[5];             /* reserved                 */
} V0_MUX_INFO;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_STATISTICS

name Name of the LS or port for which statistics are required (as specified by the *stats_type* parameter). This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. CS Linux uses this name to correlate the response to the correct link station or port.

stats_type

The type of resource for which statistics are requested.

Possible values for Token Ring / Ethernet are:

AP_LS Return LS statistics.

AP_PORT
Return port statistics.

For Enterprise Extender, this must be set to AP_LS.

table_type

The type of statistics information requested.

Allowed values for SDLC:

AP_STATS_TBL
Statistical information.

AP_OPER_TBL
Operational information.

For Token Ring / Ethernet , this must be set to AP_STATS_TBL.

For Enterprise Extender, this must be set to AP_STATS_TBL.

reset_stats

Specifies whether to reset the statistics when this verb completes. This parameter applies only if *table_type* is set to AP_STATS_TBL; it is ignored otherwise. Possible values are:

AP_YES Reset the statistics; a subsequent QUERY_STATISTICS verb will contain only data gathered after this verb was issued.

AP_NO Do not reset the statistics; the data on this verb will be included in the data returned to a subsequent QUERY_STATISTICS verb.

dlc_type

Type of the DLC. Possible values are:

AP_SDLC
Synchronous data link control

AP_TR Token Ring

AP_ETHERNET
Ethernet

AP_X25 X.25 packet switching

AP_IP Enterprise Extender (also known as HPR/IP)

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

dlc_type
Type of DLC for which statistics information is being returned. Possible values are:

AP_SDLC
SDLC

AP_X25 QLLC

AP_TR Token Ring

AP_ETHERNET
Ethernet

AP_IP Enterprise Extender (also known as HPR/IP)

statistics
Current statistics for the link station or port. This string is replaced by the appropriate structure for the DLC type. The parameters in the structure are described below.

mux_info.dlc_type, *mux_info.card_type*, *mux_info.adapter_number*
Streams configuration information for the DLC. For more information about these parameters, see "DEFINE_DLC" on page 87.

LS statistics for SDLC:

sdl_ls_stats_table.index
The index value used internally by CS Linux to identify the port that owns this LS.

sdl_ls_stats_table.address
The poll address of the secondary link station.

sdl_ls_stats_table.blus_in
The total number of basic link units (frames) received from the adjacent link station.

sdl_ls_stats_table.blus_out
The total number of basic link units (frames) transmitted to the adjacent link station.

sdl_ls_stats_table.octets_in
The total number of bytes (not including FCSs) received from the adjacent link station.

sdl_ls_stats_table.octets_out
The total number of bytes (not including FCSs) transmitted to the adjacent link station.

sdl_ls_stats_table.polls_out
Total number of polls sent to the adjacent link station.

sdl_ls_stats_table.poll_rsps_out
Total number of polls responded to by the adjacent link station.

sdl_ls_stats_table.local_busies
Total number of times the local link station has entered busy state (RNR).

sdl_ls_stats_table.remote_busies
Total number of times the remote link station has entered busy state (RNR).

sdl_ls_stats_table.iframes_in
The total number of I-frames received from the adjacent link station (including retries and out-of-order frames).

sdl_ls_stats_table.iframes_out
The total number of I-frames transmitted to the adjacent link station (including retries and out-of-order frames).

sdl_ls_stats_table.retransmits_in
The total number of retransmissions of I-frames received.

sdl_ls_stats_table.retransmits_out
The total number of retransmissions of I-frames to the adjacent link station.

sdl_ls_stats_table.ioctets_in
The total number of bytes in I-frames received from the adjacent link station.

sdl_ls_stats_table.ioctets_out
The total number of bytes in I-frames transmitted to the adjacent link station.

sdl_ls_stats_table.xids_in
The total number of XID frames received from the adjacent link station.

sdl_ls_stats_table.xids_out
The total number of XID frames transmitted to the adjacent link station.

sdl_ls_stats_table.tests_in
The total number of TEST frames, commands, or responses received from the adjacent link station.

sdl_ls_stats_table.tests_out
The total number of TEST frames, commands, or responses transmitted to the adjacent link station.

sdl_ls_stats_table.rejs_in
The total number of REJ frames received from the adjacent link station.

sdl_ls_stats_table.rejs_out
The total number of REJ frames transmitted to the adjacent link station.

sdl_ls_stats_table.frmrs_in
The total number of Frame Reject frames received from the adjacent link station.

sdl_ls_stats_table.frmrs_out
The total number of Frame Reject frames transmitted to the adjacent link station.

sdl_ls_stats_table.sims_in
The total number of Set Initialization Mode frames received from the adjacent link station.

sdl_ls_stats_table.sims_out
The total number of Set Initialization Mode frames transmitted to the adjacent link station.

sdl_ls_stats_table.rims_in
The total number of Request Initialization Mode frames received from the adjacent link station.

sdl_ls_stats_table.rims_out
The total number of Request Initialization Mode frames transmitted to the adjacent link station.

sdl_ls_stats_table.snrm_in
The total number of SNRM frames received.

sdl_ls_stats_table.snrm_out
The total number of SNRM frames sent.

LS operational information for SDLC:

sdl_ls_oper_table.index
The index value used internally by CS Linux to identify the port that owns this LS.

sdl_ls_stats_table.address
The poll address of the secondary link station.

sdl_ls_stats_table.role
The link role of the LS. Possible values are:

SDL_MIB_PRIMARY
Primary

SDL_MIB_SECONDARY
Secondary

SDL_MIB_NEGOTIABLE
Negotiable

sdl_ls_stats_table.state
An internal value indicating the processing state of the LS software (for use by support personnel).

sdl_ls_stats_table.maxdata
The current maximum PDU size allowed for the logical link (the size includes the TH and RH). For a switched line, this value may be negotiated during XID exchange.

sdl_ls_stats_table.replyto
The current reply timeout, in hundredths of a second. This parameter applies only if the LS role is primary; its value is undefined if the LS role is secondary.

sdl_ls_stats_table.maxin
The maximum number of frames that the LS can receive before it must send an acknowledgment.

sdl_ls_stats_table.maxout
The maximum number of frames that the LS can send before it must wait for an acknowledgment.

sdl_ls_stats_table.modulo
The sequence number modulus for the LS. Possible values are:

SDL_MIB_EIGHT
8

SDL_MIB_ONETWENTYEIGHT
128

sdl_ls_stats_table.retries_m
The maximum number of frames in a retry sequence (a sequence of frames that the LS retransmits because it has not received a positive acknowledgment for them).

sdl_ls_stats_table.retries_t
The timeout between retransmissions of a retry sequence.

sdl_ls_stats_table.retries_n
The number of times that the LS attempts to retransmit a retry sequence.

sdl_ls_stats_table.rnrlimit
The maximum length of time that the adjacent LS can remain in RNR state before the local LS considers it to be inoperative.

sdl_ls_stats_table.datmode
The communications mode with the adjacent LS. Possible values are:

SDL_MIB_HALF
Two-way alternate (half-duplex)

SDL_MIB_FULL
Two-way simultaneous (full-duplex)

sdl_ls_stats_table.last_fail_ctrl_in
The control field from the last frame received before the last failure. If the LS has not failed, this field is set to zeros.

sdl_ls_stats_table.last_fail_ctrl_out
The control field from the last frame sent before the last failure. If the LS has not failed, this field is set to zeros.

sdl_ls_stats_table.last_fail_frmr_info
If the last failure was caused by a frame that was not valid, this parameter contains the information field from the FRMR frame. If the LS has not failed, or if the failure cause was not a frame that was not valid, this field is set to zeros.

sdl_ls_stats_table.last_fail_replyto_s
The number of times that the reply timeout expired before the last failure. If the LS has not failed, this field is set to zero.

sdl_ls_stats_table.g_poll
The group poll address for the LS. If the LS is not in a group, this field is set to zero.

sdl_ls_stats_table.sim_rim
Specifies whether the LS supports transmission of SIM and RIM control frames. Possible values are:

SDL_MIB_YES
LS supports SIM and RIM.

SDL_MIB_NOLS
does not support SIM and RIM.

sdl_ls_stats_table.xmit_rcv_cap
Specifies the LS's transmit / receive capability. Possible values are:

SDL_MIB_HALF
Half-duplex

SDL_MIB_FULL
Full-duplex

Port statistics for SDLC:

sdl_port_stats_table.index
The index value used internally by CS Linux to identify the port.

sdl_port_stats_table.dwarf_frames
The number of frames received by the port that were too short to be valid.

sdl_port_stats_table.polls_out
Total number of polls sent to adjacent link stations.

sdl_port_stats_table.poll_rsps_out
Total number of polls responded to by adjacent link stations.

sdl_port_stats_table.local_busies
Total number of times the local link station has entered busy state (RNR).

sdl_port_stats_table.remote_busies
Total number of times remote link stations have entered busy state (RNR).

sdl_port_stats_table.iframes_in
The total number of I-frames received from adjacent link stations (including retries and out-of-order frames).

sdl_port_stats_table.iframes_out
The total number of I-frames transmitted to adjacent link stations (including retries and out-of-order frames).

sdl_port_stats_table.octets_in
The total number of bytes (not including FCSs) received from adjacent link stations.

sdl_port_stats_table.octets_out
The total number of bytes (not including FCSs) transmitted to adjacent link stations.

sdl_port_stats_table.protocol_errs
The number of times that CS Linux has deactivated an LS using this port because a frame received from the adjacent link station contained a protocol error.

sdl_port_stats_table.activity_to_s
The number of times that CS Linux has deactivated an LS using this port because there was no activity on the link.

sdl_port_stats_table.rnrlimit_s
The number of times that CS Linux has deactivated an LS using this port because the Remote Busy timer expired.

sdl_port_stats_table.retries_exps
The number of times that CS Linux has deactivated an LS using this port because a retry sequence has been exhausted.

sdl_port_stats_table.retransmits_in
The total number of retransmitted I-frames received from adjacent link stations.

sdl_port_stats_table.retransmits_out
The total number of retransmissions of I-frames to adjacent link stations.

Port operational information for SDLC:

sdl_port_oper_table.index
The index value used internally by CS Linux to identify the port.

sdl_port_oper_table.role
The link role of the port. Possible values are:

SDL_MIB_PRIMARY
Primary

SDL_MIB_SECONDARY
Secondary

SDL_MIB_NEGOTIABLE
Negotiable

sdl_port_oper_table.type
Specifies whether the port is operating as though connected to a leased or switched line. Possible values are:

SDL_MIB_LEASED

SDL_MIB_SWITCHED

sdl_port_oper_table.topology
Specifies whether the port can operate in a multipoint topology. Possible values are:

SDL_MIB_POINT_TO_POINT
Port can operate only as point-to-point.

SDL_MIB_MULTIPOINT
Port can operate as multipoint.

sdl_port_oper_table.activto
The length of time, in hundredths of a second, that the port allows a switched line to remain inactive (no I-frames being transferred) before disconnecting. A value of zero indicates no timeout; the line remains connected regardless of inactivity. This parameter applies only for a switched link; its value is undefined for a leased link.

sdl_port_oper_table.pause
The length of time that the primary station waits between successive cycles of polling secondary stations. This parameter applies only if the LS role is primary; its value is undefined if the LS role is secondary.

sdl_port_oper_table.slow_poll_method
The method used for periodically polling failed secondary link stations. This is set to SDL_MIB_POLLPAUSE.

sdl_port_oper_table.slow_poll_timer
The timeout between polls for failed secondary link stations. This parameter applies only if the port is primary and operating in a multipoint topology; its value is undefined otherwise.

LS statistics for Token Ring, Ethernet :

llc2_ls_stats.local_mac
The MAC address of the local link station.

llc2_ls_stats.local_sap
The SAP address of the local link station.

llc2_ls_stats.remote_mac
The MAC address of the remote link station.

llc2_ls_stats.remote_sap
The SAP address of the remote link station.

llc2_ls_stats.rif_len
Length of the Routing Information Field data. This parameter is used only for Token Ring; it is reserved for other DLC types.

llc2_ls_stats.rif
Routing Information Field data. This parameter is used only for Token Ring; it is reserved for other DLC types.

The data is returned as an array of 16-bit numbers in local format; the first 12 bits of each number specify the ring number, and the last 4 bits specify the bridge number.

llc2_ls_stats.ls_fsm
An internal value indicating the processing state of the LS software (for use by support personnel).

llc2_ls_stats.mac_type
The network type determined during LS activation. Possible values are:

LLC_DIX
DIX

LLC2_802_3
802.3

LLC2_802_3_DIX
Not yet determined (either 802.3 or DIX). This will change to one of the above values when the adjacent station first responds to a frame in one of these formats.

LLC2_TOKEN_RING
Token Ring

llc2_ls_stats.max_btu_size
Maximum BTU size determined during LS activation.

llc2_ls_stats.send_window
Number of I-frames the local station can send to the adjacent station before it must wait for a response.

llc2_ls_stats.receive_window
Number of I-frames the adjacent station can send to the local station before it must wait for a response.

llc2_ls_stats.t1_expiry_count
Number of times the adjacent station failed to respond within the *t1_timeout* (acknowledgment timeout) period.

llc2_ls_stats.t2_expiry_count
Number of times the *t2_timeout* period expired before a frame that could carry the required reply bits was queued.

llc2_ls_stats.remote_busy
Number of times the local station entered remote busy state because of an RNR frame from the adjacent station.

llc2_ls_stats.local_busy
Number of times the local station sent an RNR frame to the adjacent station on entering local busy state.

llc2_ls_stats.i_frames_sent
Number of I-frames sent.

llc2_ls_stats.i_bytes_sent
Number of data bytes in the I-frames sent.

llc2_ls_stats.i_frames_rcvd
Number of I-frames received.

llc2_ls_stats.i_bytes_rcvd
Number of data bytes in the I-frames received.

llc2_ls_stats.i_frames_rjctd
Number of I-frames rejected.

llc2_ls_stats.i_bytes_rjctd
Number of data bytes in the I-frames rejected.

llc2_ls_stats.i_frames_rexmit
Number of I-frames retransmitted.

llc2_ls_stats.i_bytes_rexmit
Number of data bytes in the I-frames retransmitted.

llc2_ls_stats.rej_frames_sent
Number of REJ frames sent to request retransmission of one or more I-frames.

llc2_ls_stats.rej_frames_rcvd
Number of REJ frames received requesting retransmission of one or more I-frames.

llc2_ls_stats.xid_frames_sent
Number of XID frames sent.

llc2_ls_stats.xid_frames_rcvd
Number of XID frames received.

llc2_ls_stats.ack_timeout
Acknowledgment timeout: the time in milliseconds within which a response must be received for any I-frames sent to the adjacent link station.

llc2_ls_stats.p_bit_timeout
Poll bit timeout: the time in milliseconds within which a response must be received for any frames sent to the adjacent link station with the POLL bit set.

llc2_ls_stats.t2_timeout
The maximum time in milliseconds that the local station can wait before it must send a response to a received I-frame. A longer timeout allows the local station to respond to more than one I-frame with a single RR, and so reduces acknowledgment traffic.

llc2_ls_stats.rej_timeout
Reject timeout: the time in seconds within which a response must be received for a REJ frame sent to the adjacent link station.

llc2_ls_stats.busy_state_timeout
The time in seconds that the local station waits for indication from the adjacent link station that a busy state (RNR) has cleared.

llc2_ls_stats.idle_timeout
Idle timeout: used to detect a completely inactive line. The line is considered idle when nothing has been received in this time. The timer is specified in seconds.

llc2_ls_stats.max_retry
The maximum number of times that the local station will retry when waiting for a response or for a busy state to clear.

Port statistics for Token Ring, Ethernet:

llc2_port_stats.time_secs, time_ms
The time (in seconds and milliseconds) from when the SNA software was started to when the LLC2 component received the port activation request.

llc2_port_stats.mac_addr
MAC address of the port, determined during port activation.

llc2_port_stats.max_btu_size
Maximum BTU size, determined during port activation.

llc2_port_stats.ls_count
Number of link stations currently using the port. This includes stations for which XIDs have been sent but SABME has not yet been sent.

llc2_port_stats.ui_frames_sent
Number of Type I frames (UI, TEST, and XID) issued on this port.

llc2_port_stats.ui_frames_rcvd
Number of Type I frames (UI, TEST, and XID) received on this port.

device_stats.line_error
Total number of line errors.

device_stats.internal_error
Total number of internal errors.

device_stats.burst_error
Total number of burst errors.

device_stats.ari_fci_error
Total number of address recognized / frame copied bits errors.

device_stats.end_delim
Total number of frame delimiter errors.

device_stats.lost_frame
Total number of lost frame errors.

device_stats.rcv_cngstn
Total number of receiver congestion errors.

device_stats.frm_cpy_err
Total number of frame copied errors.

device_stats.freq_err
Total number of frequency errors.

device_stats.token_err
Total number of token errors.

device_stats.crc_err
Total number of Cyclic Redundancy Check errors.

device_stats.xmit_err
Total number of transmit errors.

device_stats.collision_err
Total number of collision errors.

LS statistics for Enterprise Extender:

udp_ls_stats_table.udp_low_out
The number of UDP datagrams sent that contained low priority APPN data.

udp_ls_stats_table.udp_med_out
The number of UDP datagrams sent that contained medium priority APPN data.

udp_ls_stats_table.udp_high_out
The number of UDP datagrams sent that contained high priority APPN data.

udp_ls_stats_table.udp_network_out
The number of UDP datagrams sent that contained network priority APPN data.

udp_ls_stats_table.udp_llc_out
The number of UDP datagrams sent that contained LLC commands.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LINK_NAME
The supplied name parameter was not a valid LS name.

AP_INVALID_PORT_NAME
The supplied name parameter was not a valid port name.

AP_INVALID_STATS_TYPE
The *stats_type* parameter was not set to a valid value.

AP_INVALID_TABLE_TYPE
The *table_type* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_LINK_DEACTIVATED
The specified link is not currently active.

AP_PORT_DEACTIVATED
The specified port is not currently active.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute because the DLC type does not support returning statistics information, CS Linux returns the following parameter:

primary_rc
AP_FUNCTION_NOT_SUPPORTED

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_TN3270_ACCESS_DEF

QUERY_TN3270_ACCESS_DEF returns information about TN3270 users on other computers that can use the TN server feature of CS Linux to access a host for 3270 emulation using TN3270 Server. (To return information about users accessing the host using TN Redirector, use QUERY_TN_REDIRECT_DEF.)

This verb can return either summary or detailed information, about a single user or multiple users, depending on the options used.

VCB Structure

```
typedef struct query_tn3270_access_def
{
   AP_UINT16        opcode;                /* verb operation code           */
   unsigned char    reserv2;               /* reserved                      */
   unsigned char    format;                /* reserved                      */
   AP_UINT16        primary_rc;            /* primary return code           */
   AP_UINT32        secondary_rc;          /* secondary return code         */
   unsigned char    *buf_ptr;              /* pointer to buffer             */
   AP_UINT32        buf_size;              /* buffer size                   */
   AP_UINT32        total_buf_size;        /* total buffer size required    */
   AP_UINT16        num_entries;           /* number of entries             */
   AP_UINT16        total_num_entries;     /* total number of entries       */
   unsigned char    list_options;          /* listing options               */
   unsigned char    reserv3;               /* reserved                      */
   AP_UINT16        default_record;        /* start with DEFAULT record?    */
   unsigned char    client_address[256];   /* address of TN3270 user        */
   AP_UINT16        port_number;           /* TCP/IP port to access server  */
   AP_UINT32        num_init_sessions;     /* number of sessions for first  */
                                           /* user when starting in middle  */
   AP_UINT32        num_last_sessions;     /* number of sessions on last    */
                                           /*  detail overlay if last user  */
                                           /*  is incomplete                */
   unsigned char    last_user_incomplete;  /* set to AP_YES if session      */
                                           /*  data for last user incomplete*/
   unsigned char    reserv4[11];           /* Reserved                      */
} QUERY_TN3270_ACCESS_DEF;

typedef struct tn3270_access_summary
{
   AP_UINT16        overlay_size;          /* overlay size                  */
   AP_UINT16        default_record;        /* is this the DEFAULT record?   */
```

```
   unsigned char    client_address[256];    /* address of TN3270 user       */
   AP_UINT16        address_format;         /* Format of client address     */
   unsigned char    reserv3[6];             /* Reserved                     */
} TN3270_ACCESS_SUMMARY;

typedef struct tn3270_access_detail
{
  AP_UINT16              overlay_size;         /* overlay size              */
  AP_UINT16              sub_overlay_offset;   /* offset to first sess struct*/
  AP_UINT16              default_record;       /* is this the DEFAULT record?*/
  unsigned char          client_address[256];  /* address of TN3270 user    */
  AP_UINT32              num_filtered_sessions;/* num sess returned for user */
  unsigned char          reserv3[4];           /* Reserved                  */
  TN3270_ACCESS_DEF_DATA def_data;             /* user definition           */
} TN3270_ACCESS_DETAIL;

typedef struct tn3270_access_def_data
{
   unsigned char   description[32];     /* Description - null terminated    */
   unsigned char   reserv1[16];         /* reserved                         */
   AP_UINT16       address_format;      /* Format of client address         */
   AP_UINT32       num_sessions;        /* Number of sessions being added   */
   unsigned char   reserv3[64];         /* reserved                         */
} TN3270_ACCESS_DEF_DATA;
```

For each session, up to the number specified by the *num_sessions* parameter, the following structure is included at the end of the def_data structure:

```
typedef struct tn3270_session_def_data
{
   AP_UINT16           sub_overlay_size;   /* reserved                      */
   unsigned char       description[32];    /* Session description           */
   unsigned char       tn3270_support;     /* Level of TN3270 support       */
   unsigned char       allow_specific_lu;  /* Allow access to specific LUs  */
   unsigned char       printer_lu_name[8]; /* Generic printer LU/pool       */
                                           /*   accessed                    */
   unsigned char       reserv1[6];         /* reserved                      */
   AP_UINT16           port_number;        /* TCP/IP port used to access    */
                                           /*  server                       */
   unsigned char       lu_name[8];         /* Generic display LU/pool       */
                                           /*  accessed                     */
   unsigned char       session_type;       /* Unused in current version     */
   unsigned char       model_override;     /* Unused in current version     */
   unsigned char       ssl_enabled;        /* Is this an SSL session?       */
   unsigned char       security_level;     /* SSL encryption strength       */
   unsigned char       cert_key_label[80]; /* Certificate key label         */
   unsigned char       listen_local_address[46];
                                           /* Local addr client connects to */
  unsigned char        allow_ssl_timeout_to_nonssl;
                                           /* Allow non-SSL clients on SSL? */
  unsigned char     reserv3[17];
   AP_UINT32           reserv4;            /* reserved                      */
} TN3270_SESSION_DEF_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_TN3270_ACCESS_DEF

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of users for which data should be returned. If detailed

information about user sessions is being returned, this number includes partial entries (for which a client address is specified, so that the returned data does not include the user definition or the user's first session).

To request data for a specific user rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first session for the first user in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the supplied client address and port number, or start at the first session for the specified client address if no port number is specified.

AP_LIST_FROM_NEXT
If a port number is specified, start at the session immediately following the session with the specified port number. If no port number is specified, start at the first session for the specified client address.

The list is ordered by client address and then by port number for each user. For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

default_record
Specifies whether the requested entry (or the entry to be used as an index into the list) is the default record.

To query the default record, which is used by any TN3270 user not explicitly identified by a TCP/IP address, specify AP_YES. In this case, the *client_address* parameter is reserved.

To query a normal TN3270 user record, specify AP_NO.

client_address
The TCP/IP address of the TN3270 user for whom information is required, or the name to be used as an index into the list of users. This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST. The address is a null-terminated ASCII string, which can be any of the following.

- An IPv4 dotted-decimal address (such as 193.1.11.100).
- An IPv6 colon-hexadecimal address (such as 2001:0db8:0000:0000:0000:0000:1428:57ab or 2001:db8::1428:57ab).
- A name (such as newbox.this.co.uk.

- An alias (such as `newbox`).

port_number
To return information starting with a specific session for the specified user, set this parameter to the TCP/IP port number defined for that session. To return information starting at the first session for the specified user, set this parameter to zero.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. This may be higher than *buf_size*.

total_num_entries
Total number of entries that could have been returned. This may be higher than *num_entries*.

num_entries
The number of entries actually returned. The last entry may be incomplete; this is indicated by the *last_user_incomplete* parameter.

num_init_sessions
If the *port_number* parameter was set to a nonzero value, so that the information for the first user in the list does not start with the user's first session, this parameter indicates the number of session structures for this user that are included in the returned data. Otherwise, this parameter is not used.

num_last_sessions
If the *last_user_incomplete* parameter indicates that the data for the last user is incomplete, this parameter indicates the number of session structures for this user that are included in the returned data. Otherwise, this parameter is not used.

last_user_incomplete
Specifies whether the information for the last user is incomplete. Possible values are:

AP_YES The complete data for the last user was too large to fit in the data buffer. At least one session structure is included, but there are further session structures that are not included in the data buffer. The *num_last_sessions* parameter indicates how many session structures have been returned; the application can issue further verbs to obtain the remaining data.

AP_NO The data for the last user is complete.

Each entry in the data buffer consists of the following:

tn3270_access_summary.overlay_size
The size of the returned `tn3270_access_summary` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `tn3270_access_summary` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

tn3270_access_summary.default_record
Specifies whether this entry is the default record. Possible values are:

AP_YES This is the default record. The *client_address* parameter is reserved.

AP_NO This is a normal TN3270 user record.

tn3270_access_summary.client_address
The TCP/IP address of the TN3270 user. This can be any of the following; the *address_format* parameter indicates whether it is an IP address or a name.

- An IPv4 dotted-decimal address (such as `193.1.11.100`).
- An IPv6 colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).
- A name (such as `newbox.this.co.uk`.
- An alias (such as `newbox`).

tn3270_access_summary.address_format
Specifies the format of the *client_address* parameter. Possible values are:

AP_ADDRESS_IP
IP address (either IPv4 or IPv6)

AP_ADDRESS_FQN
Alias or fully qualified name

tn3270_access_detail.overlay_size
The size of the returned `tn3270_access_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `tn3270_access_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

tn3270_access_detail.sub_overlay_offset
The offset to the start of the first session data structure for this TN3270 access record in the data buffer.

tn3270_access_detail.default_record
Specifies whether this entry is the default record. Possible values are:

AP_YES This is the default record. The *client_address* parameter is reserved.

AP_NO This is a normal TN3270 user record.

tn3270_access_detail.client_address
The TCP/IP address of the TN3270 user. This is a null-terminated ASCII string, which can be any of the following.

- An IPv4 dotted-decimal address (such as `193.1.11.100`).
- An IPv6 colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).

- A name (such as newbox.this.co.uk.
- An alias (such as newbox).

tn3270_access_detail.num_filtered_sessions
The number of sessions returned for this user.

tn3270_access_detail.def_data
The details of the user, as defined in the configuration. This is followed by a number of session structures defining the user's sessions. The format of this information is the same as for the DEFINE_TN3270_ACCESS verb, except for the following:

- The *num_sessions* parameter in the def_data structure defines the total number of sessions defined for the user.
- If the *port_number* parameter was set to a nonzero value, the data for the first user will contain only the remaining session structures (starting from the requested entry), without the def_data structure.
- If the *last_user_incomplete* parameter is set to AP_YES, the total number of session structures returned for the last user will be as specified by the *num_last_sessions* parameter; this will be less than *num_sessions*.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_CLIENT_ADDRESS
The *list_options* parameter was set to AP_LIST_INCLUSIVE, but the *client_address* parameter did not match the address of any defined TN3270 user.

AP_INVALID_PORT_NUMBER
The *list_options* parameter was set to AP_LIST_INCLUSIVE, but the *port_number* parameter did not match a port number defined for the specified TN3270 user.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_TN3270_ASSOCIATION

QUERY_TN3270_ASSOCIATION returns information about associations between display LUs and printer LUs. Associations are queried by display LU name and are returned in order of display LU name.

This verb can be used to obtain information about a specific association or about multiple associations, depending on the options used.

VCB Structure

```
typedef struct query_tn3270_association
{
   AP_UINT16        opcode;               /* verb operation code            */
   unsigned char    reserv2;              /* reserved                       */
   unsigned char    format;               /* reserved                       */
   AP_UINT16        primary_rc;           /* primary return code            */
   AP_UINT32        secondary_rc;         /* secondary return code          */
   unsigned char   *buf_ptr;              /* pointer to buffer              */
   AP_UINT32        buf_size;             /* buffer size                    */
   AP_UINT32        total_buf_size;       /* total buffer size required     */
   AP_UINT16        num_entries;          /* number of entries              */
   AP_UINT16        total_num_entries;    /* total number of entries        */
   unsigned char    list_options;         /* listing options                */
   unsigned char    reserv3;              /* reserved                       */
   unsigned char    display_lu_name[8];   /* Display LU name                */
} QUERY_TN3270_ASSOCIATION;

typedef struct tn3270_association
{
   AP_UINT16      overlay_size;           /* Overlay size                   */
   unsigned char  reserv2[2];             /* reserved                       */
   unsigned char  display_lu_name[8];     /* Display LU name                */
   TN3270_ASSOCIATION_DEF_DATA def_data;  /* association definition         */
} TN3270_ASSOCIATION;

typedef struct tn3270_association_def_data
{
   unsigned char  description[32];        /* resource description           */
   unsigned char  reserve0[16];           /* reserved                       */
   unsigned char  printer_lu_name[8];     /* name of printer LU/pool        */
   unsigned char  reserv2[8];             /* reserved                       */
} TN3270_ASSOCIATION_DEF_DATA;
```

Data is returned in the form of `tn3270_association` structures.

Supplied Parameters

The application supplies the following parameters:

opcode `AP_QUERY_TN3270_ASSOCIATION`

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of associations for which data should be returned. To request data for a specific association rather than a range, specify the value 1. To return as many entries as possible, specify 0; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of associations from which CS Linux begins to return data. Specify one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *display_lu_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *display_lu_name* parameter.

display_lu_name
Name of the display LU for which association information is required or the name to be used as an index into the list of associations. The display LU name is an EBCDIC string padded on the right with EBCDIC spaces. This parameter is ignored if *list_options* is set to `AP_FIRST_IN_LIST`.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. This may be higher than the value supplied for the *buf_size* parameter.

num_entries
The number of entries actually returned.

total_num_entries
Total number of entries that could have been returned. This may be higher than the value supplied for the *num_entries* parameter.

Each entry in the data buffer consists of the following:

tn3270_association.overlay_size
The size of the returned `tn3270_association` structure (and therefore the offset to the start of the next entry in the data buffer).

When your application needs to go through the returned buffer to find each `tn3270_association` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

tn3270_association.display_lu_name
Name of the display LU associated with the printer LU specified by the *association.printer_lu_name* parameter. This is an EBCDIC string padded on the right with EBCDIC spaces.

tn3270_association_def_data.description
A null-terminated text string that describe the association, as specified in the definition of the association.

tn3270_association_def_data.printer_lu_name
Name of the printer LU associated with the display LU specified by the *association.display_lu_name* parameter. This is an EBCDIC string padded on the right with EBCDIC spaces.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

AP_INVALID_LU_NAME
Indicates one of the following:

- The *list_options* parameter was set to AP_LIST_FROM_NEXT, but the display LU name was not a valid EBCDIC string.
- The *list_options* parameter was set to AP_LIST_INCLUSIVE, but the display LU name either was not a valid EBCDIC string or did not correspond to an existing association record.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_TN3270_DEFAULTS

QUERY_TN3270_DEFAULTS returns information about TN3270 parameters used on all client sessions.

If you are using Secure Sockets Layer (SSL) client authentication, and checking clients against a certificate revocation list on an external LDAP server, use the QUERY_TN3270_SSL_LDAP verb to return details of how to access this server.

VCB Structure

```
typedef struct query_tn3270_defaults
{
   AP_UINT16        opcode;               /* verb operation code           */
   unsigned char    reserv2;              /* reserved                      */
   unsigned char    format;               /* reserved                      */
   AP_UINT16        primary_rc;           /* primary return code           */
   AP_UINT32        secondary_rc;         /* secondary return code         */
   TN3270_DEFAULTS_DEF_DATA def_data;     /* TN3270 defaults               */
} QUERY_TN3270_DEFAULTS;

typedef struct tn3270_defaults_def_data
{
   AP_UINT16        force_responses;      /* force printer responses?      */
   AP_UINT16        keepalive_method;     /* method for sending keep-alives */
   AP_UINT32        keepalive_interval;   /* interval between keep-alives  */
   unsigned char    reserv2[32];          /* reserved                      */
} TN3270_DEFAULTS_DEF_DATA;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_TN3270_DEFAULTS

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

def_data.force_responses
Controls client responses on printer sessions. Possible values are:

AP_YES Requests definite responses.

AP_NO Request responses matching SNA traffic.

def_data.keepalive_method
Method for sending keep-alive messages. Keep-alive messages are messages sent to TN3270 clients when there is no other activity on the connection, to keep the TCP/IP connections to the clients active; this ensures that failed connections and clients can be detected. If there is no traffic at all on a TCP/IP connection, failure of the connection or of the client may never be detected, which wastes TN server resources and prevents LUs from being used for other sessions.

Possible values are:

AP_NONE
Do not send keep-alive messages.

AP_TN3270_NOP
Send Telnet NOP messages.

AP_TN3270_TM
Send Telnet DO TIMING-MARK messages.

def_data.keepalive_interval
Interval (in seconds) between consecutive keep-alive messages. The interval should be long enough to minimize network traffic, especially if there are typically many idle client connections. The shorter the keep-alive interval, the quicker failures are detected, but the more network traffic is generated. If the keep-alive interval is too short and there are many clients, this traffic can be significant.

Because of the way TCP/IP operates, the keepalive interval that you configure is not the exact time that it will take for the server to recognize that a client has disappeared. The exact time depends on various factors, but will be no more than twice the configured timeout plus a few extra minutes (the exact number depends on how TCP/IP is configured).

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_TN3270_EXPRESS_LOGON

QUERY_TN3270_EXPRESS_LOGON returns information about the TN3270 Express Logon feature. This feature means that TN3270 client users who connect to CS Linux TN Server or TN Redirector using the Secure Sockets Layer (SSL) client authentication feature do not need to supply the user ID and password normally

used for TN3270 security. Instead, their security certificate is checked against a Digital Certificate Access Server (DCAS) at the host, which supplies the required user ID and password.

VCB Structure

```
typedef struct query_tn3270_express_logon
{
   AP_UINT16        opcode;               /* verb operation code           */
   unsigned char    reserv2;              /* reserved                      */
   unsigned char    format;               /* reserved                      */
   AP_UINT16        primary_rc;           /* primary return code           */
   AP_UINT32        secondary_rc;         /* secondary return code         */
   unsigned char    dcas_server[256];     /* IP hostname of DCAS server    */
   AP_UINT16        dcas_port;            /* port number to access server  */
   unsigned char    enabled;              /* is Express Logon enabled?     */
   unsigned char    reserv3[33];          /* reserved                      */
} QUERY_TN3270_EXPRESS_LOGON;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_TN3270_EXPRESS_LOGON

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

dcas_server
The TCP/IP address of the host DCAS server that handles Express Logon authorization. This can be specified as any of the following.

- An IPv4 dotted-decimal address (such as 193.1.11.100).
- An IPv6 colon-hexadecimal address (such as 2001:0db8:0000:0000:0000:0000:1428:57ab or 2001:db8::1428:57ab).
- A name (such as newbox.this.co.uk.
- An alias (such as newbox).

dcas_port
The TCP/IP port number used to access the DCAS server.

enabled Specifies whether the TN3270 Express Logon function is enabled. Possible values are:

AP_YES The function is enabled, so TN3270 clients can access the host without needing to specify a user ID and password.

AP_NO The function is not enabled, so TN3270 clients must specify a user ID and password.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_TN3270_SSL_LDAP

QUERY_TN3270_SSL_LDAP returns information about how to access a certificate revocation list for use with the Secure Sockets Layer (SSL) client authentication feature. This information was specified using the DEFINE_TN3270_SSL_LDAP verb.

VCB Structure

```
typedef struct query_tn3270_ssl_ldap
{
   AP_UINT16        opcode;               /* verb operation code           */
   unsigned char    reserv2;              /* reserved                      */
   unsigned char    format;               /* reserved                      */
   AP_UINT16        primary_rc;           /* primary return code           */
   AP_UINT32        secondary_rc;         /* secondary return code         */
   unsigned char   *buf_ptr;              /* pointer to buffer             */
   AP_UINT32        buf_size;             /* buffer size                   */
   AP_UINT32        total_buf_size;       /* total buffer size required    */
   AP_UINT16        num_entries;          /* reserved                      */
   AP_UINT16        total_num_entries;    /* reserved                      */
   unsigned char    list_options;         /* reserved                      */
   unsigned char    reserv3;              /* reserved                      */
} QUERY_TN3270_SSL_LDAP;

typedef struct tn3270_ssl_ldap_def_data
{
   AP_UINT16           overlay_size;      /* reserved                      */
   unsigned char       auth_type;         /* type of authorization checking */
   unsigned char       reserv1;           /* reserved                      */
   unsigned char       ldap_addr[256];    /* address of LDAP server        */
   AP_UINT16           ldap_port;         /* port number to access server  */
   unsigned char       ldap_user[1024];   /* user ID on LDAP server        */
   unsigned char       ldap_password[128]; /* password on LDAP server      */
   unsigned char       reserv2[256];      /* reserved                      */
} TN3270_SSL_LDAP_DEF_DATA;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_TN3270_SSL_LDAP

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return the complete information. This may be higher than the value supplied for the *buf_size* parameter.

The following information is returned in the data buffer:

def_data.auth_type
Specifies the type of authorization checking performed by the TN Server or TN Redirector. Possible values are:

AP_LOCAL_ONLY
The server checks client certificates locally, but does not use an external certificate revocation list. The parameters *ldap_addr—ldap_password* are reserved.

AP_LOCAL_X500
The server checks certificates locally, and also checks against an external certificate revocation list. The remaining parameters in this data structure specify the location of this list.

def_data.ldap_addr
The TCP/IP address of the LDAP server that holds the certificate revocation list. This can be specified as any of the following.

- An IPv4 dotted-decimal address (such as `193.1.11.100`).
- An IPv6 colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).
- A name (such as `newbox.this.co.uk`.
- An alias (such as `newbox`).

def_data.ldap_port
The TCP/IP port number used to access the LDAP server.

def_data.ldap_user
The user name used to access the certificate revocation list on the LDAP server.

def_data.ldap_password
The password used to access the certificate revocation list on the LDAP server.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_TN_REDIRECT_DEF

QUERY_TN_REDIRECT_DEF returns information about Telnet clients on other computers that can use the TN Redirector feature of CS Linux to access a host. It can return either summary or detailed information, about a single user or multiple users, depending on the options used.

VCB Structure

```
typedef struct query_tn_redirect_def
{
   AP_UINT16        opcode;               /* verb operation code          */
   unsigned char    reserv2;              /* reserved                     */
   unsigned char    format;               /* reserved                     */
   AP_UINT16        primary_rc;           /* primary return code          */
   AP_UINT32        secondary_rc;         /* secondary return code        */
   unsigned char    *buf_ptr;             /* pointer to buffer            */
   AP_UINT32        buf_size;             /* buffer size                  */
   AP_UINT32        total_buf_size;       /* total buffer size required   */
   AP_UINT16        num_entries;          /* number of entries            */
   AP_UINT16        total_num_entries;    /* total number of entries      */
```

```
   unsigned char    list_options;          /* listing options              */
   unsigned char    reserv3[3];            /* reserved                     */
  TN_REDIRECT_ADDRESS addr;                /* Uniquely defines record      */
} QUERY_TN_REDIRECT_DEF;

typedef struct tn_redirect_data
{
   AP_UINT16             overlay_size;     /* overlay size                 */
   unsigned char         reserv1[2];       /* Reserved                     */
   TN_REDIRECT_ADDRESS   addr;             /* addressing information       */
   TN_REDIRECT_DEF_DATA  def_data;         /* definitions for the client   */
} TN_REDIRECT_DATA;

typedef struct tn_redirect_address
{
   AP_UINT16      default_record;    /* Is this the default record ?       */
   unsigned char  address_format;    /* IP address or fully-qualified name */
   unsigned char  client_address[256]; /* Client address                   */
   AP_UINT16      port_number;       /* Port number that client connects on */
   unsigned char  listen_local_address[46];
                                     /* Local addr client connects to      */
   unsigned char  reserved[34];      /* reserved                           */
} TN_REDIRECT_ADDRESS;

typedef struct tn_redirect_def_data
{
   unsigned char  description[32];       /* Description - null terminated  */
   unsigned char  reserve0[16];          /* Reserved                       */
   unsigned char  cli_conn_ssl_enabled;  /* Is the client session SSL?     */
   unsigned char  serv_conn_ssl_enabled; /* Is the host session SSL?       */
   unsigned char  host_address_format;   /* Type of IP address for the host */
   unsigned char  reserv1;               /* Reserved                       */
   unsigned char  host_address[256];     /* Host address                   */
   AP_UINT16      host_port_number;      /* Port number to connect to host */
   unsigned char  cli_conn_security_level;      /* SSL encryption strength */
   unsigned char  serv_conn_security_level;     /* SSL encryption strength */
   unsigned char  cli_conn_cert_key_label[80];  /* Key label for certificate */
   unsigned char  serv_conn_cert_key_label[80]; /* Key label for certificate */
   unsigned char  reserved[46];                 /* Reserved                */
} TN_REDIRECT_DEF_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_TN_REDIRECT_DEF

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of users for which data should be returned. To request data for a specific user rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify one of the following values:

AP_FIRST_IN_LIST
Start at the first user in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the supplied client addressing information.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the supplied client addressing information.

The list is ordered by client address. For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

addr Specifies addressing information for the Telnet client for whom information is required, or the user to be used as an index into the list of users. For more information about the contents of this data structure, see "DEFINE_TN_REDIRECT" on page 213.

The information in this structure is ignored if *list_options* is set to `AP_FIRST_IN_LIST`.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. This may be higher than *buf_size*.

total_num_entries
Total number of entries that could have been returned. This may be higher than *num_entries*.

num_entries
The number of entries actually returned.

tn_redirect_data.overlay_size
The size of the returned `tn_redirect_data` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `tn_redirect_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

tn_redirect_data.addr
Specifies addressing information for the Telnet client. For more information about the contents of this data structure, see "DEFINE_TN_REDIRECT" on page 213.

tn_redirect_data.def_data
Specifies definitions for the Telnet client. For more information about the contents of this data structure, see "DEFINE_TN_REDIRECT" on page 213.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_CLIENT_ADDRESS
The *list_options* parameter was set to AP_LIST_INCLUSIVE, but the supplied addressing information did not match any defined TN Redirector user.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_TN_SERVER_TRACE

This verb returns information about the current tracing options for the CS Linux TN server feature.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_tn_server_trace
{
   AP_UINT16        opcode;                  /* verb operation code     */
   unsigned char    reserv2;                 /* reserved                */
   unsigned char    format;                  /* reserved                */
   AP_UINT16        primary_rc;              /* primary return code     */
   AP_UINT32        secondary_rc;            /* secondary return code   */
   AP_UINT16        trace_flags;             /* trace flags             */
   unsigned char    reserv3[6];              /* Reserved                */
} QUERY_TN_SERVER_TRACE;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_TN_SERVER_TRACE

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

trace_flags
The types of tracing currently active.

If no tracing is active, or if tracing of all types is active, this is one of the following values:

AP_TN_SERVER_NO_TRACE
No tracing.

AP_TN_SERVER_ALL_TRACE
Tracing of all types.

If tracing is being used on specific interfaces, this parameter is set to one or more values from the list below, combined using a logical OR operation.

AP_TN_SERVER_TRC_TCP
TCP/IP interface tracing: messages between TN server and TN3270 clients

AP_TN_SERVER_TRC_FM
Node interface tracing: internal control messages, and messages between TN server and TN3270 clients (in internal format)

AP_TN_SERVER_TRC_CFG
Configuration message tracing: messages relating to the configuration of TN server

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_TP

QUERY_TP returns information about TPs that are currently using a local LU. This verb can be used to obtain information about a specific TP or about multiple TPs, depending on the options used. This verb returns information about current usage of the TPs, not about their definition; use QUERY_TP_DEFINITION to obtain the definition of the TPs.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_tp
{
  AP_UINT16        opcode;                 /* Verb operation code        */
  unsigned char    reserv2;                /* reserved                   */
  unsigned char    format;                 /* reserved                   */
  AP_UINT16        primary_rc;             /* Primary return code        */
  AP_UINT32        secondary_rc;           /* Secondary return code      */
  unsigned char    *buf_ptr;               /* pointer to buffer          */
  AP_UINT32        buf_size;               /* buffer size                */
  AP_UINT32        total_buf_size;         /* total buffer size required */
  AP_UINT16        num_entries;            /* number of entries          */
  AP_UINT16        total_num_entries;      /* total number of entries    */
  unsigned char    list_options;           /* listing options            */
  unsigned char    reserv3;                /* reserved                   */
  unsigned char    lu_name[8];             /* LU name                    */
  unsigned char    lu_alias[8];            /* LU alias                   */
  unsigned char    tp_name[64];            /* TP name                    */
} QUERY_TP;
```

```
typedef struct tp_data
{
  AP_UINT16        overlay_size;              /* size of returned entry     */
  unsigned char    tp_name[64];               /* TP name                    */
  unsigned char    description[32];           /* resource description       */
  unsigned char    reserv1[16];               /* reserved                   */
  AP_UINT16        instance_limit;            /* maximum instance count     */
  AP_UINT16        instance_count;            /* current instance count     */
  AP_UINT16        locally_started_count;     /* locally started instance   */
                                              /*  count                     */
  AP_UINT16        remotely_started_count;    /* remotely started instance  */
                                              /*  count                     */
  unsigned char    reserva[20];               /* reserved                   */
} TP_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_TP

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of TPs for which data should be returned. To request data for a specific TP rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of TPs from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of LU name and TP name.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of LU name and TP name.

For more information about how the list is ordered and how the application can obtain specific entries from it, see “List Options For QUERY_* Verbs” on page 39.

lu_name
LU name. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters. To specify that the LU is identified by its alias rather than its LU name, set this parameter to 8 binary zeros and specify the LU alias in the following parameter. To specify the LU associated with the local CP (the default LU), set both *lu_name* and *lu_alias* to binary zeros.

lu_alias
Locally defined LU alias. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. This parameter is

used only if *lu_name* is set to 8 binary zeros; it is ignored otherwise. To specify the LU associated with the local CP (the default LU), set both *lu_name* and *lu_alias* to binary zeros.

tp_name
TP name. This is a 64-byte string, padded on the right with spaces if the name is shorter than 64 characters. This value is ignored if *list_options* is set to `AP_FIRST_IN_LIST`.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

tp_data.overlay_size
The size of the returned `tp_data` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `tp_data` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

tp_data.tp_name
TP name. This is a 64-byte string, padded on the right with spaces if the name is shorter than 64 characters.

tp_data.description
A null-terminated text string describing the TP, as specified in the definition of the TP.

tp_data.instance_limit
Maximum number of concurrently active instances of the specified TP.

tp_data.instance_count
Number of instances of the specified TP that are currently active.

tp_data.locally_started_count
Number of instances of the TP that have been started locally (by the TP issuing a TP_STARTED verb).

tp_data.remotely_started_count
Number of instances of the TP that have been started remotely (by a received Attach request).

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

AP_INVALID_LU_ALIAS
The supplied *lu_alias* parameter was not valid.

AP_INVALID_LU_NAME
The supplied *lu_name* parameter was not valid.

AP_INVALID_TP_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *tp_name* parameter was not valid.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_TP_DEFINITION

QUERY_TP_DEFINITION returns information about TPs defined on the CS Linux system. This verb can be used to obtain information about a specific TP or about multiple TPs, depending on the options used. It returns information about the definition of the TPs, not about their current usage; use QUERY_TP to obtain the usage information.

VCB Structure

```
typedef struct query_tp_definition
{
   AP_UINT16        opcode;               /* Verb operation code          */
   unsigned char    reserv2;              /* reserved                     */
   unsigned char    format;               /* reserved                     */
   AP_UINT16        primary_rc;           /* Primary return code          */
   AP_UINT32        secondary_rc;         /* Secondary return code        */
   unsigned char    *buf_ptr;             /* pointer to buffer            */
   AP_UINT32        buf_size;             /* buffer size                  */
   AP_UINT32        total_buf_size;       /* total buffer size required   */
   AP_UINT16        num_entries;          /* number of entries            */
   AP_UINT16        total_num_entries;    /* total number of entries      */
   unsigned char    list_options;         /* listing options              */
   unsigned char    reserv3;              /* reserved                     */
   unsigned char    tp_name[64];          /* TP name                      */
} QUERY_TP_DEFINITION;
```

```
typedef struct tp_def_summary
{
   AP_UINT16        overlay_size;           /* size of returned entry        */
   unsigned char    tp_name[64];            /* TP name                       */
   unsigned char    description[32];        /* resource description          */
   unsigned char    reserv1[16];            /* reserved                      */
} TP_DEF_SUMMARY;

typedef struct tp_def_detail
{
   AP_UINT16        overlay_size;           /* size of returned entry        */
   unsigned char    tp_name[64];            /* TP name                       */
   TP_CHARS         tp_chars;               /* TP characteristics            */
} TP_DEF_DETAIL;

typedef struct tp_chars
{
   unsigned char    description[32];        /* resource description          */
   unsigned char    security_list_name[14]; /* security access list name     */
   unsigned char    reserv1[2];             /* reserved                      */
   unsigned char    conv_type;              /* conversation type             */
   unsigned char    security_rqd;           /* security support              */
   unsigned char    sync_level;             /* synchronization level support */
   unsigned char    dynamic_load;           /* dynamic load                  */
   unsigned char    enabled;                /* is the TP enabled?            */
   unsigned char    pip_allowed;            /* program initialization        */
                                            /*  parameters supported         */
   unsigned char    reserv3[10];            /* reserved                      */
   AP_UINT16        tp_instance_limit;      /* limit on currently active TP  */
                                            /*  instances                    */
   AP_UINT16        incoming_alloc_timeout; /* incoming allocation timeout   */
   AP_UINT16        rcv_alloc_timeout;      /* receive allocation timeout    */
   AP_UINT16        tp_data_len;            /* reserved                      */
   unsigned char    tp_data[120];           /* reserved                      */
} TP_CHARS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_TP_DEFINITION

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of TPs for which data should be returned. To request data for a specific TP rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data, and the level of information required for each entry. Specify the level of information with one of the following values:

AP_SUMMARY
Summary information only.

AP_DETAIL
Detailed information.

Combine this value using a logical OR operation with one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *tp_name* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *tp_name* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

tp_name
TP name. This is a 64-byte string, padded on the right with spaces if the name is shorter than 64 characters. This parameter is ignored if *list_options* is set to AP_FIRST_IN_LIST.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

tp_def_summary.overlay_size
The size of the returned tp_def_summary structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each tp_def_summary structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C sizeof() operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

tp_def_summary.tp_name
TP name. This is a 64-byte string, padded on the right with spaces if the name is shorter than 64 characters.

tp_def_summary.description
A null-terminated text string describing the TP, as specified in the definition of the TP.

tp_def_detail.overlay_size
The size of the returned `tp_def_detail` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `tp_def_detail` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

tp_def_detail.tp_name
TP name. This is a 64-byte string, padded on the right with spaces if the name is shorter than 64 characters.

tp_def_detail.tp_chars.description
A null-terminated text string describing the TP, as specified in the definition of the TP.

tp_def_detail.tp_chars.security_list_name
Name of the security access list used by this TP (defined using the DEFINE_SECURITY_ACCESS_LIST verb). This parameter restricts the TP so that only the users named in the specified list can allocate conversations with it.

If this parameter is set to 14 binary zeros, the TP is available for use by any user.

tp_def_detail.tp_chars.conv_type
Specifies the type or types of conversation supported by the TP. Possible values are:

AP_BASIC
The TP supports only basic conversations.

AP_MAPPED
The TP supports only mapped conversations.

AP_EITHER
The TP supports either basic or mapped conversations.

tp_def_detail.tp_chars.security_rqd
Specifies the level of conversation security information required to start the TP. Possible values are:

AP_YES A user ID and password are required to start the TP.

AP_NO No security information is required.

tp_def_detail.tp_chars.sync_level
Specifies the values of synchronization level supported by the TP. Possible values are:

AP_NONE
The TP supports only *sync_level* NONE.

AP_CONFIRM_SYNC_LEVEL
The TP supports only *sync_level* CONFIRM.

AP_EITHER
The TP supports either *sync_level* NONE or CONFIRM.

AP_SYNCPT_REQUIRED
The TP supports only *sync_level* SYNCPT (syncpoint is required).

AP_SYNCPT_NEGOTIABLE
The TP supports any of the three *sync_level* values NONE, CONFIRM, and SYNCPT.

tp_def_detail.tp_chars.dynamic_load
Specifies whether the TP can be dynamically loaded. This is set to AP_YES.

tp_def_detail.tp_chars.enabled
Specifies whether the TP can be attached successfully. Possible values are:

AP_YES TP can be attached.

AP_NO TP cannot be attached.

tp_def_detail.tp_chars.pip_allowed
Specifies whether the TP can receive Program Initialization Parameters (PIP). Possible values are:

AP_YES TP can receive PIP.

AP_NO TP cannot receive PIP.

tp_def_detail.tp_chars.duplex_support
Specifies which conversation duplex types are supported by the TP. Possible values are:

AP_HALF_DUPLEX
The TP supports half-duplex conversations only.

AP_FULL_DUPLEX
The TP supports full-duplex conversations.

AP_EITHER_DUPLEX
The TP supports both half-duplex and full-duplex conversations.

tp_def_detail.tp_chars.tp_instance_limit
Limit on the number of concurrently active TP instances.

tp_def_detail.tp_chars.incoming_alloc_timeout
Specifies the number of seconds that an incoming Attach will be queued waiting for a RECEIVE_ALLOCATE. The value 0 (zero) implies that there is no timeout; the incoming Attach will be queued indefinitely.

tp_def_detail.tp_chars.rcv_alloc_timeout
Number of seconds that a RECEIVE_ALLOCATE verb is queued waiting for an incoming Attach. The value 0 (zero) implies that there is no timeout; the RECEIVE_ALLOCATE verb will be queued indefinitely.

tp_def_detail.tp_chars.tp_data_len
Length of the implementation dependent TP data.

tp_def_detail.tp_chars.tp_data
CS Linux does not use this parameter (it is set to all zeros).

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_TP_NAME
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied name, but the *tp_name* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_TP_LOAD_INFO

QUERY_TP_LOAD_INFO returns information about TP load information entries. The buffer contains a number of the variably sized tp_load_info structures.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_tp_load_info
{
  AP_UINT16               opcode;               /* Verb operation code        */
  unsigned char           reserv2;              /* reserved                   */
  unsigned char           format;               /* reserved                   */
  AP_UINT16               primary_rc;           /* Primary return code        */
  AP_UINT32               secondary_rc;         /* Secondary return code      */
  unsigned char           *buf_ptr;             /* pointer to buffer          */
  AP_UINT32               buf_size;             /* buffer size                */
  AP_UINT32               total_buf_size;       /* total buffer size required */
  AP_UINT16               num_entries;          /* number of entries          */
  AP_UINT16               total_num_entries;    /* total number of entries    */
  unsigned char           list_options;         /* listing options            */
  unsigned char           reserv3[3];           /* reserved                   */
  unsigned char           tp_name[64];          /* TP name                    */
  unsigned char           lu_alias[8];          /* LU alias                   */
} QUERY_TP_LOAD_INFO;

typedef struct tp_load_info
{
  AP_UINT16               overlay_size;         /* size of returned entry     */
  unsigned char           tp_name[64];          /* TP name                    */
  unsigned char           lu_alias[8];          /* LU alias                   */
  TP_LOAD_INFO_DEF_DATA   def_data;             /* defined data               */
} TP_LOAD_INFO;

typedef struct tp_load_info_def_data
{
  unsigned char           description[32];      /* Description                */
  unsigned char           reserv1[16];          /* reserved                   */
  unsigned char           user_id[64];          /* User ID                    */
  unsigned char           group_id[64];         /* Group ID                   */
  unsigned shor           timeout;              /* Timeout value              */
  unsigned char           type;                 /* TP type                    */
  unsigned char           reserv2;              /* reserved                   */
  AP_UINT16               reserv3;              /* reserved                   */
  AP_UINT16               ltv_length;           /* Length of LTV data         */
} TP_LOAD_INFO_DEF_DATA;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_TP_LOAD_INFO

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of extra data control blocks for which data should be returned. To request data for a specific resource rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list of TPs from which CS Linux should begin to return data. Possible values are:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the combination of TP name and LU alias.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the combination of TP name and LU alias.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

tp_name
TP name to query. This is a 64-byte EBCDIC string, padded on the right with spaces if the name is shorter than 64 characters. Specify all binary zeroes to match on all TPs. This value is ignored if *list_options* is set to AP_FIRST_IN_LIST.

lu_alias
The LU alias to query. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes. Specify all binary zeroes to match on all LUs.

This parameter can be used only if the TP is an APPC application; it is reserved if the TP is a CPI-C application.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required

to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

tp_load_info.overlay_size
The size of this overlay, including the LTV data. This size includes padding to ensure that the next overlay falls on a properly aligned memory location.

When your application needs to go through the returned buffer to find each `tp_load_info` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

tp_load_info.tp_name
TP name of the TP load info entry. This is a 64-byte EBCDIC string, padded on the right with spaces if the name is shorter than 64 characters.

tp_load_info.lu_alias
The LU alias of the TP load info entry. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

This parameter is used only if the TP is an APPC application; it is reserved if the TP is a CPI-C application.

def_data.description
Description of the TP load info.

def_data.user_id
User ID required to access and run the TP.

def_data.group_id
Group ID required to access and run the TP.

def_data.timeout
Timeout in seconds after the TP is loaded.

def_data.type
Indicates the TP type. Possible values are:

`AP_TP_TYPE_QUEUED`

`AP_TP_TYPE_QUEUED_BROADCAST`

`AP_TP_TYPE_NON_QUEUED`

def_data.ltv_length
Length of the LTV data buffer appended to this structure.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_TP_NAME
The *tp_name* parameter did not match the name of a defined TP.

AP_INVALID_LU_ALIAS
The *lu_alias* parameter did not match any defined LU alias.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_TRACE_FILE

This verb returns information about the files that CS Linux uses to record trace data.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_trace_file
{
   AP_UINT16        opcode;                 /* verb operation code       */
   unsigned char    reserv2;                /* reserved                  */
   unsigned char    format;                 /* reserved                  */
   AP_UINT16        primary_rc;             /* primary return code       */
   AP_UINT32        secondary_rc;           /* secondary return code     */
   unsigned char    trace_file_type;        /* type of trace file        */
   unsigned char    dual_files;             /* dual trace files          */
   AP_UINT32        trace_file_size;        /* trace file size           */
   unsigned char    reserv3[4];             /* reserved                  */
   unsigned char    file_name[81];          /* file name                 */
   unsigned char    file_name_2[81];        /* second file name          */
} QUERY_TRACE_FILE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_TRACE_FILE

trace_file_type
The type of trace file. Possible values are:

AP_CS_TRACE
File contains tracing on data transferred across the CS Linux LAN between the specified computer and other nodes (activated by the SET_CS_TRACE verb).

AP_TN_SERVER_TRACE
File contains tracing on the CS Linux TN server component.

AP_IPS_TRACE
File contains tracing on kernel components for the specified node (activated by the SET_TRACE_TYPE or ADD_DLC_TRACE verb).

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

dual_files
Specifies whether tracing is to one file or to two files. Possible values are:

AP_YES Tracing is to two files. When the first file reaches the size specified by *trace_file_size*, the second file is cleared, and tracing continues to the second file. When this file then reaches the size specified by *trace_file_size*, the first file is cleared, and tracing continues to the first file. This ensures that tracing can continue for long periods without using excessive disk space; the maximum space required is approximately twice the value of *trace_file_size*.

AP_NO Tracing is to one file.

trace_file_size
The maximum size of the trace file. If *dual_files* is set to AP_YES, tracing will switch between the two files when the current file reaches this size. If *dual_files* is set to AP_NO, this parameter is ignored; the file size is not limited.

file_name
Name of the trace file, or of the first trace file if *dual_files* is set to AP_YES. This parameter is an ASCII string of 1–80 characters, followed by a NULL character (binary zero).

If no path is included, the file is stored in the default directory for diagnostics files, **/var/opt/ibm/sna** if a path is included, this is either a full path (starting with a / character) or the path relative to the default directory.

file_name_2
Name of the second trace file; this parameter is used only if *dual_files* is set to AP_YES. This parameter is an ASCII string of 1–80 characters, followed by a NULL character (binary zero).

If no path is included, the file is stored in the default directory for diagnostics files, **/var/opt/ibm/sna** if a path is included, this is either a full path (starting with a / character) or the path relative to the default directory.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_FILE_TYPE
The *trace_file_type* parameter was not set to a valid value.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_TRACE_TYPE

This verb returns information about the current tracing options for CS Linux kernel components. For more information about tracing options, see the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

This verb does not return information about DLC line tracing. To do this, use the QUERY_DLC_TRACE verb.

This verb must be issued to a running node.

VCB Structure

```
typedef struct query_trace_type
{
   AP_UINT16        opcode;               /* verb operation code           */
   unsigned char    reserv2;              /* reserved                      */
   unsigned char    format;               /* reserved                      */
   AP_UINT16        primary_rc;           /* primary return code           */
   AP_UINT32        secondary_rc;         /* secondary return code         */
   AP_UINT16        trace_flags;          /* trace flags                   */
   AP_UINT32        truncation_length;    /* truncate each msg to this size */
   AP_UINT16        internal_level;       /* reserved                      */
   AP_UINT32        api_flags;            /* reserved                      */
} QUERY_TRACE_TYPE;
```

Supplied Parameters

The application supplies the following parameter:

opcode AP_QUERY_TRACE_TYPE

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

trace_flags
The types of tracing currently active. For more information about these trace types, see “SET_TRACE_TYPE” on page 653.

If no tracing is active, or if tracing of all types is active, this is one of the following values:

AP_NO_TRACE
No tracing.

AP_ALL_TRACE
Tracing of all types.

If tracing is being used on specific interfaces, this parameter is set to one or more values from the list below, combined using a logical OR operation.

AP_APPC_MSG
APPC messages

AP_FM_MSG
FM messages

AP_LUA_MSG
LUA messages

AP_NOF_MSG
NOF messages

AP_MS_MSG
MS messages

AP_GSNA_MSG
Generic SNA messages

AP_PV_MSG
(not used in this version of CS Linux)

AP_LLC2_MSG
LLC2 messages

AP_LLI_MSG
LLI messages

AP_MAC_MSG
MAC messages

AP_SDLC_MSG
SDLC messages

AP_NLI_MSG
NLI messages

AP_IPDL_MSG
Enterprise Extender (HPR/IP) messages

AP_DLC_MSG
Node to DLC messages

AP_NODE_MSG
Node messages

AP_SLIM_MSG
Messages sent between master and backup servers in a client/server system

AP_DATAGRAM
Datagram messages

truncation_length
The maximum length, in bytes, of the information written to the trace file for each message. If a message is longer than this, CS Linux writes only the start of the message to the trace file, and discards the data beyond *truncation_length*. This allows you to record the most important information for each message but avoid filling up the file with long messages. A value of zero indicates that trace messages are not truncated.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

QUERY_USERID_PASSWORD

QUERY_USERID_PASSWORD returns information about user ID / password pairs for use with APPC and CPI-C conversation security, or about profiles for a defined user ID and password. It can be used to obtain information about a specific user ID / password pair or about multiple pairs, depending on the options used.

VCB Structure

```
typedef struct query_userid_password
{
   AP_UINT16         opcode;                /* Verb operation code         */
   unsigned char     reserv2;               /* reserved                    */
   unsigned char     format;                /* reserved                    */
   AP_UINT16         primary_rc;            /* Primary return code         */
   AP_UINT32         secondary_rc;          /* Secondary return code       */
   unsigned char     *buf_ptr;              /* pointer to buffer           */
   AP_UINT32         buf_size;              /* buffer size                 */
   AP_UINT32         total_buf_size;        /* total buffer size required  */
   AP_UINT16         num_entries;           /* number of entries           */
   AP_UINT16         total_num_entries;     /* total number of entries     */
   unsigned char     list_options;          /* listing options             */
   unsigned char     reserv3;               /* reserved                    */
   unsigned char     user_id[10];           /* user ID                     */
} QUERY_USERID_PASSWORD;

typedef struct userid_info
{
   AP_UINT16              overlay_size;     /* size of returned entry      */
   unsigned char          user_id[10];      /* user ID                     */
   USERID_PASSWORD_CHARS  password_chars;   /* password characteristics    */
} USERID_INFO;

typedef struct userid_password_chars
{
   unsigned char          description[32];  /* resource description        */
   unsigned char          reserv2[16];      /* reserved                    */
   AP_UINT16              profile_count;    /* number of profiles          */
   AP_UINT16              reserv1;          /* reserved                    */
   unsigned char          password[10];     /* password                    */
   unsigned char          profiles[10][10]; /* profiles                    */
} USERID_PASSWORD_CHARS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_QUERY_USERID_PASSWORD

buf_ptr A pointer to a data buffer that CS Linux will use to return the requested information.

buf_size
Size of the supplied data buffer.

num_entries
Maximum number of user ID / password pairs for which data should be returned. To request a specific entry rather than a range, specify the value 1. To return as many entries as possible, specify zero; in this case, CS Linux will return the maximum number of entries that can be accommodated in the supplied data buffer.

list_options
The position in the list from which CS Linux should begin to return data. Specify one of the following values:

AP_FIRST_IN_LIST
Start at the first entry in the list.

AP_LIST_INCLUSIVE
Start at the entry specified by the *user_id* parameter.

AP_LIST_FROM_NEXT
Start at the entry immediately following the entry specified by the *user_id* parameter.

For more information about how the list is ordered and how the application can obtain specific entries from it, see "List Options For QUERY_* Verbs" on page 39.

user_id User ID. This is a 10-byte type-AE EBCDIC string, padded on the right with spaces if the name is shorter than 10 characters. The user ID is ignored if *list_options* is set to `AP_FIRST_IN_LIST`.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
`AP_OK`

buf_size
Length of the information returned in the supplied buffer.

total_buf_size
Returned value indicating the size of buffer that would have been required to return all the list information requested. A value greater than *buf_size* indicates that not all the available entries were returned.

num_entries
Number of entries returned in the data buffer.

total_num_entries
Total number of entries available. A value greater than *num_entries* indicates that not all the available entries were returned.

Each entry in the data buffer consists of the following parameters:

userid_info.overlay_size
The size of the returned `userid_info` structure, and therefore the offset to the start of the next entry in the data buffer.

When your application needs to go through the returned buffer to find each `userid_info` structure in turn, it must use this value to move to the correct offset for the next data structure, and must not use the C `sizeof()` operator. This is because the size of the returned overlay may increase in future releases of CS Linux; using the returned overlay size ensures that your application will continue to work with future releases.

userid_info.user_id
User identifier. This is a 10-byte type-AE EBCDIC character string, padded on the right with EBCDIC spaces.

userid_info.password_chars.description
A null-terminated text string describing the user ID and password, as specified in the definition of the user ID and password.

userid_info.password_chars.profile_count
Number of profiles defined for this user.

userid_info.password_chars.password
An encrypted version of the user's password supplied on a DEFINE_USERID_PASSWORD verb. This is a 10-byte type-AE EBCDIC character string, padded on the right with EBCDIC spaces.

userid_info.password_chars.profiles
Profiles associated with user. Each of these is a 10-byte type-AE EBCDIC character string, padded on the right with EBCDIC spaces.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_USERID
The *list_options* parameter was set to AP_LIST_INCLUSIVE to list all entries starting from the supplied user ID, but the *user_id* parameter was not valid.

AP_INVALID_LIST_OPTION
The *list_options* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

REGISTER_INDICATION_SINK

REGISTER_INDICATION_SINK registers the NOF application to receive indications of a particular type; for details of the CS Linux NOF indications, see Chapter 4, "NOF Indications," on page 675. The application specifies the required type of indication by its *opcode* parameter; an application can register more than once to accept multiple indication types. Each time an event occurs for which the application has requested indications (for example a change in the configuration of the application's target node or a change in the status of a DLC), CS Linux sends the appropriate indication message to the application.

A NOF_STATUS_INDICATION, which indicates status changes for the target node or file, may be returned to an application that has registered for any type of indication. For more information, see "NOF_STATUS_INDICATION" on page 711.

This verb must always be issued using the asynchronous NOF API entry point, including a callback routine (for more information about the NOF API entry points, see "Asynchronous Entry Point: nof_async" on page 25). CS Linux uses this callback routine to return the requested indications to the application.

This verb may be issued to different targets depending on the type of indications required, as follows:

- To register for SNA network file indications, the target must be the **sna.net** file.
- To register for server indications, no target is required; the application must specify a null target handle.
- To register for configuration indications relating to domain resources, the target must be the domain configuration file.
- To register for configuration indications relating to node resources, or to register for any other indications, the target may be either a running node or an inactive node on a computer where the CS Linux software is running.

VCB Structure

```
typedef struct register_indication_sink
{
   AP_UINT16        opcode;              /* verb operation code             */
   unsigned char    reserv2;             /* reserved                        */
   unsigned char    format;              /* reserved                        */
   AP_UINT16        primary_rc;          /* primary return code             */
   AP_UINT32        secondary_rc;        /* secondary return code           */
   AP_UINT32        proc_id;             /* reserved                        */
   AP_UINT16        queue_id;            /* reserved                        */
   AP_UINT16        indication_opcode;   /* opcode of indication to be sunk */
} REGISTER_INDICATION_SINK;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_REGISTER_INDICATION_SINK

indication_opcode

The *opcode* parameter of the indication to be returned. CS Linux will send this indication to the application's callback routine every time the indication is generated.

To receive configuration indications, specify the value AP_CONFIG_INDICATION. If the target handle specified on the REGISTER_INDICATION_SINK verb identifies the domain configuration file, this value requests an indication each time the file is updated; if the target handle identifies a node, this value requests an indication each time the node's configuration is updated.

To receive SNA network file indications, issue the verb using a target handle that identifies the **sna.net** file, and specify the value AP_SNA_NET_INDICATION. This value requests an indication each time the file is updated.

For all other indications, specify the *opcode* value for the required indication. For more information, see the descriptions of individual indications in Chapter 4, "NOF Indications," on page 675.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc

AP_OK

secondary_rc

Not used.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_OP_CODE
One of the following has occurred:

- The *indication_opcode* parameter did not match the *opcode* of any of the CS Linux NOF API indications.
- The *indication_opcode* parameter specified an indication type that does not apply to the specified target. If the target handle identifies the domain configuration file, only configuration indications are valid; if the target handle identifies the **sna.net** file, only SNA network file indications are valid; and if the target handle specifies a running node, all indications except SNA network file indications are valid.

AP_DYNAMIC_LOAD_ALREADY_REGD
The *indication_opcode* parameter was set to a reserved value.

AP_SYNC_NOT_ALLOWED
The application issued REGISTER_INDICATION_SINK using the synchronous NOF entry point. This verb must use the asynchronous entry point.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node does not support the function associated with the specified indication, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support the specified indication. For details of the support required for each indication, see the description of each indication in Chapter 4, “NOF Indications,” on page 675.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

REMOVE_DLC_TRACE

This verb removes DLC line tracing that was previously specified using ADD_DLC_TRACE. It can be used to remove all tracing on a resource that is currently being traced, to remove the tracing of certain messages from a resource currently being traced, or to remove all DLC line tracing.

VCB Structure

```
typedef struct remove_dlc_trace
{
   AP_UINT16         opcode;                 /* verb operation code        */
   unsigned char     reserv2;                /* reserved                   */
   unsigned char     format;                 /* reserved                   */
   AP_UINT16         primary_rc;             /* primary return code        */
   AP_UINT32         secondary_rc;           /* secondary return code      */
   DLC_TRACE_FILTER  filter;                 /* resource to stop tracing   */
} REMOVE_DLC_TRACE;

typedef struct dlc_trace_filter
{
   unsigned char     resource_type;          /* type of resource           */
   unsigned char     resource_name[8];       /* name of resource           */
   SNA_LFSID         lfsid;                  /* session identifier         */
   unsigned char     message_type;           /* type of messages           */
} DLC_TRACE_FILTER;

typedef struct sna_lfsid
{
      union
      {
          AP_UINT16            session_id;
          struct
          {
              unsigned char      sidh;
              unsigned char      sidl;
          } s;
      } uu;
      AP_UINT16       odai;
} SNA_LFSID;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_REMOVE_DLC_TRACE

resource_type

The resource type of the trace entry to remove or modify. Possible values are:

AP_ALL_DLC_TRACES

Remove all DLC tracing options, so that no resources are traced. If this option is specified, the remaining parameters on this verb *(resource_name* through *message_type*) are reserved.

AP_ALL_RESOURCES

Remove or modify the tracing options used for tracing all DLCs, ports, and LSs; resources for which DLC_TRACE entries are explicitly defined will continue to be traced.

AP_DLC Remove or modify tracing for the DLC named in *resource_name*, and for all ports and LSs that use this DLC.

AP_PORT

Remove or modify tracing for the port named in *resource_name*, and for all LSs that use this port.

AP_LS Remove or modify tracing for the LS named in *resource_name*.

AP_RTP Remove or modify tracing for the RTP (rapid transport protocol) connection named in *resource_name*.

AP_PORT_DEFINED_LS
Modify tracing for the port named in *resource_name* and its defined LSs.

AP_PORT_IMPLICIT_LS
Modify tracing for the port named in *resource_name* and its implicit LSs.

resource_name
The name of the DLC, port, LS, or RTP connection for which tracing is being removed or modified. This parameter is reserved if *resource_type* is set to AP_ALL_DLC_TRACES or AP_ALL_RESOURCES.

lfsid The Local Form Session Identifier for a session on the specified LS. This is only valid for *resource_type* AP_LS, and indicates that only messages on this session are to be removed. The structure contains the following three values, which are returned in the SESSION_STATS section of a QUERY_SESSION verb:

lfsid.uu.s.sidh
Session ID high byte.

lfsid.uu.s.sidl
Session ID low byte.

lfsid.odai
Origin Destination Assignor Indicator.

message_type
The type of messages to trace for the specified resource or session. Set this parameter to AP_TRACE_ALL to remove all messages, or specify one or more of the following values (combined using a logical OR):

AP_TRACE_XID
XID messages

AP_TRACE_SC
Session Control RUs

AP_TRACE_DFC
Data Flow Control RUs

AP_TRACE_FMD
FMD messages

AP_TRACE_SEGS
Non-BBIU segments that do not contain an RH

AP_TRACE_CTL
Messages other then MUs and XIDs

AP_TRACE_NLP
(this message type is currently not used)

AP_TRACE_NC
(this message type is currently not used)

For tracing on an RTP connection, the values AP_TRACE_XID, AP_TRACE_NLP, and AP_TRACE_CTL are ignored.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns one of the following.

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_RESOURCE_TYPE
The *resource_type* parameter specified a value that was not valid.

AP_INVALID_MESSAGE_TYPE
The *message_type* parameter specified a value that was not valid.

AP_INVALID_DLC_NAME
The DLC named in *resource_name* does not have any tracing options set.

AP_INVALID_PORT_NAME
The Port named in *resource_name* does not have any tracing options set.

AP_INVALID_LS_NAME
The LS named in *resource_name* does not have any tracing options set.

AP_INVALID_RTP_CONNECTION
The RTP connection named in the *resource_name* parameter does not have any tracing options set.

AP_INVALID_LFSID_SPECIFIED
The LS named in *resource_name* does not have any tracing options set for the specified LFSID.

AP_INVALID_FILTER_TYPE
The *message_type* parameter specified a message type that is not currently being traced for the specified resource.

AP_ALL_RESOURCES_NOT_DEFINED
The *resource_type* parameter was set to AP_ALL_RESOURCES, but there is no DLC_TRACE entry defined for tracing options on all resources.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

RESET_SESSION_LIMIT

The RESET_SESSION_LIMIT verb requests CS Linux to reset the session limits for a particular LU-LU-mode combination. Sessions may be deactivated as a result of processing this verb.

VCB Structure

```
typedef struct reset_session_limit
{
   AP_UINT16       opcode;               /* verb operation code           */
   unsigned char   reserv2;              /* reserved                      */
   unsigned char   format;               /* reserved                      */
   AP_UINT16       primary_rc;           /* primary return code           */
   AP_UINT32       secondary_rc;         /* secondary return code         */
   unsigned char   lu_name[8];           /* local LU name                 */
   unsigned char   lu_alias[8];          /* local LU alias                */
   unsigned char   plu_alias[8];         /* partner LU alias              */
   unsigned char   fqplu_name[17];       /* fully qualified partner LU name*/
   unsigned char   reserv3;              /* reserved                      */
   unsigned char   mode_name[8];         /* mode name                     */
   unsigned char   mode_name_select;     /* select mode name              */
   unsigned char   set_negotiable;       /* set max negotiable limit to   */
                                         /*  zero?                        */
   unsigned char   reserv4[8];           /* reserved                      */
   unsigned char   responsible;          /* who is responsible for        */
                                         /*  deactivation                 */
   unsigned char   drain_source;         /* drain source                  */
   unsigned char   drain_target;         /* drain target                  */
   unsigned char   force;                /* force                         */
   AP_UINT32       sense_data;           /* sense data                    */
} RESET_SESSION_LIMIT;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_RESET_SESSION_LIMIT

lu_name

LU name of the local LU, as defined to CS Linux. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 bytes. To indicate that the LU is defined by its LU alias instead of its LU name, set this parameter to 8 binary zeros.

lu_alias

LU alias of the local LU, as defined to CS Linux. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes. It is used only if *lu_name* is set to zeros.

To indicate the LU associated with the CP (the default LU), set both *lu_name* and *lu_alias* to 8 binary zeros.

plu_alias

LU alias of the partner LU.

This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes. To indicate that the partner LU is defined by its fully qualified LU name instead of its LU alias, set this parameter to 8 binary zeros.

fqplu_name
Fully qualified LU name for the partner LU, as defined to CS Linux. This parameter is used only if the *plu_alias* field is set to zeros; it is ignored if *plu_alias* is specified.

The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

mode_name
Name of the mode for which to reset session limits. This parameter is ignored if *mode_name_select* is set to AP_ALL.

This is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 bytes.

mode_name_select
Selects whether session limits should be reset on a single specified mode, or on all modes between the local and partner LUs. Possible values are:

AP_ONE Reset session limits on the mode specified by *mode_name*.

AP_ALL Reset session limits on all modes.

set_negotiable
Specifies whether the maximum negotiable session limit for this LU-LU-mode combination should be reset to zero. (The current limit may be the limit specified for the mode, or may have been changed by *initialize_session_limit* or *change_session_limit*). Possible values are:

AP_YES Reset the maximum negotiable session limit for this LU-LU-mode combination to zero so that sessions cannot be activated until it is changed by INITIALIZE_SESSION_LIMIT.

AP_NO Leave the maximum negotiable session limit unchanged.

responsible
Indicates whether the source (local) or target (partner) LU is responsible for deactivating sessions after the session limit is reset. Possible values are:

AP_SOURCE
The local LU is responsible for deactivating sessions.

AP_TARGET
The partner LU is responsible for deactivating sessions.

drain_source
Specifies whether the source LU satisfies waiting session requests before deactivating a session. Possible values are:

AP_YES Waiting session requests are satisfied.

AP_NO Waiting session requests are not satisfied.

drain_target
Specifies whether the target LU satisfies waiting session requests before deactivating a session. Possible values are:

AP_YES Waiting session requests are satisfied.

AP_NO Waiting session requests are not satisfied.

force Specifies whether session limits will be set to zero even if CNOS negotiation fails. Possible values are:

AP_YES Session limits will be set to zero.

AP_NO Session limits will not be set to zero if CNOS negotiation fails.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Possible values are:

AP_FORCED
The session limits were set to zero even though CNOS negotiation failed.

AP_AS_NEGOTIATED
The session limits were changed, but one or more values were negotiated by the partner LU.

AP_AS_SPECIFIED
The session limits were changed as requested, without being negotiated by the partner LU.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_EXCEEDS_MAX_ALLOWED
A CS Linux internal error occurred.

AP_INVALID_LU_ALIAS
The *lu_alias* parameter did not match any defined local LU alias.

AP_INVALID_LU_NAME
The *lu_name* parameter did not match any defined local LU name.

AP_INVALID_MODE_NAME
The *mode_name* parameter did not match any defined mode name.

AP_INVALID_PLU_NAME
The *fqplu_name* parameter did not match any defined partner LU name.

AP_INVALID_MODE_NAME_SELECT
The *mode_name_select* parameter was not set to a valid value.

AP_INVALID_DRAIN_SOURCE
The *drain_source* parameter was not set to a valid value.

AP_INVALID_DRAIN_TARGET
The *drain_target* parameter was not set to a valid value.

AP_INVALID_FORCE
The *force* parameter was not set to a valid value.

AP_INVALID_RESPONSIBLE
The *responsible* parameter was not set to a valid value.

AP_INVALID_SET_NEGOTIABLE
The *set_negotiable* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_MODE_RESET
No sessions are currently active for this LU-LU-mode combination. Use INITIALIZE_SESSION_LIMIT instead of RESET_SESSION_LIMIT to specify the limits.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Session Allocation Error

If the verb does not execute because of a session allocation error, CS Linux returns the following parameters:

primary_rc
AP_ALLOCATION_ERROR

secondary_rc

AP_ALLOCATION_FAILURE_NO_RETRY
A session could not be allocated because of a condition that requires corrective action. Check the *sense_data* parameter and any logged messages to determine the reason for the failure, and take any action required. Do not attempt to retry the verb until the condition has been corrected.

sense_data
The SNA sense data associated with the allocation failure.

Returned Parameters: CNOS Processing Errors

If the verb does not execute because of an error, CS Linux returns the following parameters.

primary_rc

AP_CONV_FAILURE_NO_RETRY
The session limits could not be changed because of a condition that requires action (such as a configuration mismatch or a session protocol error). Check the CS Linux log file for information about the error condition, and correct it before retrying this verb.

primary_rc

AP_CNOS_PARTNER_LU_REJECT
The verb failed because CS Linux failed to negotiate the session limits with the partner. Check configuration at both the local LU and partner LU.

secondary_rc

AP_CNOS_COMMAND_RACE_REJECT
The verb failed because the specified mode was being accessed by another administration program (or internally by the CS Linux software) for session activation or deactivation, or for session limit processing. The application should retry the verb, preferably after a timeout to allow the race condition to be cleared.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

SET_BUFFER_AVAILABILITY

This verb specifies the amount of STREAMS buffers that CS Linux can use at any one time. This allows the node to make efficient use of the buffers available, and allows you to ensure that buffers are available for other processes on the Linux computer.

VCB Structure

```
typedef struct set_buffer_availability
{
   AP_UINT16        opcode;              /* verb operation code            */
   unsigned char    reserv2;             /* reserved                       */
   unsigned char    format;              /* reserved                       */
   AP_UINT16        primary_rc;          /* primary return code            */
   AP_UINT32        secondary_rc;        /* secondary return code          */
   AP_UINT32        buf_avail;           /* maximum buffer space available */
   unsigned char    reserv3[8];          /* reserved                       */
} SET_BUFFER_AVAILABILITY;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_SET_BUFFER_AVAILABILITY

buf_avail
The maximum amount of STREAMS buffer space available, in bytes.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

SET_CENTRAL_LOGGING

This verb specifies whether CS Linux log messages are sent to a central file from all servers, or to a separate file on each server. For more information, see "SET_LOG_FILE" on page 642.

This verb must be issued to the node that is currently acting as the central logger; for information about accessing this node, see "CONNECT_NODE" on page 61.

VCB Structure

```
typedef struct set_central_logging
{
   AP_UINT16        opcode;                 /* verb operation code          */
   unsigned char    reserv2;                /* reserved                     */
   unsigned char    format;                 /* reserved                     */
   AP_UINT16        primary_rc;             /* primary return code          */
   AP_UINT32        secondary_rc;           /* secondary return code        */
   unsigned char    enabled;                /* is central logging enabled?  */
   unsigned char    reserv3[3];             /* reserved                     */
} SET_CENTRAL_LOGGING;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_SET_CENTRAL_LOGGING

enabled Specify whether central logging is enabled or disabled. Possible values are:

AP_YES Central logging is enabled. All log messages are sent to a single file on the node currently acting as the central logger.

AP_NO Central logging is disabled. Log messages from each server are sent to a file on that server (specified using the SET_LOG_FILE verb).

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_NOT_CENTRAL_LOGGER
The verb was issued to a node that is not the central logger.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

SET_CS_TRACE

This verb specifies tracing options for data sent between computers on the CS Linux LAN. For more information about tracing options, see the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

This verb can be issued from a NOF application running on an AIX or Linux client. The NOF application must run with the userid `root`, or with a userid that is a member of the `sys` group (AIX) or `sna` group (Linux).

This verb must be issued to a running node, unless it is issued from a client.

VCB Structure

```
typedef struct set_cs_trace
{
   AP_UINT16        opcode;           /* verb operation code               */
   unsigned char    reserv2;          /* reserved                          */
   unsigned char    format;           /* reserved                          */
   AP_UINT16        primary_rc;       /* primary return code               */
   AP_UINT32        secondary_rc;     /* secondary return code             */
   unsigned char    dest_sys[128];    /* node to which messages are traced  */
   unsigned char    reserv4[4];       /* reserved                          */
   AP_UINT16        trace_flags;      /* trace flags                       */
   AP_UINT16        trace_direction;  /* direction (send/rcv/both) to trace */
   unsigned char    reserv3[8];       /* reserved                          */
} SET_CS_TRACE;
```

Supplied Parameters

The application supplies the following parameters:

opcode `AP_SET_CS_TRACE`

dest_sys

The server name for which tracing is required. This is an ASCII string, padded on the right with spaces if the name is shorter than 128 characters.

To manage tracing on messages flowing between the computer to which this verb is issued (identified by the *target_handle* parameter on the NOF API call) and one other server on the LAN, specify the name of the other server here. Tracing on messages flowing to and from other computers on the LAN will be unchanged; in particular, you can issue two SET_CS_TRACE verbs to activate tracing between the same target computer and two different destination servers.

If the server name includes a `.` (period) character, CS Linux assumes that it is a fully-qualified name; otherwise it performs a DNS lookup to determine the server name.

To manage tracing on messages flowing between the computer to which this verb is issued (identified by the *target_handle* parameter on the NOF API call) and all other servers and clients on the LAN, set this parameter to 128 ASCII space characters. The options you specify on this verb override any previous settings for tracing to specific computers (identified by *dest_sys* on the previous verbs).

trace_flags

The types of tracing required. To turn off all tracing, or to turn on tracing of all types, specify one of the following values:

AP_NO_TRACE
No tracing.

AP_ALL_TRACE
Tracing of all types.

To activate tracing on specific message types, select one or more values from the list below, combined using a logical OR operation.

AP_CS_ADMIN_MSG
Internal messages relating to client/server topology

AP_CS_DATAGRAM
Datagram messages

AP_CS_DATA
Data messages

trace_direction
Specifies the direction(s) in which tracing is required. This parameter is ignored if *trace_flags* is set to AP_NO_TRACE. Possible values are:

AP_CS_SEND
Trace messages flowing from the target computer to the computer defined by *dest_sys*.

AP_CS_RECEIVE
Trace messages flowing from the computer defined by *dest_sys* to the target computer.

AP_CS_BOTH
Trace messages flowing in both directions.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_NAME_NOT_FOUND
The server specified by the *dest_sys* parameter did not exist or was not started.

AP_LOCAL_SYSTEM
The server specified by the *dest_sys* parameter is the same as the target node to which this verb was issued.

AP_INVALID_TRC_DIRECTION
The *trace_direction* parameter was not set to a valid value.

AP_INVALID_TARGET
The verb was issued on a standalone server. This verb can only be issued on a client/server system.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

SET_GLOBAL_LOG_TYPE

This verb specifies the types of information that CS Linux records in log files. It specifies default values that are used on all servers; SET_LOG_TYPE can then be used to override these defaults on a particular server. For more information about log files, see "SET_LOG_FILE" on page 642.

CS Linux logs messages for the following types of event:

Problem
An abnormal event that degrades the system in a way perceptible to a user (such as abnormal termination of a session).

Exception
An abnormal event that degrades the system but that is not immediately perceptible to a user (such as a resource shortage), or an event that does not degrade the system but may indicate the cause of later exceptions or problems (such as receiving an unexpected message from the remote system).

Audit A normal event (such as starting a session).

Problem and exception messages are logged to the error log file; audit messages are logged to the audit log file. Problem messages are always logged and cannot be disabled, but you can specify whether to log each of the other two message types. For each of the two files (audit and error), you can specify whether to use succinct logging (including only the text of the message and a summary of the message source) or full logging (including full details of the message source, cause, and any action required).

This verb must be issued to the node currently acting as the central logger; for more information, see "CONNECT_NODE" on page 61.

VCB Structure

```
typedef struct set_global_log_type
{
   AP_UINT16       opcode;             /* verb operation code               */
   unsigned char   reserv2;            /* reserved                          */
   unsigned char   format;             /* reserved                          */
   AP_UINT16       primary_rc;         /* primary return code               */
   AP_UINT32       secondary_rc;       /* secondary return code             */
   unsigned char   audit;              /* audit logging on or off           */
   unsigned char   exception;          /* exception logging on or off       */
   unsigned char   succinct_audits;    /* use succinct logging in audit file?*/
   unsigned char   succinct_errors;    /* use succinct logging in error file?*/
   unsigned char   reserv3[4];         /* reserved                          */
} SET_GLOBAL_LOG_TYPE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_SET_GLOBAL_LOG_TYPE

audit Specify whether audit messages are recorded. Possible values are:

AP_YES Audit messages are recorded.

AP_NO Audit messages are not recorded.

AP_LEAVE_UNCHANGED
Leave audit logging unchanged from the existing definition. (The initial default, when the CS Linux software is started, is that audit messages are not recorded.)

exception
Specify whether exception messages are recorded. Possible values are:

AP_YES Exception messages are recorded.

AP_NO Exception messages are not recorded.

AP_LEAVE_UNCHANGED
Leave exception logging unchanged from the existing definition. (The initial default, when the CS Linux software is started, is that exception messages are recorded.)

succinct_audits
Specifies whether to use succinct logging or full logging in the audit log file. Possible values are:

AP_YES Succinct logging: each message in the log file contains a summary of the message header information (such as the message number, log type, and system name) and the message text string and parameters. To obtain more details of the cause of the log and any action required, you can use the snahelp utility.

AP_NO Full logging: each message in the log file includes a full listing of the message header information, the message text string and parameters, and additional information about the cause of the log and any action required.

AP_LEAVE_UNCHANGED
Use the value (succinct logging or full logging) specified for this parameter on the previous SET_GLOBAL_LOG_TYPE verb. The initial default, before any SET_GLOBAL_LOG_TYPE verb has been issued, is to use succinct logging.

If you are using central logging, the choice of succinct or full logging for messages from all computers is determined by the setting of this parameter on the server acting as the central logger; this setting may either be from the SET_GLOBAL_LOG_TYPE verb, or from a SET_LOG_TYPE verb issued to that server to override the default.

succinct_errors
Specifies whether to use succinct logging or full logging in the error log file; this applies to both exception logs and problem logs. The allowed values and their meanings are the same as for the *succinct_audits* parameter.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_NOT_CENTRAL_LOGGER
The verb was issued to a node that is not the central logger.

AP_INVALID_SUCCINCT_SETTING
The *succinct_audits* or *succinct_errors* parameter was not set to a valid value.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

SET_KERNEL_MEMORY_LIMIT

This verb specifies a limit on the amount of kernel memory that CS Linux can use at any one time. This allows you to ensure that memory is available for other processes on the Linux computer.

You can also specify the kernel memory limit when starting the CS Linux software (for more information, see the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*). This verb overrides the limit, if any, specified when starting the CS Linux software.

VCB Structure

```
typedef struct set_kernel_memory_limit
{
   AP_UINT16       opcode;           /* verb operation code                */
   unsigned char   reserv2;          /* reserved                           */
   unsigned char   format;           /* reserved                           */
   AP_UINT16       primary_rc;       /* primary return code                */
   AP_UINT32       secondary_rc;     /* secondary return code              */
   AP_UINT32       limit;            /* kernel memory limit, 0 => no limit  */
   unsigned char   reserv3[8];       /* Reserved                           */
} SET_KERNEL_MEMORY_LIMIT;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_SET_KERNEL_MEMORY_LIMIT

limit The maximum amount of kernel memory that CS Linux should use at any

time, in bytes. If a CS Linux component attempts to allocate kernel memory that would take the total amount of memory currently allocated to CS Linux components above this limit, the allocation attempt will fail.

To remove the limit set by a previous SET_KERNEL_MEMORY_LIMIT verb, specify zero.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

SET_LOG_FILE

This verb manages a file that CS Linux uses to record log messages. It allows you to do the following:

- Specify a file used to record log messages (audit, error, or usage logs), and the backup file (to which log information is copied).
- Specify the maximum log file size (when the log file reaches this size, CS Linux copies log information to the backup file and resets the log file).
- Copy the current contents of the log file to the backup file, and optionally delete the current file.

You can record audit log and error log messages in separate files, or record both types of messages in the same file.

If you are using central logging, as defined by SET_CENTRAL_LOGGING, this verb must be issued to the node that is acting as the central logger. Otherwise you can issue it to each node separately in order to specify a different log file on each node.

This verb can be issued from a NOF application running on an AIX or Linux client. The NOF application must run with the userid `root`, or with a userid that is a member of the `sys` group (AIX) or `sna` group (Linux).

VCB Structure

```
typedef struct set_log_file
{
   AP_UINT16       opcode;                 /* verb operation code          */
   unsigned char   reserv2;                /* reserved                     */
   unsigned char   format;                 /* reserved                     */
   AP_UINT16       primary_rc;             /* primary return code          */
   AP_UINT32       secondary_rc;           /* secondary return code        */
   unsigned char   log_file_type;          /* type of log file             */
   unsigned char   action;                 /* reset and/or backup existing */
   unsigned char   file_name[81];          /* file name                    */
   unsigned char   backup_file_name[81];   /* backup file                  */
```

```
   AP_UINT32       file_size;              /* log file size              */
   unsigned char   succinct;               /* reserved                   */
   unsigned char   reserv3[3];             /* reserved                   */
} SET_LOG_FILE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_SET_LOG_FILE

log_file_type
The type of log file being managed. Possible values are:

AP_AUDIT_FILE
Audit log file (audit messages only).

AP_ERROR_FILE
Error log file (problem and exception messages).

AP_USAGE_FILE
Usage log file (information on current and peak usage of CS Linux resources).

To record both audit and error messages in the same file, issue two SET_LOG_FILE verbs for the same file name, specifying AP_AUDIT_FILE on one verb and AP_ERROR_FILE on the other.

action The action to be taken on the log file. Specify one of the following values:

AP_NO_FILE_ACTION
Use the file specified in the *file_name* parameter as the log file, and the file specified in the *backup_file_name* parameter as the backup file. After this verb completes successfully, all log messages of the type defined by *log_file_type* are written to the new log file. The log file that was used before this verb is issued, if any, is left unchanged.

AP_DELETE_FILE
Delete the contents of the current log file.

AP_BACKUP_FILE
Copy the contents of the current log file to the backup file, and then delete the contents of the current file.

file_name
Name of the new log file.

To create the file in the default directory for diagnostics files, **/var/opt/ibm/sna**, specify the file name with no path. To create the file in a different directory, specify either a full path or the path relative to the default directory. If you include the path, ensure that it is a valid path (either relative to the application's working directory or a full path) on any computer to which this verb is issued.

This parameter is an ASCII string of 1–80 characters, followed by a NULL character (binary zero). To continue logging to the file specified on a previous SET_LOG_FILE verb, specify a null string.

backup_file_name
Name of the backup log file. When the log file reaches the size specified by *file_size* below, CS Linux copies the current contents to the backup file and then clears the log file. You can also request a backup at any time using the action parameter above.

To create the file in the default directory for diagnostics files, **/var/opt/ibm/sna**, specify the file name with no path. To create the file in a different directory, specify either a full path or the path relative to the default directory. If you include the path, ensure that it is a valid path (either relative to the application's working directory or a full path) on any computer to which this verb is issued.

This parameter is an ASCII string of 1–80 characters, followed by a NULL character (binary zero). To continue using the backup file specified on a previous SET_LOG_FILE verb, specify a null string.

file_size

The maximum size of the log file specified by *log_file_type*. When a message written to the file causes the file size to exceed this limit, CS Linux copies the current contents of the log file to the backup log file and clears the log file. This means that the maximum amount of disk space taken up by log files is approximately twice *file_size*.

To continue using the file size specified on a previous SET_LOG_FILE verb, set this parameter to zero. The initial default value, before any SET_LOG_FILE verb has been issued, is 10,000,000 bytes. A value of zero indicates “continue using the existing file size” and not “no limit”.

You may need to increase the size of the audit and error log files according to the size of the CS Linux client/server network, to allow for the volume of log information generated in larger systems. In particular, consider increasing the log file size to allow for the following:

- Large numbers of clients or users (since a single communications link failure may result in large numbers of logs on the server relating to session failures)
- Activating audit logging as well as exception logging
- Using central logging instead of distributed logging
- Using full logging instead of succinct logging.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc

AP_OK

secondary_rc

Not used.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc

AP_PARAMETER_CHECK

secondary_rc

Possible values are:

AP_INVALID_FILE_ACTION

The *action* parameter was not set to a valid value.

AP_INVALID_FILE_TYPE

The *log_file_type* parameter was not set to a valid value.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

SET_LOG_TYPE

This verb specifies the types of information that CS Linux records in log files on a particular server. It can be used to override the default settings specified on SET_GLOBAL_LOG_TYPE, or to remove the override so that this server reverts to using the default settings. For more information about log files, see “SET_LOG_FILE” on page 642.

This verb can be issued from a NOF application running on an AIX or Linux client. The NOF application must run with the userid root, or with a userid that is a member of the sys group (AIX) or sna group (Linux).

Problem
An abnormal event that degrades the system in a way perceptible to a user (such as abnormal termination of a session).

Exception
An abnormal event that degrades the system but that is not immediately perceptible to a user (such as a resource shortage), or an event that does not degrade the system but may indicate the cause of later exceptions or problems (such as receiving an unexpected message from the remote system).

Audit A normal event (such as starting a session).

Problem and exception messages are logged to the error log file; audit messages are logged to the audit log file. Problem messages are always logged and cannot be disabled, but you can specify whether to log each of the other two message types. For each of the two files (audit and error), you can specify whether to use succinct logging (including only the text of the message and a summary of the message source) or full logging (including full details of the message source, cause, and any action required).

VCB Structure

```
typedef struct set_log_type
{
   AP_UINT16       opcode;             /* verb operation code               */
   unsigned char   reserv2;            /* reserved                          */
   unsigned char   format;             /* reserved                          */
   AP_UINT16       primary_rc;         /* primary return code               */
   AP_UINT32       secondary_rc;       /* secondary return code             */
   unsigned char   override;           /* override global defaults?         */
   unsigned char   audit;              /* audit logging on or off           */
   unsigned char   exception;          /* exception logging on or off       */
   unsigned char   succinct_audits;    /* use succinct logging in audit file?*/
   unsigned char   succinct_errors;    /* use succinct logging in error file?*/
   unsigned char   reserv3[3];         /* reserved                          */
} SET_LOG_TYPE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_SET_LOG_TYPE

override
Specifies whether this verb is being used to override the global log types specified on SET_GLOBAL_LOG_TYPE, or to revert to using these defaults. Possible values are:

AP_YES Override the global log types. The log types to be used on this server are specified by the *audit* and *exception* parameters below, and the choice of succinct or full logging is specified by the *succinct_** parameters below.

AP_NO Revert to using the global log types. The *audit*, *exception*, and *succinct_** parameters below are ignored.

audit Specify whether audit messages are recorded on this server. Possible values are:

AP_YES Audit messages are recorded.

AP_NO Audit messages are not recorded.

AP_LEAVE_UNCHANGED
Leave audit logging unchanged from the existing definition.

exception
Specify whether exception messages are recorded on this server. Possible values are:

AP_YES Exception messages are recorded.

AP_NO Exception messages are not recorded.

AP_LEAVE_UNCHANGED
Leave exception logging unchanged from the existing definition.

succinct_audits
Specifies whether to use succinct logging or full logging in the audit log file on this server. Possible values are:

AP_YES Succinct logging: each message in the log file contains a summary of the message header information (such as the message number, log type, and system name) and the message text string and parameters. To obtain more details of the cause of the log and any action required, you can use the snahelp utility.

AP_NO Full logging: each message in the log file includes a full listing of the message header information, the message text string and parameters, and additional information about the cause of the log and any action required.

AP_LEAVE_UNCHANGED
Leave succinct logging or full logging unchanged from the existing definition.

If you are using central logging, the choice of succinct or full logging for messages from all computers is determined by the setting of this parameter on the server acting as the central logger; this setting may either be from the SET_GLOBAL_LOG_TYPE verb, or from a SET_LOG_TYPE verb issued to that server to override the default.

succinct_errors
Specifies whether to use succinct logging or full logging in the error log

file on this server; this applies to both exception logs and problem logs. The allowed values and their meanings are the same as for the *succinct_audits* parameter.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_SUCCINCT_SETTING
The *succinct_audits* or *succinct_errors* parameter was not set to a valid value.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

SET_PROCESSING_MODE

This verb specifies how the NOF application interacts with the target node, configuration file, or SNA network data file: whether the application has read-only access or read/write access, and whether the application has exclusive access to the domain configuration file so that other applications cannot access it.

This verb applies only to NOF applications running on a server. For an application running on a client, the only processing mode available is read-only mode (the default), in which the application can issue QUERY_* verbs but cannot define, start or stop resources. The client application cannot use SET_PROCESSING_MODE to select any other mode.

The target node or file is specified by the *target_handle* parameter on the NOF API call; the application obtains this parameter from the verb CONNECT_NODE (for a node) or OPEN_FILE (for a file). For more information about the use of this parameter, see "NOF API Entry Points for AIX or Linux" on page 24.

This verb may be issued to the domain configuration file, to the **sna.net** file, or to a running node. The valid processing modes that can be set with this verb depend on the target type.

VCB Structure

```
typedef struct set_processing_mode
{
   AP_UINT16        opcode;           /* verb operation code              */
   unsigned char    reserv2;          /* reserved                         */
```

```
   unsigned char    format;           /* reserved                          */
   AP_UINT16        primary_rc;       /* primary return code               */
   AP_UINT32        secondary_rc;     /* secondary return code             */
   unsigned char    mode;             /* new mode to be set for this handle */
   AP_UINT16        reserv1;          /* reserved                          */
} SET_PROCESSING_MODE;
```

Supplied Parameters

opcode AP_SET_PROCESSING_MODE

mode Requested mode for this target handle. The mode cannot be changed while any previous verbs issued using this target handle are still outstanding. Possible values are:

AP_MODE_READ_ONLY
Read-only mode: the application will use only QUERY_* verbs, which do not modify the configuration. This option can be used with either a file or a node as the target.

AP_MODE_READ_WRITE
Read / write mode: the application may use any NOF API verbs. This option can be used with either a file or a node as the target.

AP_MODE_COMMIT
Commit mode: the application has exclusive read/write access to the target file, so that other applications cannot access it until this application releases it. This option can be used only with the domain configuration file as the target.

This mode is intended for issuing a series of connected verbs to a file (such as a series of DEFINE verbs for related components). The application should complete the series of verbs as quickly as possible and then reset its processing mode to one of the other options, in order to release the file so that other NOF API applications or CS Linux components can access it.

Note: To obtain read/write or commit access to the file, your NOF application must be running with a user ID that is a member of the SNA administrators group `sna` (or running as `root`). If the user ID is not a member of this group or `root`, the only valid processing mode is `AP_MODE_READ_ONLY`.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_PROC_MODE
The *mode* parameter was not set to a valid value.

AP_INVALID_TARGET_MODE
The *mode* parameter was not valid for the selected target.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state check, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_FILE_UNAVAILABLE
The application specified commit mode, but was unable to get exclusive access to the required configuration file. This may be because another application is accessing the file in commit mode.

AP_VERB_IN_PROGRESS
The processing mode for the specified target handle cannot be changed because a previous verb issued for this handle is still outstanding. All verbs for the target handle must be completed before attempting to change the processing mode.

AP_NOT_AUTHORIZED
The NOF application cannot obtain read/write access to the file because it is running on a client, or because it is running with a user ID that is not a member of the SNA administrators group sna. If the user ID is not a member of this group, the only valid processing mode is AP_MODE_READ_ONLY.

AP_NOT_MASTER
The processing mode cannot be changed to AP_MODE_READ_WRITE or AP_MODE_COMMIT because the target handle specifies a file (either the domain configuration file or the SNA network data file) on a backup server that is no longer acting as the master server. Changes to the running configuration file can be made only to the copy of this file on the master (so that they will be distributed to other servers); other copies of the file can be accessed only in read-only mode. If the application needs to use read/write or commit mode, it should issue CLOSE_FILE for this target handle, and then reissue OPEN_FILE to access the file on the new master server.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

SET_TN_SERVER_TRACE

This verb specifies tracing options for the CS Linux TN server component.

This verb must be issued to a running node.

VCB Structure

```
typedef struct set_tn_server_trace
{
   AP_UINT16        opcode;                  /* verb operation code      */
   unsigned char    reserv2;                 /* reserved                 */
   unsigned char    format;                  /* reserved                 */
   AP_UINT16        primary_rc;              /* primary return code      */
   AP_UINT32        secondary_rc;            /* secondary return code    */
   AP_UINT16        trace_flags;             /* trace flags              */
   unsigned char    reserv3[6];              /* reserved                 */
} SET_TN_SERVER_TRACE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_SET_TN_SERVER_TRACE

trace_flags

The types of tracing required. To turn off all tracing, or to turn on tracing of all types, specify one of the following values:

AP_TN_SERVER_NO_TRACE
No tracing.

AP_TN_SERVER_ALL_TRACE
Tracing of all types.

To activate tracing on specific message types, select one or more values from the list below, combined using a logical OR operation.

AP_TN_SERVER_TRC_TCP
TCP/IP interface tracing: messages between TN server and TN3270 clients

AP_TN_SERVER_TRC_FM
Node interface tracing: internal control messages, and messages between TN server and TN3270 clients (in internal format)

AP_TN_SERVER_TRC_CFG
Configuration message tracing: messages relating to the configuration of TN server

AP_TN_SERVER_TRC_NOF
Internal node operator function (NOF) tracing: trace NOF requests made by TN server.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

SET_TRACE_FILE

This verb specifies the name of a file that CS Linux uses to record trace data.

If you issue a second SET_TRACE_FILE verb specifying a new file for the same file type, all subsequent trace information will be written to the new file; the existing file is not removed, but further information will not be written to it. If you issue a second SET_TRACE_FILE verb for the same trace file, this resets the file (discarding trace information that was written to the file before the second verb).

This verb must be issued to a running node.

VCB Structure

```
typedef struct set_trace_file
{
   AP_UINT16        opcode;                  /* verb operation code    */
   unsigned char    reserv2;                 /* reserved               */
   unsigned char    format;                  /* reserved               */
   AP_UINT16        primary_rc;              /* primary return code    */
   AP_UINT32        secondary_rc;            /* secondary return code  */
   unsigned char    trace_file_type;         /* type of trace file     */
   unsigned char    dual_files;              /* dual trace files       */
   AP_UINT32        trace_file_size;         /* trace file size        */
   unsigned char    reserv3[4];              /* reserved               */
   unsigned char    file_name[81];           /* file name              */
   unsigned char    file_name_2[81];         /* second file name       */
} SET_TRACE_FILE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_SET_TRACE_FILE

trace_file_type

The type of trace file. Possible values are:

AP_CS_TRACE
File contains tracing on data transferred across the CS Linux LAN between the specified computer and other nodes (activated by the SET_CS_TRACE verb).

AP_TN_SERVER_TRACE
File contains tracing on the CS Linux TN server component.

AP_IPS_TRACE
File contains tracing on kernel components for the specified node (activated by the SET_TRACE_TYPE or ADD_DLC_TRACE verb).

dual_files

Specifies whether tracing is to one file or to two files. Possible values are:

AP_YES Tracing is to two files. When the first file reaches the size specified by *trace_file_size*, the second file is cleared, and tracing continues to the second file. When this file then reaches the size specified by *trace_file_size*, the first file is cleared, and tracing continues to the first file. This ensures that tracing can continue for long periods

without using excessive disk space; the maximum space required is approximately twice the value of *trace_file_size*.

AP_NO Tracing is to one file.

AP_LEAVE_UNCHANGED
Leave the *dual_files* setting unchanged from the existing definition. (The initial default, when the CS Linux software is started, is to use two files.)

trace_file_size
The maximum size of the trace file, in bytes. The initial default value, before any SET_TRACE_FILE verb has been issued, is 10,000,000 bytes. To continue using the existing file size definition, specify zero.

If *dual_files* is set to AP_YES, tracing will switch between the two files when the current file reaches this size. If *dual_files* is set to AP_NO, this parameter is ignored; the file size is not limited.

You may need to increase the size of the trace files according to the size of the CS Linux client/server network, to allow for the volume of trace information generated in larger systems. In particular, consider increasing the trace file size on a server to allow for large numbers of clients or users accessing the server.

file_name
Name of the trace file, or of the first trace file if *dual_files* is set to AP_YES. To continue using the file name specified on a previous SET_TRACE_FILE verb, set this parameter to a null string.

To create the file in the default directory for diagnostics files, **/var/opt/ibm/sna**, specify the file name with no path. To create the file in a different directory, specify either a full path or the path relative to the default directory. If you include the path, ensure that it is a valid path (either relative to the application's working directory or a full path) on any computer to which this verb is issued.

This parameter is an ASCII string of 1–80 characters, followed by a NULL character (binary zero).

file_name_2
Name of the second trace file; this parameter is used only if *dual_files* is set to AP_YES. To continue using the file name specified on a previous *set_trace_file* verb, set this parameter to a null string.

To create the file in the default directory for diagnostics files, **/var/opt/ibm/sna**, specify the file name with no path. To create the file in a different directory, specify either a full path or the path relative to the default directory. If you include the path, ensure that it is a valid path (either relative to the application's working directory or a full path) on any computer to which this verb is issued.

This parameter is an ASCII string of 1–80 characters, followed by a NULL character (binary zero).

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_FILE_NAME
The *file_name* or *file_name_2* parameter was not set to a valid Linux file name, or *file_name_2* was not specified when changing from a single trace file to dual trace files.

AP_INVALID_FILE_TYPE
The *trace_file_type* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

SET_TRACE_TYPE

This verb specifies tracing options for CS Linux kernel components. You can use this verb to specify the state of tracing (on or off) at all interfaces, or to turn tracing on or off at specific interfaces (leaving tracing at other interfaces unchanged). For more information about tracing options, see the *IBM Communications Server for Data Center Deployment on Linux Administration Guide*.

To control DLC line tracing, use the ADD_DLC_TRACE verb. The truncation length specified on this verb also applies to DLC tracing, but the tracing options on this verb do not apply to DLC tracing.

This verb must be issued to a running node.

VCB Structure

```
typedef struct set_trace_type
{
   AP_UINT16        opcode;               /* verb operation code           */
   unsigned char    reserv2;              /* reserved                      */
   unsigned char    format;               /* reserved                      */
   AP_UINT16        primary_rc;           /* primary return code           */
   AP_UINT32        secondary_rc;         /* secondary return code         */
   AP_UINT16        trace_flags;          /* trace flags                   */
   AP_UINT32        truncation_length;    /* truncate each msg to this size */
   unsigned char    init_flags;           /* TRUE if initializing flags    */
   unsigned char    set_flags;            /* TRUE if setting flags         */
                                          /*  FALSE if unsetting flags     */
   unsigned char    set_internal;         /* reserved                      */
   AP_UINT16        internal_level;       /* reserved                      */
   AP_UINT32        api_flags;            /* api trace flags               */
} SET_TRACE_TYPE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_SET_TRACE_TYPE

trace_flags

The types of tracing required. To turn off all tracing, or to turn on tracing of all types, specify one of the following values:

AP_NO_TRACE
No tracing.

AP_ALL_TRACE
Tracing of all types.

To control tracing on specific interfaces, select one or more values from the list below, combined using a logical OR operation. For more information about these trace types, see "Trace Types" on page 656.

If *init_flags* is set to AP_YES, select the values corresponding to the interfaces where you want tracing to be active, and do not select the values corresponding to the interfaces where you want it to be inactive. If *init_flags* is set to AP_NO, select the values corresponding to the interfaces where you want to change the state of tracing.

AP_APPC_MSG
APPC messages

AP_LUA_MSG
LUA messages

AP_NOF_MSG
NOF messages

AP_MS_MSG
MS messages

AP_LLC2_MSG
LLC2 messages

AP_LLI_MSG
LLI messages

AP_MAC_MSG
MAC messages

AP_SDLC_MSG
SDLC messages (note that this option also provides additional detail in SDLC line tracing)

AP_NLI_MSG
NLI messages

AP_IPDL_MSG
Enterprise Extender (HPR/IP) messages

AP_DLC_MSG
Node to DLC messages

AP_NODE_MSG
Node messages

AP_SLIM_MSG
Messages sent between master and backup servers

AP_DATAGRAM
Datagram messages

truncation_length
Specify the maximum length, in bytes, of the information to be written to the trace file for each message. This value must be at least 256.

If a trace message is longer than the length specified in this parameter, CS Linux writes only the start of the message to the trace file, and discards the data beyond *truncation_length*. This allows you to record the most important information for each message but avoid filling up the file with long messages.

To specify no truncation (all the data from each message is written to the file), set this parameter to zero.

init_flags
Specifies whether to initialize tracing (define the tracing state at all interfaces), or to change the state of tracing at one or more interfaces (leaving the others unchanged). Possible values are:

AP_YES Tracing is being initialized. The *trace_flags* parameter defines the required state of tracing at all interfaces.

AP_NO Tracing is being changed. The *trace_flags* parameter defines the interfaces where tracing is being activated or deactivated; other interfaces will not be affected.

set_flags
If *init_flags* is set to AP_NO, this parameter specifies whether tracing is to be activated or deactivated at the requested interfaces. Possible values are:

AP_YES Tracing is to be activated at the interfaces specified by the *trace_flags* parameter.

AP_NO Tracing is to be deactivated at the interfaces specified by the *trace_flags* parameter.

If *init_flags* is set to AP_YES, this parameter is ignored.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

secondary_rc
Not used.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_TRUNC_LEN
The *truncation_length* parameter specified a length of less than 256 bytes.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

Trace Types

Figure 2, shows the overall structure of CS Linux. Each kernel-space trace type, relating to data transferred across a particular interface between CS Linux components, is shown in the diagram at the interface where it is traced.

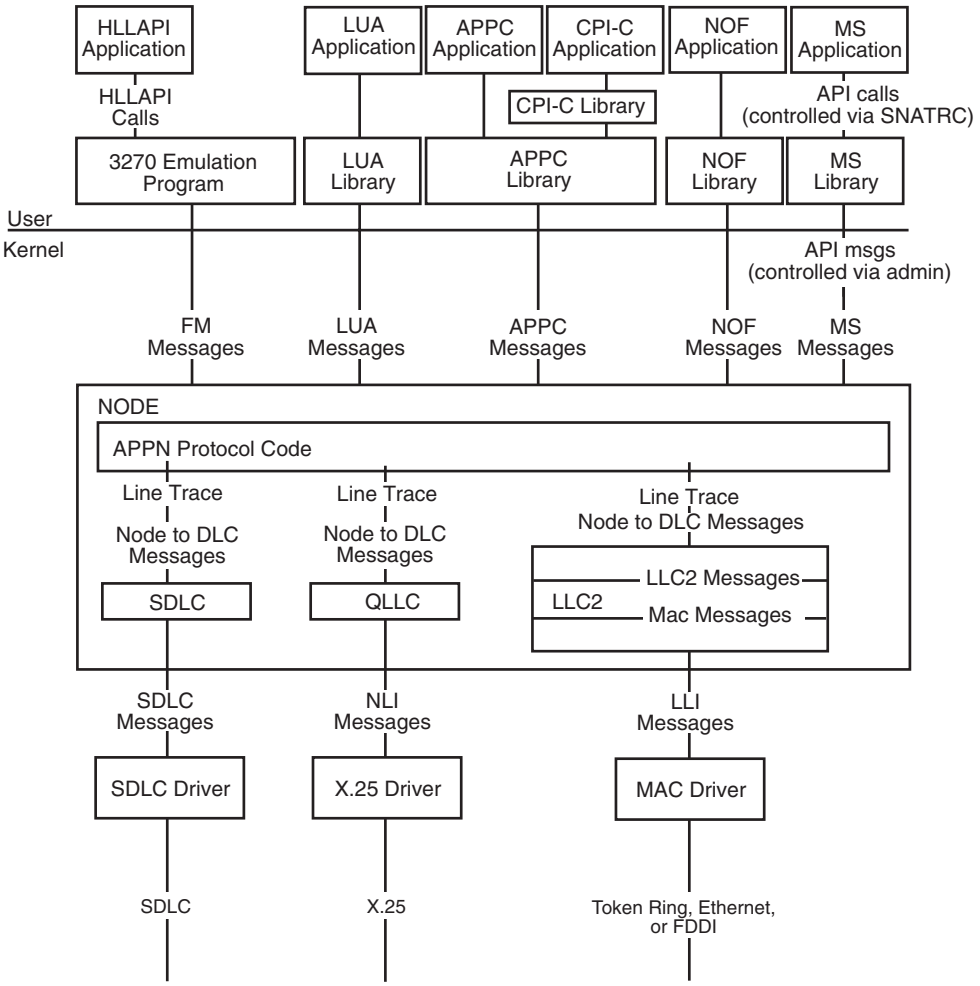

Figure 2. Overall Structure of CS Linux

Figure 2 shows the following types of tracing, each of which can be controlled separately:

APPC messages
Messages between the APPC library and the node

LUA messages
Messages between the LUA library and the node

NOF messages
Messages between the NOF library and the node

MS messages
Messages between the MS library and the node

DLC line trace
SNA data sent on a DLC (tracing on these messages is controlled by the ADD_DLC_TRACE verb, not by SET_TRACE_TYPE)

Node to DLC messages
Messages between the APPN node and the DLC component

In addition, the following message types (internal to CS Linux) can be traced:

Node messages
Messages between components within the APPN protocol code

Control messages
Internal control messages between system components

START_DLC

START_DLC requests the activation of a DLC.

This verb must be issued to a running node.

VCB Structure

```
typedef struct start_dlc
{
   AP_UINT16        opcode;                 /* verb operation code      */
   unsigned char    reserv2;                /* reserved                 */
   unsigned char    format;                 /* reserved                 */
   AP_UINT16        primary_rc;             /* primary return code      */
   AP_UINT32        secondary_rc;           /* secondary return code    */
   unsigned char    dlc_name[8];            /* name of DLC              */
} START_DLC;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_START_DLC

dlc_name
Name of the DLC to be started. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes, which must match the name of a defined DLC.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameter:

primary_rc
AP_OK

This return code indicates only that the verb was issued successfully; the verb does not wait for the DLC to initialize, and so does not return error return codes if the initialization of the DLC fails. DLC initialization failures are reported using messages written to the error log file.

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_DLC
The *dlc_name* parameter was not the name of a defined DLC.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_DLC_DEACTIVATING
The specified DLC has already been started, and is in the process of being deactivated.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

START_INTERNAL_PU

START_INTERNAL_PU requests DLUR to initiate SSCP-PU session activation for a previously defined local PU which is served by DLUR.

This verb must be issued to a running node.

VCB Structure

```
typedef struct start_internal_pu
{
   AP_UINT16        opcode;                 /* verb operation code      */
   unsigned char    reserv2;                /* reserved                 */
   unsigned char    format;                 /* reserved                 */
   AP_UINT16        primary_rc;             /* primary return code      */
   AP_UINT32        secondary_rc;           /* secondary return code    */
   unsigned char    pu_name[8];             /* internal PU name         */
   unsigned char    dlus_name[17];          /* DLUS name                */
   unsigned char    bkup_dlus_name[17];     /* Backup DLUS name         */
} START_INTERNAL_PU;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_START_INTERNAL_PU

pu_name
Name of the internal PU to be started (which must have been previously

defined using DEFINE_INTERNAL_PU). The name is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

dlus_name
Name of DLUS node which DLUR will contact to solicit SSCP-PU session activation for the given PU. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

To use the DLUS specified in the DEFINE_INTERNAL_PU verb, or the global default specified in DEFINE_DLUR_DEFAULTS if none was specified in DEFINE_INTERNAL_PU, set this parameter to 17 binary zeros.

bkup_dlus_name
Name of DLUS node which DLUR will store as the backup DLUS for the given PU. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

To use the backup DLUS specified in the DEFINE_INTERNAL_PU verb, or the global backup default specified in DEFINE_DLUR_DEFAULTS if none was specified in DEFINE_INTERNAL_PU, set this parameter to 17 binary zeros.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_DLUS_NAME
The *dlus_name* parameter contained a character that was not valid or was not in the correct format.

AP_INVALID_BKUP_DLUS_NAME
The *bkup_dlus_name* parameter contained a character that was not valid or was not in the correct format.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_NO_DEFAULT_DLUS_DEFINED
A DLUS name was not specified either on this verb or on the DEFINE_INTERNAL_PU verb, and there is no default DLUS defined because the DEFINE_DLUR_DEFAULTS verb has not been issued.

AP_PU_NOT_DEFINED
The supplied PU name was not the name of an internal PU defined using DEFINE_INTERNAL_PU.

AP_PU_ALREADY_ACTIVATING
The PU is already in the process of being started.

AP_PU_ALREADY_ACTIVE
The PU has already been started.

Returned Parameters: Unsuccessful

If the verb does not execute successfully, CS Linux returns the following parameters.

primary_rc
AP_UNSUCCESSFUL

secondary_rc
Possible values are:

AP_DLUS_REJECTED
The DLUS rejected the session activation request.

AP_DLUS_CAPS_MISMATCH
The configured DLUS name was not a DLUS node.

AP_PU_FAILED_ACTPU
The local node rejected a message from the DLUS. This may be caused by an internal error, a resource shortage, or a problem with the received message; check the CS Linux log files for messages providing more information.

Returned Parameters: Function Not Supported

If the verb does not execute because the node's configuration does not support it, CS Linux returns the following parameter:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The node does not support DLUR; this is defined by the *dlur_supported* parameter on DEFINE_NODE.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

START_LS

START_LS normally starts an inactive LS. Alternatively, it can be used to leave the LS inactive but specify that it can be activated automatically by CS Linux when required or activated by the remote system.

Note: If the LS is a leased SDLC link or a QLLC PVC link, it must be activated by the remote system as well as by CS Linux. You are recommended to define the LS to be activated when the node is started and to be reactivated automatically after failures, to ensure that the link is always available; see "DEFINE_LS" on page 117 for more information.

This verb must be issued to a running node.

VCB Structure

```
typedef struct start_ls
{
   AP_UINT16        opcode;          /* verb operation code                */
   unsigned char    reserv2;         /* reserved                           */
   unsigned char    format;          /* reserved                           */
   AP_UINT16        primary_rc;      /* primary return code                */
   AP_UINT32        secondary_rc;    /* secondary return code              */
   unsigned char    ls_name[8];      /* name of link station               */
   unsigned char    enable;          /* start ls or enable auto-activation? */
   unsigned char    react_kicked;    /* retry in progress?                 */
   unsigned char    reserv3[2];      /* reserved                           */
} START_LS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_START_LS

ls_name

Name of the link station to be started. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes, which must already have been defined by a DEFINE_LS verb.

enable Specifies the action to be taken for the LS.

To start the LS, set this parameter to AP_ACTIVATE.

To leave the LS inactive but specify that it can be activated (either by CS Linux or by the remote system) when required, specify one or both of the following values (combined using a logical OR):

AP_AUTO_ACT

The LS can be activated automatically by CS Linux when required for a session. This value should be used only when the LS is defined to be auto-activatable (*auto_act_supp* in the LS definition is set to AP_YES); it re-enables auto-activation after the LS has been manually stopped using STOP_LS.

AP_REMOTE_ACT

The LS can be activated by the remote system. This value does not alter the defined value of *disable_remote_act* in the LS definition; when the LS is next stopped, it will return to the defined setting.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc

AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_LINK_NAME_SPECIFIED
The *ls_name* parameter was not the name of a defined LS.

AP_INVALID_LINK_ENABLE
The *enable* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_ACTIVATION_LIMITS_REACHED
The activation limits have been reached.

AP_LINK_DEACT_IN_PROGRESS
The specified LS is currently being deactivated. You cannot start it until the deactivation process has finished.

AP_ALREADY_STARTING
The specified LS is already starting.

AP_PARALLEL_TGS_NOT_SUPPORTED
A link to the remote system is already active. The adjacent node does not support parallel transmission groups.

AP_PORT_INACTIVE
The LS cannot be started because its associated port is not active.

react_kicked
Specifies whether CS Linux will retry the attempt to activate the LS (based on the *react_timer_retry* parameter in the LS definition). Possible values are:

AP_YES LS activation will be retried (up to the number of attempts specified by *react_timer_retry*).

AP_NO LS activation will not be retried.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Unsuccessful

If the verb does not execute successfully because the SNA subsystem on the remote computer cannot be contacted, CS Linux returns the following parameters:

primary_rc
AP_LS_FAILURE

secondary_rc
Possible values are:

AP_PARTNER_NOT_FOUND
No response was received from the port associated with this LS. For Token Ring, Ethernet: check that the *mac_address* parameter in the LS definition is correct.

AP_ERROR
The connection to the remote computer could not be established. This may be because the SNA subsystem on the remote computer is not started. For link types other than LAN types (Token Ring, Ethernet), it may also indicate that CS Linux could not find a remote computer matching the supplied addressing information.

Returned Parameters: Cancelled

If the verb does not execute because it was cancelled by another verb, CS Linux returns the following parameters:

primary_rc
AP_CANCELLED

secondary_rc
Possible values are:

AP_NO_SECONDARY_RC
A STOP_LS verb was issued before the START_LS verb had completed. The START_LS verb was cancelled.

AP_LINK_DEACTIVATED
The DLC or port used by the LS was stopped before the START_LS verb had completed. The START_LS verb was cancelled.

react_kicked
Specifies whether CS Linux will retry the attempt to activate the LS (based on the *react_timer_retry* parameter in the LS definition). Possible values are:

AP_YES LS activation will be retried (up to the number of attempts specified by *react_timer_retry*).

AP_NO LS activation will not be retried.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

START_PORT

START_PORT requests the activation of a port. The DLC specified for the port must be active before this verb is issued.

This verb must be issued to a running node.

VCB Structure

```
typedef struct start_port
{
   AP_UINT16       opcode;                    /* verb operation code     */
```

```
   unsigned char    reserv2;                /* reserved                 */
   unsigned char    format;                 /* reserved                 */
   AP_UINT16        primary_rc;             /* primary return code      */
   AP_UINT32        secondary_rc;           /* secondary return code    */
   unsigned char    port_name[8];           /* name of port             */
} START_PORT;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_START_PORT

port_name
Name of port to be started. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes, which must already have been defined by a DEFINE_PORT verb.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_PORT
The *port_name* parameter was not the name of a defined port.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_DLC_INACTIVE
The port cannot be started because its associated DLC is not active.

AP_DUPLICATE_PORT
The specified port has already been started.

AP_STOP_PORT_PENDING
The specified port is currently being deactivated. You cannot start it until the deactivation process has finished.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Cancelled

If the verb does not execute because it was cancelled, CS Linux returns the following parameters.

primary_rc

AP_CANCELLED
A STOP_PORT verb was issued before this verb had completed. The START_PORT verb was cancelled.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

STOP_DLC

STOP_DLC requests CS Linux to stop a DLC; this also stops any active ports and LSs that use the DLC.

This verb must be issued to a running node.

VCB Structure

```
typedef struct stop_dlc
{
   AP_UINT16        opcode;                 /* verb operation code      */
   unsigned char    reserv2;                /* reserved                 */
   unsigned char    format;                 /* reserved                 */
   AP_UINT16        primary_rc;             /* primary return code      */
   AP_UINT32        secondary_rc;           /* secondary return code    */
   unsigned char    stop_type;              /* stop type                */
   unsigned char    dlc_name[8];            /* name of DLC              */
} STOP_DLC;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_STOP_DLC

stop_type
Type of stop processing required. Possible values are:

AP_ORDERLY_STOP
CS Linux will perform cleanup operations before stopping the DLC.

AP_IMMEDIATE_STOP
CS Linux will stop the DLC immediately.

dlc_name
Name of DLC to be stopped. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes, which must already have been defined by a DEFINE_DLC verb.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_DLC
The *dlc_name* parameter did not match the name of a defined DLC.

AP_UNRECOGNIZED_DEACT_TYPE
The *stop_type* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_STOP_DLC_PENDING
The specified DLC is already in the process of being stopped.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Cancelled

If the verb does not execute because it has been cancelled, CS Linux returns the following parameters:

primary_rc

AP_CANCELLED
The *stop_type* parameter specified an orderly stop, but the DLC was then stopped by a second command specifying an immediate stop or by a failure condition.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

STOP_INTERNAL_PU

STOP_INTERNAL_PU requests DLUR to initiate SSCP-PU session deactivation for a previously defined local PU which is served by DLUR.

This verb must be issued to a running node.

VCB Structure

```
typedef struct stop_internal_pu
{
   AP_UINT16        opcode;                 /* verb operation code      */
   unsigned char    reserv2;                /* reserved                 */
   unsigned char    format;                 /* reserved                 */
   AP_UINT16        primary_rc;             /* primary return code      */
   AP_UINT32        secondary_rc;           /* secondary return code    */
   unsigned char    pu_name[8];             /* internal PU name         */
   unsigned char    stop_type;              /* type of stop requested   */
} STOP_INTERNAL_PU;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_STOP_INTERNAL_PU

pu_name
Name of the internal PU for which the SSCP-PU session will be deactivated. This is an 8-byte type-A EBCDIC string (starting with a letter), padded to the right with EBCDIC spaces.

stop_type
Specifies how to stop the PU. Possible values are:

AP_ORDERLY_STOP
Deactivate all underlying PLU-SLU and SSCP-LU sessions before deactivating the SSCP-PU session.

AP_IMMEDIATE_STOP
Deactivate the SSCP-PU session immediately.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_STOP_TYPE
The *stop_type* parameter was not set to a valid value.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
Possible values are:

AP_PU_NOT_DEFINED
The supplied PU name did not match the name of a defined internal PU.

AP_PU_ALREADY_DEACTIVATING
The PU is already in the process of being stopped.

AP_PU_NOT_ACTIVE
The PU is not active.

Returned Parameters: Function Not Supported

If the verb does not execute because the node's configuration does not support it, CS Linux returns the following parameter:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The node does not support DLUR; this is defined by the *dlur_supported* parameter on DEFINE_NODE.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

STOP_LS

STOP_LS stops an active LS. Alternatively, it can be issued for an inactive LS, to specify that the LS cannot be activated automatically by CS Linux when required or activated by the remote system; if both of these are disabled, the LS can be activated only by issuing START_LS.

This verb must be issued to a running node.

VCB Structure

```
typedef struct stop_ls
{
   AP_UINT16        opcode;            /* verb operation code                */
   unsigned char    reserv2;           /* reserved                           */
   unsigned char    format;            /* reserved                           */
   AP_UINT16        primary_rc;        /* primary return code                */
   AP_UINT32        secondary_rc;      /* secondary return code              */
   unsigned char    stop_type;         /* stop type                          */
   unsigned char    ls_name[8];        /* name of link station               */
   unsigned char    disable;           /* disable remote or auto activation? */
   unsigned char    reserved[3];       /* reserved                           */
} STOP_LS;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_STOP_LS

stop_type
Type of stop processing required. Possible values are:

AP_ORDERLY_STOP
CS Linux will perform cleanup operations before stopping the LS.

AP_IMMEDIATE_STOP
CS Linux will stop the LS immediately.

ls_name
Name of LS to be stopped. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes, which must already have been defined by a DEFINE_LS verb.

disable Specifies the action to be taken for the LS.

To stop an active LS and return to the default settings for auto-activation and remote activation, set this parameter to AP_NO.

To specify that an inactive LS cannot be activated by CS Linux, or cannot be activated by the remote system, specify one or both of the following values (combined using a logical OR):

AP_AUTO_ACT
The LS cannot be activated automatically by CS Linux.

AP_REMOTE_ACT
The LS cannot be activated by the remote system. This value does not alter the defined value of *disable_remote_act* in the LS definition; when the LS is next started and stopped, it will return to the defined setting.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_LINK_NOT_DEFD
The *ls_name* parameter did not match the name of a defined LS.

AP_UNRECOGNIZED_DEACT_TYPE
The *stop_type* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_LINK_DEACT_IN_PROGRESS
The specified LS is already in the process of being deactivated.

Appendix B, “Common Return Codes,” on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Cancelled

If the verb does not execute because it was cancelled, CS Linux returns the following parameters.

primary_rc

AP_CANCELLED
The *stop_type* parameter specified an orderly stop, but the LS was then stopped by a second verb specifying an immediate stop or by a failure condition.

Returned Parameters: Other Conditions

Appendix B, “Common Return Codes,” on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

STOP_PORT

STOP_PORT allows the application to stop a port. This also stops any active LSs that are using the port.

This verb must be issued to a running node.

VCB Structure

```
typedef struct stop_port
{
   AP_UINT16        opcode;                 /* verb operation code      */
   unsigned char    reserv2;                /* reserved                 */
   unsigned char    format;                 /* reserved                 */
   AP_UINT16        primary_rc;             /* primary return code      */
   AP_UINT32        secondary_rc;           /* secondary return code    */
   unsigned char    stop_type;              /* Stop Type                */
   unsigned char    port_name[8];           /* name of port             */
} STOP_PORT;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_STOP_PORT

stop_type
Type of stop processing required. Possible values are:

AP_ORDERLY_STOP
CS Linux will perform cleanup operations before stopping the port.

AP_IMMEDIATE_STOP
CS Linux will stop the port immediately.

port_name
Name of port to be stopped. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
Possible values are:

AP_INVALID_PORT_NAME
The *port_name* parameter did not match the name of a defined port.

AP_UNRECOGNIZED_DEACT_TYPE
The *stop_type* parameter was not set to a valid value.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: State Check

If the verb does not execute because of a state error, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc

AP_STOP_PORT_PENDING
The specified port is already in the process of being deactivated.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_STATE_CHECK, which are common to all NOF verbs.

Returned Parameters: Cancelled

If the verb does not execute because it has been cancelled, CS Linux returns the following parameters:

primary_rc

AP_CANCELLED
The *stop_type* parameter specified an orderly stop, but the port was then stopped by a second verb specifying an immediate stop or by a failure condition.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

TERM_NODE

TERM_NODE allows the application to stop the node with a specified urgency. This also stops all connectivity resources associated with the node.

This verb must be issued to a running node.

VCB Structure

```
typedef struct term_node
{
   AP_UINT16        opcode;                  /* verb operation code      */
   unsigned char    reserv2;                 /* reserved                 */
   unsigned char    format;                  /* reserved                 */
   AP_UINT16        primary_rc;              /* primary return code      */
   AP_UINT32        secondary_rc;            /* secondary return code    */
   unsigned char    stop_type;               /* stop type                */
} TERM_NODE;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_TERM_NODE

stop_type

Specifies how CS Linux should stop the node. Possible values are:

AP_ABORT

Stop immediately without attempting any cleanup processing. This value should be used only in serious error conditions, because it may cause problems for other programs using the node's resources.

AP_SHUTDOWN

Deactivate all LSs associated with the node before stopping.

AP_QUIESCE

Indicate to the network that the node is quiesced, reset session limits on all modes, unbind all endpoint sessions for the node's LUs, and then stop as for AP_SHUTDOWN.

AP_QUIESCE_ISR

Same functions as AP_QUIESCE, except that the node waits for all intermediate sessions to end. This value applies only to network nodes.

AP_DEACT_CLEAN

Same functions as AP_QUIESCE, except that session limits are not reset and RTP connections are allowed to terminate gracefully before the LSs are deactivated.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc

AP_OK

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

UNREGISTER_INDICATION_SINK

UNREGISTER_INDICATION_SINK unregisters the NOF application so that it no longer receives indications of a particular type (previously specified using REGISTER_INDICATION_SINK).

If the application has registered more than once to accept multiple indication types, it must unregister separately for each indication that it no longer wants to receive.

This verb must always be issued using the asynchronous NOF API entry point, including the callback routine that was supplied on the REGISTER_INDICATION_SINK verb (for more information about the asynchronous NOF API entry point, see "Asynchronous Entry Point: nof_async" on page 25).

This verb may be issued to the domain configuration file, to a running node or to a server where the node is not running, or to the **sna.net** file, depending on the type of indication for which the application is unregistering.

VCB Structure

```
typedef struct unregister_indication_sink
{
   AP_UINT16        opcode;             /* verb operation code              */
   unsigned char    reserv2;            /* reserved                         */
   unsigned char    format;             /* reserved                         */
   AP_UINT16        primary_rc;         /* primary return code              */
   AP_UINT32        secondary_rc;       /* secondary return code            */
   AP_UINT32        proc_id;            /* reserved                         */
   AP_UINT16        queue_id;           /* reserved                         */
   AP_UINT16        indication_opcode;  /* opcode of indication to be unsunk */
} UNREGISTER_INDICATION_SINK;
```

Supplied Parameters

The application supplies the following parameters:

opcode AP_UNREGISTER_INDICATION_SINK

indication_opcode
The *opcode* parameter of the indication that is no longer required.

Returned Parameters: Successful Execution

If the verb executes successfully, CS Linux returns the following parameters:

primary_rc
AP_OK

Returned Parameters: Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc

AP_INVALID_OP_CODE
The *indication_opcode* parameter did not match the *opcode* of any of

the CS Linux NOF indications, or the application has not previously registered to receive the specified indication on this target handle.

Appendix B, "Common Return Codes," on page 743 lists further secondary return codes associated with AP_PARAMETER_CHECK, which are common to all NOF verbs.

Returned Parameters: Function Not Supported

If the verb does not execute successfully because the local node does not support the function associated with the specified indication, CS Linux returns the following parameters:

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The local node does not support the specified indication. For details of the support required for each indication, see the description of each indication in Chapter 4, "NOF Indications," on page 675.

Returned Parameters: Other Conditions

Appendix B, "Common Return Codes," on page 743 lists further combinations of primary and secondary return codes that are common to all NOF verbs.

Chapter 4. NOF Indications

This chapter provides the following information for each NOF indication:

- Description of the indication's purpose and usage
- Verb control block (VCB) structure, as defined in the NOF API header file **/usr/include/sna/nof_c.h** (AIX) or **/opt/ibm/sna/include/nof_c.h** (Linux)
- Explanations of the parameters returned to the application in the VCB

For information about how the application registers to receive NOF indications, see "REGISTER_INDICATION_SINK" on page 625.

CONFIG_INDICATION

This indication is generated when another NOF application or a CS Linux administration tool makes a change to the target configuration, when the target node is stopped or started, or when a DLC, port, or LS owned by the target node is stopped or started. The target can be the domain configuration file, a running node, or an inactive node on a server where the CS Linux software is running. The target is identified by the *target_handle* parameter on the REGISTER_INDICATION_SINK verb that registers to receive this indication.

VCB Structure

No specific VCB structure is associated with this indication. To register for configuration indications, the application specifies the value `AP_CONFIG_INDICATION` as the *indication_opcode* parameter on REGISTER_INDICATION_SINK. When a change is made, CS Linux then reports this to the application's callback routine by sending a copy of the VCB from the NOF verb that made the change. For example, if the configuration was modified by a DEFINE_DLC verb, CS Linux sends a copy of the DEFINE_DLC VCB to the application's callback routine.

To enable the application to distinguish between configuration indications and asynchronous responses to its own NOF verbs, CS Linux changes the *primary_rc* parameter in the VCB for a configuration indication. The value `AP_INDICATION` identifies a VCB associated with a configuration indication; the value `AP_OK`, or any other value, indicates an asynchronous response to one of the application's own NOF verbs.

The following events are not reported as configuration indications:

- Changes to the SNA network file **sna.net**. To receive indications of these changes, the application must register for the indication type `AP_SNA_NET_INDICATION`. For more information, see "SNA_NET_INDICATION" on page 730.
- Starting and stopping the SNA software on other servers. To receive indications of these changes, the application must register for the indication type `AP_SERVER_INDICATION`. For more information, see "SERVER_INDICATION" on page 725.

The range of VCBs that can be returned as configuration indications depends on the type of target handle specified on REGISTER_INDICATION_SINK:

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Domain configuration file
The application can receive VCBs for any verbs that modify domain resources but not node resources (verbs that can be issued to the domain configuration file).

Node configuration file
The application can receive VCBs for any verbs that modify node resources.

Running node
The application can receive VCBs for any verbs that modify node resources, TERM_NODE VCBs, and START_* and STOP_* VCBs for DLCs, ports, and LSs.

Inactive node
The application can receive VCBs for any verbs that modify node resources and also INIT_NODE VCBs.

DIRECTORY_INDICATION

This indication is generated when an entry is added to or removed from the local directory database.

VCB Structure

```
typedef struct directory_indication
{
   AP_UINT16        opcode;              /* verb operation code              */
   unsigned char    reserv2;             /* reserved                         */
   unsigned char    format;              /* reserved                         */
   AP_UINT16        primary_rc;          /* primary return code              */
   AP_UINT32        secondary_rc;        /* secondary return code            */
   unsigned char    data_lost;           /* previous indication lost         */
   unsigned char    removed;             /* is entry being removed?          */
   unsigned char    resource_name[17];   /* resource name                    */
   unsigned char    invalid;             /* invalid entry being removed?     */
   AP_UINT16        resource_type;       /* resource type                    */
   unsigned char    parent_name[17];     /* parent resource name             */
   unsigned char    entry_type;          /* type of the directory entry      */
   AP_UINT16        parent_type;         /* parent resource type             */
   unsigned char    description[32];     /* resource description             */
   unsigned char    reserv3[16];         /* reserved                         */
   AP_UINT16        real_owning_cp_type;     /* CP type of real owner        */
   unsigned char    real_owning_cp_name[17]; /* CP name of real owner        */
   AP_UINT16        supplier_cp_type;        /* CP type of supplier          */
   unsigned char    supplier_cp_name[17];    /* CP name of supplier          */
   unsigned char    reserva;                 /* reserved                     */
} DIRECTORY_INDICATION;
```

Parameters

opcode AP_DIRECTORY_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous directory indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous directory indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous directory indications were lost.

removed

Specifies whether the indicated resource has been removed from the directory or added to it. Possible values are:

AP_YES The entry has been removed.

AP_NO The entry has been added.

resource_name

Fully qualified name of the resource. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

invalid When an end node registers its resources with a network node, new directory entries are added to the network node's directory database for these resources. If the database already contains an explicitly defined entry for one of these resources, but the entry does not match the registered resource, CS Linux removes the entry that is not valid and replaces it with the correct entry. This parameter is used to indicate whether the entry has been removed because it was not valid and has been replaced by the correct entry from the registered resource or because it was explicitly deleted. Possible values are:

AP_YES The entry has been removed because it was incorrect.

AP_NO The entry has been removed because it was explicitly deleted.

If the local node is not a network node, or if *removed* is set to AP_NO, this parameter is not used.

resource_type

Resource type. Possible values are:

AP_NNCP_RESOURCE
Network node.

AP_ENCP_RESOURCE
End node.

AP_LU_RESOURCE
LU.

parent_name

Fully qualified name of parent resource. If *resource_type* is AP_NNCP_RESOURCE, this is set to 17 binary zeros.

The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

entry_type

Specifies the type of the directory entry. This is one of the following:

AP_HOME
Local resource.

AP_CACHE
Cached entry.

AP_REGISTER
Registered resource (NN only)

parent_type
Specifies the parent type of the resource being registered. If *resource_type* is AP_NNCP_RESOURCE, this parameter is not used. Possible values are:

AP_NNCP_RESOURCE
Network node.

AP_ENCP_RESOURCE
End node.

description
A null-terminated text string describing the resource, as specified in the definition of the resource.

real_owning_cp_type
This parameter applies only if the local node is a Network Node or a Branch Network Node; it is reserved otherwise.

Specifies whether the real CP that owns the resource identified by this directory entry is the parent resource or another node. This is one of the following:

AP_NONE
The real owner is the parent resource.

AP_ENCP_RESOURCE
The real owner is an end node that is not the parent resource. For example, if the resource is owned by an End Node in the domain of a Branch Network Node (BrNN), the directory of this BrNN's Network Node Server includes the BrNN as the parent resource, but the real owning CP is the End Node.

real_owning_cp_name
This parameter applies only if the local node is a Network Node or a Branch Network Node; it is reserved otherwise.

If the *real_owning_cp_type* parameter indicates that the real owner of the resource is not the parent, this parameter specifies the fully qualified name of the CP that owns the resource; otherwise it is reserved.

The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

supplier_cp_type
This parameter applies only if the local node is a Network Node or a Branch Network Node; it is reserved otherwise.

Specifies whether this directory entry was registered by another node that is not the owning CP of the resource. This is one of the following:

AP_NONE
The directory entry was not registered, or was registered by its owning CP.

AP_ENCP_RESOURCE
The directory entry was registered by a node that is not its owning CP. For example, if the resource is owned by an End Node in the domain of a Branch Network Node (BrNN) that is itself in the

domain of the local node, the BrNN is the supplier because it registers the resource with the local node, but the real owning CP is the End Node.

supplier_cp_name
This parameter applies only if the local node is a Network Node or a Branch Network Node; it is reserved otherwise.

If the *supplier_cp_type* parameter indicates that the directory entry was registered by a node that is not the owning resource, this parameter specifies the fully qualified name of the CP that supplied the registration; otherwise it is reserved.

The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and a network name of 1–8 A-string characters.

DLC_INDICATION

This indication is generated when a DLC changes state between active and inactive.

VCB Structure

```
typedef struct dlc_indication
{
   AP_UINT16        opcode;             /* verb operation code             */
   unsigned char    reserv2;            /* reserved                        */
   unsigned char    format;             /* reserved                        */
   AP_UINT16        primary_rc;         /* primary return code             */
   AP_UINT32        secondary_rc;       /* secondary return code           */
   unsigned char    data_lost;          /* previous indication lost        */
   unsigned char    deactivated;        /* has session been deactivated?   */
   unsigned char    dlc_name[8];        /* link station name               */
   unsigned char    description[32];    /* resource description            */
   unsigned char    reserv1[16];        /* reserved                        */
   unsigned char    reserva[20];        /* reserved                        */
} DLC_INDICATION;
```

Parameters

opcode AP_DLC_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous DLC indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous DLC indications were lost.

deactivated
Specifies whether the DLC has become inactive or become active. Possible values are:

AP_YES The DLC has become inactive.

AP_NO The DLC has become active.

dlc_name
Name of DLC. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

description
A null-terminated text string describing the DLC, as specified in the definition of the DLC.

DLUR_LU_INDICATION

This indication is generated when a DLUR LU is activated or deactivated. This indication can be used by a registered application to maintain a list of currently active DLUR LUs.

VCB Structure

```
typedef struct dlur_lu_indication
{
   AP_UINT16        opcode;             /* Indication operation code        */
   unsigned char    reserv2;            /* reserved                         */
   unsigned char    format;             /* reserved                         */
   AP_UINT16        primary_rc;         /* primary return code              */
   AP_UINT32        secondary_rc;       /* secondary return code            */
   unsigned char    data_lost;          /* Previous indication lost?        */
   unsigned char    reason;             /* reason for this indication       */
   unsigned char    lu_name[8];         /* LU name                          */
   unsigned char    pu_name[8];         /* PU name                          */
   unsigned char    nau_address;        /* NAU address                      */
   unsigned char    reserv5[7];         /* reserved                         */
} DLUR_LU_INDICATION;
```

Parameters

opcode AP_DLUR_LU_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous directory indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous directory indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous directory indications were lost.

reason Reason for this indication. Possible values are:

AP_ADDED
The DLUR has just been activated by the DLUS.

AP_REMOVED
The DLUR has been deactivated, either explicitly by the DLUS or implicitly by a link failure or the deactivation of the PU.

lu_name
Name of the logical unit (LU). This is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

pu_name
Name of the physical unit (PU) that this LU uses. This is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

nau_address
Network accessible unit (NAU) address of the LU. This value must be in the range 1–255.

DLUR_PU_INDICATION

This indication is generated when a physical unit (PU) for the node that supports the dependent LU requester (DLUR) function is attempting to activate, fails to activate, activates, or is deactivated. This indication can be used to maintain a list of currently active DLUR PUs.

VCB Structure

```
typedef struct dlur_pu_indication
{
   AP_UINT16        opcode;              /* Indication operation code        */
   unsigned char    reserv2;             /* reserved                         */
   unsigned char    format;              /* reserved                         */
   AP_UINT16        primary_rc;          /* primary return code              */
   AP_UINT32        secondary_rc;        /* secondary return code            */
   unsigned char    data_lost;           /* Previous indication lost?        */
   unsigned char    reason;              /* reason for this indication       */
   unsigned char    pu_name[8];          /* PU name                          */
   unsigned char    pu_id[4];            /* PU identifier                    */
   unsigned char    pu_location;         /* downstream or local PU           */
   unsigned char    pu_status;           /* status of the PU                 */
   unsigned char    dlus_name[17];       /* current DLUS name                */
   unsigned char    dlus_session_status; /* status of the DLUS pipe          */
   unsigned char    reserv5[2];          /* reserved                         */
} DLUR_PU_INDICATION;
```

Parameters

opcode AP_DLUR_PU_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous directory indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous directory indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous directory indications were lost.

reason Cause of the indication. Possible values are:

Possible values are:

AP_ACTIVATION_STARTED
The PU is activating.

AP_ACTIVATING
The PU has become active.

AP_DEACTIVATING
The PU has become inactive.

AP_FAILED
The PU has failed.

AP_ACTIVATION_FAILED
The PU has failed to activate.

pu_name
Name of the physical unit (PU). This is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

pu_id PU identifier defined in a DEFINE_INTERNAL_PU verb or obtained in an XID from a downstream PU. This value is a 4-byte hexadecimal string. Bits 0–11 are set to the Block number and bits 12–31 are set to the ID number that uniquely identifies the PU.

pu_location
Location of the PU. Possible values are:

AP_INTERNAL
The PU has been defined by a DEFINE_INTERNAL_PU verb.

AP_DOWNSTREAM
The PU is located at a downstream computer.

pu_status
Status of the PU, as seen by the DLUR. Possible values are:

AP_RESET_NO_RETRY
The PU is in reset state and will not be retried.

AP_RESET_RETRY
The PU is in reset state and will be retried.

AP_PEND_ACTPU
The PU is waiting for an ACTPU from the host.

AP_PEND_ACTPU_RSP
Having forwarded an ACTPU to the PU, DLUR is now waiting for the PU to respond to it.

AP_ACTIVE
The PU is active.

AP_PEND_DACTPU_RSP
Having forwarded a DACTPU to the PU, DLUR is now waiting for the PU to respond to it.

AP_PEND_INOP
DLUR is waiting for all necessary events to complete before it deactivates the PU.

dlus_name
Name of the dependent LU server (DLUS) node that the PU is currently using (or attempting to use). The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8

A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters. If the *reason* parameter is set to AP_FAILED, the *dlus_name* parameter is set to all zeros.

dlus_session_status
Status of the DLUS pipe currently being used by the PU. Possible values are:

AP_PENDING_ACTIVE
The DLUS pipe is currently being activated.

AP_ACTIVE
The DLUS pipe is active.

AP_PENDING_INACTIVE
The DLUS pipe is currently being deactivated.

AP_INACTIVE
The DLUS pipe is inactive.

DLUS_INDICATION

This indication is generated when a pipe to a DLUS node changes state between active and inactive. When the pipe becomes inactive, the indication also includes pipe statistics.

VCB Structure

```
typedef struct dlus_indication
{
   AP_UINT16        opcode;                 /* verb operation code          */
   unsigned char    reserv2;                /* reserved                     */
   unsigned char    format;                 /* reserved                     */
   AP_UINT16        primary_rc;             /* primary return code          */
   AP_UINT32        secondary_rc;           /* secondary return code        */
   unsigned char    data_lost;              /* previous indication lost     */
   unsigned char    deactivated;            /* has DLUS become inactive?    */
   unsigned char    dlus_name[17];          /* DLUS name                    */
   unsigned char    reserv1;                /* reserved                     */
   PIPE_STATS       pipe_stats;             /* pipe statistics              */
   unsigned char    persistent_pipe_support; /* reserved                    */
   unsigned char    persistent_pipe;        /* reserved                     */
   unsigned char    reserva[18];            /* reserved                     */
} DLUS_INDICATION;

typedef struct pipe_stats
{
   AP_UINT32       reqactpu_sent;           /* REQACTPUs sent to DLUS       */
   AP_UINT32       reqactpu_rsp_received;   /* RSP(REQACTPU)s received      */
                                            /*  from DLUS                   */
   AP_UINT32       actpu_received;          /* ACTPUs received from DLUS    */
   AP_UINT32       actpu_rsp_sent;          /* RSP(ACTPU)s sent to DLUS     */
   AP_UINT32       reqactpu_sent;           /* REQDACTPUs sent to DLUS      */
   AP_UINT32       reqdactpu_rsp_received;  /* RSP(REQDACTPU)s received     */
                                            /*  from DLUS                   */
   AP_UINT32       dactpu_received;         /* DACTPUs received from DLUS   */
   AP_UINT32       dactpu_rsp_sent;         /* RSP(DACTPU)s sent to DLUS    */
   AP_UINT32       actlu_received;          /* ACTLUs received from DLUS    */
   AP_UINT32       actlu_rsp_sent;          /* RSP(ACTLU)s sent to DLUS     */
   AP_UINT32       dactlu_received;         /* DACTLUs received from DLUS   */
   AP_UINT32       dactlu_rsp_sent;         /* RSP(DACTLU)s sent to DLUS    */
   AP_UINT32       sscp_pu_mus_rcvd;        /* MUs for SSCP-PU sessions rcvd */
   AP_UINT32       sscp_pu_mus_sent;        /* MUs for SSCP-PU sessions sent */
   AP_UINT32       sscp_lu_mus_rcvd;        /* MUs for SSCP-LU sessions rcvd */
   AP_UINT32       sscp_lu_mus_sent;        /* MUs for SSCP-LU sessions sent */
} PIPE_STATS;
```

Parameters

opcode AP_DLUS_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous DLUS indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous downstream LU indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous downstream LU indications were lost.

deactivated
Specifies whether the pipe has become inactive or become active. Possible values are:

AP_YES The pipe has become inactive.

AP_NO The pipe has become active.

dlus_name
Name of the DLUS node. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

If the pipe was deactivated, a pipe_stats structure is included. The fields in this structure are as follows:

pipe_stats.reqactpu_sent
Number of REQACTPUs sent to DLUS over the pipe.

pipe_stats.reqactpu_rsp_received
Number of RSP(REQACTPU)s received from DLUS over the pipe.

pipe_stats.actpu_received
Number of ACTPUs received from DLUS over the pipe.

pipe_stats.actpu_rsp_sent
Number of RSP(ACTPU)s sent to DLUS over the pipe.

pipe_stats.reqdactpu_sent
Number of REQDACTPUs sent to DLUS over the pipe.

pipe_stats.reqdactpu_rsp_received
Number of RSP(REQDACTPU)s received from DLUS over the pipe.

pipe_stats.dactpu_received
Number of DACTPUs received from DLUS over the pipe.

pipe_stats.dactpu_rsp_sent
Number of RSP(DACTPU)s sent to DLUS over the pipe.

pipe_stats.actlu_received
Number of ACTLUs received from DLUS over the pipe.

pipe_stats.actlu_rsp_sent
Number of RSP(ACTLU)s sent to DLUS over the pipe.

pipe_stats.dactlu_received
Number of DACTLUs received from DLUS over the pipe.

pipe_stats.dactlu_rsp_sent
Number of RSP(DACTLU)s sent to DLUS over the pipe.

pipe_stats.sscp_pu_mus_rcvd
Number of SSCP-PU MUs received from DLUS over the pipe.

pipe_stats.sscp_pu_mus_sent
Number of SSCP-PU MUs sent to DLUS over the pipe.

pipe_stats.sscp_lu_mus_rcvd
Number of SSCP-LU MUs received from DLUS over the pipe.

pipe_stats.sscp_lu_mus_sent
Number of SSCP-LU MUs sent to DLUS over the pipe.

DOWNSTREAM_LU_INDICATION

This indication is generated when either the LU-SSCP session or the PLU-SLU session between the downstream LU and the host changes state between active and inactive. When one of these sessions becomes inactive, the indication also includes session statistics for that session.

VCB Structure

```
typedef struct downstream_lu_indication
{
   AP_UINT16       opcode;               /* verb operation code             */
   unsigned char   reserv2;              /* reserved                        */
   unsigned char   format;               /* reserved                        */
   AP_UINT16       primary_rc;           /* primary return code             */
   AP_UINT32       secondary_rc;         /* secondary return code           */
   unsigned char   data_lost;            /* previous indication lost        */
   unsigned char   dspu_name[8];         /* PU name                         */
   unsigned char   ls_name[8];           /* Link station name               */
   unsigned char   dslu_name[8];         /* LU name                         */
   unsigned char   description[32];      /* resource description            */
   unsigned char   reserv3[16];          /* reserved                        */
   unsigned char   nau_address;          /* NAU address                     */
   unsigned char   lu_sscp_sess_active;  /* Is LU-SSCP session active       */
   unsigned char   plu_sess_active;      /* Is PLU-SLU session active       */
   unsigned char   dspu_services;        /* DSPU services                   */
   unsigned char   reserv1;              /* reserved                        */
   SESSION_STATS   lu_sscp_stats;        /* LU-SSCP session statistics      */
   SESSION_STATS   ds_plu_stats;         /* Downstream PLU-SLU session stats */
   SESSION_STATS   us_plu_stats;         /* Upstream PLU-SLU session stats  */
} DOWNSTREAM_LU_INDICATION;

typedef struct session_stats
{
  AP_UINT16       rcv_ru_size;          /* session receive RU size         */
  AP_UINT16       send_ru_size;         /* session send RU size            */
  AP_UINT16       max_send_btu_size;    /* maximum send BTU size           */
  AP_UINT16       max_rcv_btu_size;     /* maximum rcv BTU size            */
  AP_UINT16       max_send_pac_win;     /* maximum send pacing window size */
  AP_UINT16       cur_send_pac_win;     /* current send pacing window size */
  AP_UINT16       max_rcv_pac_win;      /* maximum receive pacing window size*/
  AP_UINT16       cur_rcv_pac_win;      /* current receive pacing window size*/
  AP_UINT32       send_data_frames;     /* number of data frames sent      */
  AP_UINT32       send_fmd_data_frames; /* num fmd data frames sent        */
  AP_UINT32       send_data_bytes;      /* number of data bytes sent       */
  AP_UINT32       rcv_data_frames;      /* number of data frames received  */
  AP_UINT32       rcv_fmd_data_frames;  /* num fmd data frames received    */
  AP_UINT32       rcv_data_bytes;       /* number of data bytes received   */
```

```
  unsigned char   sidh;                /* session ID high byte (from LFSID) */
  unsigned char   sidl;                /* session ID low byte (from LFSID)  */
  unsigned char   odai;                /* ODAI bit set                      */
  unsigned char   ls_name[8];          /* Link station name                 */
  unsigned char   reserve;             /* reserved                          */
} SESSION_STATS;
```

Parameters

opcode AP_DOWNSTREAM_LU_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous downstream LU indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous downstream LU indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous downstream LU indications were lost.

dspu_name
Name of the downstream PU associated with the downstream LU. This is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

ls_name
Name of the link station associated with the downstream LU. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters.

dslu_name
Name of the downstream LU. This is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

description
A null-terminated text string describing the downstream LU, as specified in the definition of the LU.

nau_address
Network accessible unit address of the LU.

lu_sscp_sess_active
Specifies whether the LU-SSCP session is active. Possible values are:

AP_YES The session is active.

AP_NO The session is not active.

plu_sess_active
Specifies whether the PLU-SLU session is active. Possible values are:

AP_YES The session is active.

AP_NO The session is not active.

dspu_services
Specifies the services provided by the local node to the downstream LU.

Possible values are:

AP_PU_CONCENTRATION
Downstream LU is served by SNA gateway.

AP_DLUR
Downstream LU is served by DLUR.

If the LU-SSCP session was deactivated, a `session_stats` structure is included for this session; if the PLU-SLU session was deactivated, `session_stats` structures are included for the downstream and upstream PLU-SLU sessions. The fields in this structure are as follows:

rcv_ru_size
Maximum receive RU size. (In the LU-SSCP session statistics, this parameter is reserved.)

send_ru_size
Maximum send RU size. (In the LU-SSCP session statistics, this parameter is reserved.)

max_send_btu_size
Maximum BTU size that can be sent.

max_rcv_btu_size
Maximum BTU size that can be received.

max_send_pac_win
Maximum size of the send pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

cur_send_pac_win
Current size of the send pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

max_rcv_pac_win
Maximum size of the receive pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

cur_rcv_pac_win
Current size of the receive pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

send_data_frames
Number of normal flow data frames sent.

send_fmd_data_frames
Number of normal flow FMD data frames sent.

send_data_bytes
Number of normal flow data bytes sent.

rcv_data_frames
Number of normal flow data frames received.

rcv_fmd_data_frames
Number of normal flow FMD data frames received.

rcv_data_bytes
Number of normal flow data bytes received.

sidh Session ID high byte. (In the upstream PLU-SLU session statistics, this parameter is reserved.)

sidl Session ID low byte. (In the upstream PLU-SLU session statistics, this parameter is reserved.)

odai Origin Destination Assignor Indicator. When bringing up a session, the sender of the BIND sets this field to zero if the local node contains the primary link station, and sets it to one if the BIND sender is the node containing the secondary link station. (In the upstream PLU-SLU session statistics, this parameter is reserved.)

ls_name
Link station name associated with statistics. This is an 8-byte ASCII character string, right-padded with spaces if the name is shorter than 8 characters. (In the upstream PLU-SLU session statistics, this parameter is reserved if *dspu_services* is set to AP_PU_CONCENTRATION.)

DOWNSTREAM_PU_INDICATION

This indication is generated when the PU-SSCP session between the downstream PU and the host changes state between active and inactive. When the session becomes inactive, the indication also includes PU-SSCP session statistics.

VCB Structure

```
typedef struct downstream_pu_indication
{
 AP_UINT16         opcode;                /* verb operation code          */
 unsigned char     reserv2;               /* reserved                     */
 unsigned char     format;                /* reserved                     */
 AP_UINT16         primary_rc;            /* primary return code          */
 AP_UINT32         secondary_rc;          /* secondary return code        */
 unsigned char     data_lost;             /* previous indication lost     */
 unsigned char     dspu_name[8];          /* PU name                      */
 unsigned char     description[32];       /* resource description         */
 unsigned char     reserv3[16];           /* reserved                     */
 unsigned char     ls_name[8];            /* Link station name            */
 unsigned char     pu_sscp_sess_active;   /* Is PU-SSCP session active    */
 unsigned char     dspu_services;         /* DSPU services                */
 unsigned char     reserv1[2];            /* reserved                     */
 SESSION_STATS     pu_sscp_stats;         /* PU-SSCP session statistics   */
} DOWNSTREAM_PU_INDICATION;

typedef struct session_stats
{
 AP_UINT16        rcv_ru_size;          /* session receive RU size          */
 AP_UINT16        send_ru_size;         /* session send RU size             */
 AP_UINT16        max_send_btu_size;    /* maximum send BTU size            */
 AP_UINT16        max_rcv_btu_size;     /* maximum rcv BTU size             */
 AP_UINT16        max_send_pac_win;     /* maximum send pacing window size  */
 AP_UINT16        cur_send_pac_win;     /* current send pacing window size  */
 AP_UINT16        max_rcv_pac_win;      /* maximum receive pacing window size*/
 AP_UINT16        cur_rcv_pac_win;      /* current receive pacing window size*/
 AP_UINT32        send_data_frames;     /* number of data frames sent       */
 AP_UINT32        send_fmd_data_frames; /* num fmd data frames sent         */
 AP_UINT32        send_data_bytes;      /* number of data bytes sent        */
 AP_UINT32        rcv_data_frames;      /* number of data frames received   */
 AP_UINT32        rcv_fmd_data_frames;  /* num fmd data frames received     */
 AP_UINT32        rcv_data_bytes;       /* number of data bytes received    */
 unsigned char    sidh;                 /* session ID high byte (from LFSID) */
 unsigned char    sidl;                 /* session ID low byte (from LFSID)  */
 unsigned char    odai;                 /* ODAI bit set                     */
 unsigned char    ls_name[8];           /* Link station name                */
 unsigned char    reserve;              /* reserved                         */
} SESSION_STATS;
```

Parameters

opcode AP_DOWNSTREAM_PU_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous downstream PU indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous downstream PU indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous downstream PU indications were lost.

dspu_name
Name of downstream PU. The name is an 8-byte EBCDIC type-A string, padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

description
A null-terminated text string describing the downstream PU, as specified in the definition of the LS associated with the PU.

ls_name
Name of the link station associated with the downstream PU. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 characters.

pu_sscp_sess_active
Specifies whether the PU-SSCP session to the downstream PU is active. Possible values are:

AP_YES The session is active.

AP_NO The session is not active.

dspu_services
Specifies the services provided by the local node to the downstream PU.

Possible values are:

AP_PU_CONCENTRATION
Downstream LU is served by SNA gateway.

AP_DLUR
Downstream LU is served by DLUR.

pu_sscp_stats.rcv_ru_size
Reserved (always set to zero).

pu_sscp_stats.send_ru_size
Reserved (always set to zero).

pu_sscp_stats.max_send_btu_size
Maximum BTU size that can be sent.

pu_sscp_stats.max_rcv_btu_size
Maximum BTU size that can be received.

pu_sscp_stats.max_send_pac_win
Reserved (always set to zero).

pu_sscp_stats.cur_send_pac_win
Reserved (always set to zero).

pu_sscp_stats.max_rcv_pac_win
Reserved (always set to zero).

pu_sscp_stats.cur_rcv_pac_win
Reserved (always set to zero).

pu_sscp_stats.send_data_frames
Number of normal flow data frames sent.

pu_sscp_stats.send_fmd_data_frames
Number of normal flow FMD data frames sent.

pu_sscp_stats.send_data_bytes
Number of normal flow data bytes sent.

pu_sscp_stats.rcv_data_frames
Number of normal flow data frames received.

pu_sscp_stats.rcv_fmd_data_frames
Number of normal flow FMD data frames received.

pu_sscp_stats.rcv_data_bytes
Number of normal flow data bytes received.

pu_sscp_stats.sidh
Session ID high byte.

pu_sscp_stats.sidl
Session ID low byte.

pu_sscp_stats.odai
Origin Destination Assignor Indicator. When bringing up a session, the sender of the BIND sets this field to zero if the local node contains the primary link station, and sets it to one if the BIND sender is the node containing the secondary link station.

pu_sscp_stats.ls_name
Link station name associated with statistics. This is an 8-byte ASCII character string, right-padded with spaces if the name is shorter than 8 characters.

FOCAL_POINT_INDICATION

This indication is generated whenever a focal point is acquired, changed or revoked.

VCB Structure

```
typedef struct focal_point_indication
{
  AP_UINT16        opcode;             /* verb operation code               */
  unsigned char    reserv2;            /* reserved                          */
  unsigned char    format;             /* reserved                          */
  AP_UINT16        primary_rc;         /* primary return code               */
  AP_UINT32        secondary_rc;       /* secondary return code             */
  unsigned char    data_lost;          /* previous indication lost          */
  unsigned char    ms_category[8];     /* Focal point category              */
  unsigned char    fp_fqcp_name[17];   /* Fully qualified focal point cp name*/
  unsigned char    ms_appl_name[8];    /* Focal point application name      */
  unsigned char    fp_type;            /* type of current focal point       */
  unsigned char    fp_status;          /* status of focal point             */
  unsigned char    fp_routing;         /* type of MDS routing to reach FP   */
  unsigned char    reserva[20];        /* reserved                          */
} FOCAL_POINT_INDICATION;
```

Parameters

opcode AP_FOCAL_POINT_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous focal point indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous focal point indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous focal point indications were lost.

ms_category
Management Services category for which the focal point has changed. This can be either one of the category names specified in the MS Discipline-Specific Application Programs table contained in the *SNA Management Services Reference*, padded on the right with spaces if the name is shorter than 8 bytes, or a user-defined category. User-defined category names should be an 8-byte type-1134 EBCDIC string, padded on the right with spaces if the name is shorter than 8 bytes.

fp_fqcp_name
Fully qualified name of the current focal point for the specified MS category. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters. If this parameter is set to 17 binary zeros, this indicates that there is no focal point currently defined for the specified MS category; the previous focal point has been deleted and not replaced.

ms_appl_name
Name of the current focal point application. This can be either one of the application names specified in the MS Discipline-Specific Application Programs table in *Systems Network Architecture: Management Services Reference SC30–3346*, padded on the right with spaces to 8 bytes, or a user-defined application name (see the Bibliography). User-defined names should be an 8-byte type-1134 EBCDIC string, padded on the right with spaces if the name is shorter than 8 bytes. If this parameter is set to 8 binary zeros, this indicates that there is no focal point currently defined for the specified MS category; the previous focal point has been deleted and not replaced.

fp_type Type of focal point. Refer to SNA Management Services for further detail. Possible values are:

AP_EXPLICIT_PRIMARY_FP

AP_IMPLICIT_PRIMARY_FP

AP_BACKUP_FP

AP_DEFAULT_PRIMARY_FP

AP_DOMAIN_FP

AP_HOST_FP

AP_NO_FP

fp_status
Status of the focal point. Possible values are:

AP_NOT_ACTIVE
The focal point has gone from active to inactive.

AP_ACTIVE
The focal point has gone from inactive or pending active to active.

fp_routing
Type of routing that applications should specify when sending data to the focal point. This parameter is used only if the focal point status is AP_ACTIVE. Possible values are:

AP_DEFAULT
Data should be sent using default routing.

AP_DIRECT
Data should be sent using direct routing.

ISR_INDICATION

This indication is generated when an intermediate session routing (ISR) session is activated or deactivated. When the session is deactivated, the returned data includes statistics on the session's usage.

VCB Structure

```
typedef struct isr_indication
{
  AP_UINT16       opcode;                /* verb operation code             */
  unsigned char   reserv2;               /* reserved                        */
  unsigned char   format;                /* reserved                        */
  AP_UINT16       primary_rc;            /* primary return code             */
  AP_UINT32       secondary_rc;          /* secondary return code           */
  unsigned char   data_lost;             /* previous indication lost        */
  unsigned char   deactivated;           /* has ISR session been            */
                                         /*  deactivated?                   */
  FQPCID          fqpcid;                /* FQPCID for ISR session          */
  unsigned char   fqplu_name[17];        /* fully-qualified primary LU name */
  unsigned char   fqslu_name[17];        /* fully-qualified secondary       */
                                         /*  LU name                        */
  unsigned char   mode_name[8];          /* mode name                       */
  unsigned char   cos_name[8];           /* COS name                        */
  unsigned char   transmission_priority; /* transmission priority           */
  AP_UINT32       sense_data;            /* sense data                      */
  unsigned char   reserv2a[2];           /* reserved                        */
  SESSION_STATS   pri_sess_stats;        /* Primary hop session statistics  */
  SESSION_STATS   sec_sess_stats;        /* Secondary hop session statistics*/
  unsigned char   reserva[20];           /* reserved                        */
} ISR_INDICATION;

typedef struct fqpcid
{
  unsigned char   pcid[8];             /* procedure correlator identifier   */
  unsigned char   fqcp_name[17];       /* originator's network qualified    */
                                       /*  CP name                          */
  unsigned char   reserve3[3];         /* reserved                          */
} FQPCID;

typedef struct session_stats
{
  AP_UINT16       rcv_ru_size;         /* session receive RU size           */
  AP_UINT16       send_ru_size;        /* session send RU size              */
```

```
  AP_UINT16       max_send_btu_size;    /* maximum send BTU size            */
  AP_UINT16       max_rcv_btu_size;     /* maximum rcv BTU size             */
  AP_UINT16       max_send_pac_win;     /* maximum send pacing window size  */
  AP_UINT16       cur_send_pac_win;     /* current send pacing window size  */
  AP_UINT16       max_rcv_pac_win;      /* maximum receive pacing window size*/
  AP_UINT16       cur_rcv_pac_win;      /* current receive pacing window size*/
  AP_UINT32       send_data_frames;     /* number of data frames sent       */
  AP_UINT32       send_fmd_data_frames; /* num fmd data frames sent         */
  AP_UINT32       send_data_bytes;      /* number of data bytes sent        */
  AP_UINT32       rcv_data_frames;      /* number of data frames received   */
  AP_UINT32       rcv_fmd_data_frames;  /* num fmd data frames received     */
  AP_UINT32       rcv_data_bytes;       /* number of data bytes received    */
  unsigned char   sidh;                 /* session ID high byte (from LFSID) */
  unsigned char   sidl;                 /* session ID low byte (from LFSID)  */
  unsigned char   odai;                 /* ODAI bit set                     */
  unsigned char   ls_name[8];           /* Link station name                */
  unsigned char   reserve;              /* reserved                         */
} SESSION_STATS;
```

Parameters

opcode AP_ISR_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous ISR indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous ISR indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous ISR indications were lost.

deactivated
Specifies whether the ISR session was deactivated or activated. Possible values are:

AP_YES The session was deactivated.

AP_NO The session was activated.

fqpcid.pcid
Procedure Correlator ID for the session. This is an 8-byte hexadecimal string.

fqpcid.fqcp_name
Fully qualified control point name. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

fqplu_name
Fully qualified name of the primary LU for this session; this parameter is reserved if *deactivated* is set to AP_YES. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

fqslu_name
Fully qualified name of the secondary LU for this session; this parameter is

reserved if *deactivated* is set to AP_YES. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

mode_name
Mode name for this session; this parameter is reserved if *deactivated* is set to AP_YES. This is an 8-byte type-A EBCDIC string (starting with a letter), padded to the right with EBCDIC spaces.

cos_name
COS name for this session; this parameter is reserved if *deactivated* is set to AP_YES. This is an 8-byte type-A EBCDIC string (starting with a letter), padded to the right with EBCDIC spaces.

transmission_priority
The transmission priority associated with the session. This parameter is reserved if *deactivated* is set to AP_YES.

sense_data
The sense data sent or received on the UNBIND request. This parameter is reserved if *deactivated* is set to AP_NO.

If the ISR session was deactivated, session_stats structures are included for the primary and secondary sessions. The fields in this structure are as follows:

rcv_ru_size
Maximum receive RU size.

send_ru_size
Maximum send RU size.

max_send_btu_size
Maximum BTU size that can be sent.

max_rcv_btu_size
Maximum BTU size that can be received.

max_send_pac_win
Maximum size of the send pacing window on this session.

cur_send_pac_win
Current size of the send pacing window on this session.

max_rcv_pac_win
Maximum size of the receive pacing window on this session.

cur_rcv_pac_win
Current size of the receive pacing window on this session.

send_data_frames
Number of normal flow data frames sent.

send_fmd_data_frames
Number of normal flow FMD data frames sent.

send_data_bytes
Number of normal flow data bytes sent.

rcv_data_frames
Number of normal flow data frames received.

rcv_fmd_data_frames
Number of normal flow FMD data frames received.

rcv_data_bytes
Number of normal flow data bytes received.

sidh Session ID high byte.

sidl Session ID low byte.

odai Origin Destination Assignor Indicator. When bringing up a session, the sender of the BIND sets this field to zero if its local node contains the primary link station, and sets it to one if its local node contains the secondary link station.

ls_name
Link station name associated with statistics. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes, which can be used to correlate the session statistics with the link over which the session traffic flows.

LOCAL_LU_INDICATION

This indication is generated when a local LU is defined or deleted. This indication can be used by a registered application to maintain a list of all local LUs currently defined.

VCB Structure

```
typedef struct local_lu_indication
{
   AP_UINT16        opcode;             /* Indication operation code        */
   unsigned char    reserv2;            /* reserved                         */
   unsigned char    format;             /* reserved                         */
   AP_UINT16        primary_rc;         /* primary return code              */
   AP_UINT32        secondary_rc;       /* secondary return code            */
   unsigned char    data_lost;          /* Previous indication lost?        */
   unsigned char    reason;             /* reason for this indication       */
   unsigned char    lu_name[8];         /* LU name                          */
   DESCRIPTION      description;        /* resource description             */
   unsigned char    lu_alias[8];        /* LU alias                         */
   unsigned char    nau_address;        /* NAU address                      */
   unsigned char    reserv4;            /* reserved                         */
   unsigned char    pu_name[8];         /* PU name                          */
   unsigned char    lu_sscp_active;     /* Is LU-SSCP session active        */
   unsigned char    reserv5;            /* reserved                         */
   SESSION_STATS    lu_sscp_stats;      /* LU-SSCP session statistics       */
   unsigned char    sscp_id[6];         /* SSCP ID                          */
} LOCAL_LU_INDICATION;

typedef struct session_stats
{
   AP_UINT16        rcv_ru_size;        /* session receive RU size          */
   AP_UINT16        send_ru_size;       /* session send RU size             */
   AP_UINT16        max_send_btu_size;  /* max send BTU size                */
   AP_UINT16        max_rcv_btu_size;   /* max receive BTU size             */
   AP_UINT16        max_send_pac_win;   /* max send pacing window size      */
   AP_UINT16        cur_send_pac_win;   /* current send pacing window size  */
   AP_UINT16        max_rcv_pac_win;    /* max receive pacing window size   */
   AP_UINT16        cur_rcv_pac_win;    /* current rcv pacing window size   */
   AP_UINT32        send_data_frames;   /* number of data frames sent       */
   AP_UINT32        send_fmd_data_frames; /* num of fmd data frames sent    */
   AP_UINT32        send_data_bytes;    /* number of data bytes sent        */
   AP_UINT32        rcv_data_frames;    /* number of data frames received   */
   AP_UINT32        rcv_fmd_data_frames; /* num of fmd data frames received */
   AP_UINT32        rcv_data_bytes;     /* number of data bytes received    */
   unsigned char    sidh;               /* session ID high byte             */
   unsigned char    sidl;               /* session ID low byte              */
```

```
   unsigned char    odai;               /*origin-destination assignor bit set*/
   unsigned char    ls_name[8];         /* link station name                  */
   unsigned char    pacing_type;        /* type of pacing in use              */
} SESSION_STATS;
```

The LU-SSCP statistics contained in the session_stats structure are valid only when both the *nau_address* parameter is set to a nonzero value and the *lu_sscp_active* parameter is set to AP_YES. Otherwise, the parameters in the session_stats structure are reserved.

Parameters

opcode AP_LOCAL_LU_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous directory indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous directory indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous directory indications were lost.

reason Reason for the indication. Possible values are:

AP_ADDED
The LU has been defined.

AP_REMOVED
The LU has been deleted, either explicitly using DELETE_LOCAL_LU, or implicitly, using DELETE_LS, DELETE_PORT, or DELETE_DLC.

AP_SSCP_ACTIVE
The LU-SSCP session has become active after the node has successfully processed an ACTLU.

AP_SSCP_INACTIVE
The LU-SSCP session has become inactive after a normal DACTLU or a link failure.

lu_name
Name of the local logical unit (LU) whose state has changed. This is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces.

description
Resource description, as specified on DEFINE_LOCAL_LU.

lu_alias
Locally defined LU alias. This is an 8-byte string in a locally displayable character set. All eight bytes are significant.

nau_address
Network accessible unit (NAU) address of the LU. This value must be in the range 1–255. A nonzero value implies that the LU is a dependent LU. The value 0 (zero) implies that the LU is an independent LU.

pu_name
Name of the physical unit (PU) that this LU uses. This is an 8-byte type-A EBCDIC string), padded on the right with EBCDIC spaces. This parameter is significant only if the *nau_address* parameter is not set to `0` (zero). If the *nau_address* parameter is set to `0`, the *pu_name* parameter is set to all binary zeros.

lu_sscp_sess_active
Specifies whether the LU-SSCP session is active. If the *nau_address* parameter is set to `0` (zero), this parameter is reserved. Possible values are:

AP_YES The LU-SSCP session is active.

AP_NO The LU-SSCP session is not active.

lu_sscp_stats.rcv_ru_size
This parameter is always reserved.

lu_sscp_stats.send_ru_size
This parameter is always reserved.

lu_sscp_stats.max_send_btu_size
Maximum basic transmission unit (BTU) that can be sent.

lu_sscp_stats.max_rcv_btu_size
Maximum basic transmission unit (BTU) that can be received.

lu_sscp_stats.max_send_pac_win
This parameter is always set to zero.

lu_sscp_stats.cur_send_pac_win
This parameter is always set to zero.

lu_sscp_stats.max_rcv_pac_win
This parameter is always set to zero.

lu_sscp_stats.cur_rcv_pac_win
This parameter is always set to zero.

lu_sscp_stats.send_data_frames
Number of normal flow data frames sent.

lu_sscp_stats.send_fmd_data_frames
Number of normal flow function management data (FMD) frames sent.

lu_sscp_stats.send_data_bytes
Number of normal flow data bytes sent.

lu_sscp_stats.rcv_data_frames
Number of normal flow data frames received.

lu_sscp_stats.rcv_fmd_data_frames
Number of normal flow function management data (FMD) frames received.

lu_sscp_stats.rcv_data_bytes
Number of normal flow data bytes received.

lu_sscp_stats.sidh
Session ID high byte.

lu_sscp_stats.sidl
Session ID low byte.

lu_sscp_stats.odai
Origin Destination Assignor indicator. When activating a session, the

sender of the ACTLU sets this parameter to zero if the local node contains the primary link station and sets it to one if the ACTLU sender is the node containing the secondary link station.

lu_sscp_stats.ls_name
Link station name associated with statistics. This is an 8-byte string in a locally displayable character set. All eight bytes are significant. The parameter can be used to correlate this session with the link over which the session flows.

lu_sscp_stats.pacing_type
Receive pacing type in use on the LU-SSCP session. This will take the value AP_NONE.

sscp_id The identifier of the SSCP as received in the ACTPU for the PU used by this LU. This parameter is 6 bytes and is used only by dependent LUs. This parameter is set to all zeros for independent LUs or if the *lu_sscp_sess_active* parameter is not set to AP_YES.

LOCAL_TOPOLOGY_INDICATION

This indication is generated when one of the following occurs:

- A TG in the local node's topology database changes state between active and inactive.
- A TG in the local node's topology database changes state between quiescing and not quiescing.
- A contention winner CP-CP session over a TG in the local node's topology database is activated or deactivated.

VCB Structure

```
typedef struct local_topology_indication
{
   AP_UINT16       opcode;              /* verb operation code              */
   unsigned char   reserv2;             /* reserved                         */
   unsigned char   format;              /* reserved                         */
   AP_UINT16       primary_rc;          /* primary return code              */
   AP_UINT32       secondary_rc;        /* secondary return code            */
   unsigned char   data_lost;           /* previous indication lost         */
   unsigned char   status;              /* TG status                        */
   unsigned char   dest[17];            /* name of TG destination node      */
   unsigned char   dest_type;           /* TG destination node type         */
   unsigned char   tg_num;              /* TG number                        */
   unsigned char   cp_cp_session_active;   /* CP-CP sessions active?        */
   unsigned char   branch_link_type;       /* Up or down link?              */
   unsigned char   branch_tg;              /* Branch TG?                    */
   unsigned char   reserva[17];            /* reserved                      */
} LOCAL_TOPOLOGY_INDICATION;
```

Parameters

opcode AP_LOCAL_TOPOLOGY_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous local topology indications have been lost. If CS Linux detects a condition that prevents it from sending an indication

(for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous local topology indications were lost.

AP_NO No previous local topology indications were lost.

status Specifies the status of the TG. This can be AP_NONE or one or more of the following values (combined using a logical OR):

AP_TG_OPERATIVE

AP_TG_CP_CP_SESSIONS

AP_TG_QUIESCING

dest Fully qualified destination node name for the TG. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

dest_type
Type of the destination node. Possible values are:

AP_END_NODE
End node.

AP_NETWORK_NODE
Network node.

AP_VRN Virtual routing node.

tg_num
Transmission group number associated with the TG.

cp_cp_session_active
Specifies whether the local node's contention winner CP-CP session is active. Possible values are:

AP_YES The CP-CP session is active.

AP_NO The CP-CP session is not active.

AP_UNKNOWN
The CP-CP session status is unknown.

branch_link_type
This parameter applies only if the node is a Branch Network Node; it is reserved otherwise.

Specifies the branch link type of this TG. Possible values are:

AP_UPLINK
The TG is an uplink.

AP_DOWNLINK
The TG is a downlink to an End Node.

AP_DOWNLINK_TO_BRNN
The TG is a downlink to a Branch Network Node that appears as an End Node from the perspective of the local node.

AP_OTHERLINK
The TG is a link to a VRN.

branch_tg
This parameter applies only if the node is a Network Node; it is reserved otherwise.

Specifies whether the TG is a branch TG. Possible values are:

AP_YES The TG is a branch TG.

AP_NO The TG is not a branch TG.

AP_UNKNOWN
The TG type is unknown.

LS_INDICATION

This indication is generated when a link station is activated or deactivated. When the link station is deactivated, the returned data includes statistics on the link station's usage.

VCB Structure

```
typedef struct ls_indication
{
  AP_UINT16       opcode;               /* verb operation code               */
  unsigned char   reserv2;              /* reserved                          */
  unsigned char   format;               /* reserved                          */
  AP_UINT16       primary_rc;           /* primary return code               */
  AP_UINT32       secondary_rc;         /* secondary return code             */
  unsigned char   data_lost;            /* previous indication lost          */
  unsigned char   deactivated;          /* has LS been deactivated?          */
  unsigned char   ls_name[8];           /* link station name                 */
  unsigned char   description[32];      /* resource description              */
  unsigned char   reserv1[16];          /* reserved                          */
  unsigned char   adj_cp_name[17];      /* network qualified Adjacent CP name*/
  unsigned char   adj_node_type;        /* adjacent node type                */
  AP_UINT16       act_sess_count;       /* active session count on link      */
  unsigned char   indication_cause;     /* cause of indication               */
  LS_STATS        ls_stats;             /* link station statistics           */
  unsigned char   tg_num;               /* tg number                         */
  AP_UINT32       sense_data;           /* sense data                        */
  unsigned char   brnn_link_type;       /* type of branch link               */
  unsigned char   adj_cp_is_brnn;       /* is adjacent node a BrNN?          */
  unsigned char   mltg_member;          /* reserved                          */
  unsigned char   tg_sharing;           /* reserved                          */
  unsigned char   ls_type;              /* how LS was defined or discovered  */
  unsigned char   reserva[14];          /* reserved                          */
} LS_INDICATION;

typedef struct ls_stats
{
  AP_UINT32       in_xid_bytes;          /* number of XID bytes received     */
  AP_UINT32       in_msg_bytes;          /* number of message bytes received */
  AP_UINT32       in_xid_frames;         /* number of XID frames received    */
  AP_UINT32       in_msg_frames;         /* number of message frames received*/
  AP_UINT32       out_xid_bytes;         /* number of XID bytes sent         */
  AP_UINT32       out_msg_bytes;         /* number of message bytes sent     */
  AP_UINT32       out_xid_frames;        /* number of XID frames sent        */
  AP_UINT32       out_msg_frames;        /* number of message frames sent    */
  AP_UINT32       in_invalid_sna_frames;        /* number of invalid         */
                                                /*  frames received          */
  AP_UINT32       in_session_control_frames;    /* number of control         */
                                                /*  frames received          */
  AP_UINT32       out_session_control_frames;   /* number of control         */
                                                /*  frames sent              */
  AP_UINT32       echo_rsps;             /* reserved                          */
  AP_UINT32       current_delay;         /* reserved                          */
```

```
  AP_UINT32       max_delay;          /* reserved                        */
  AP_UINT32       min_delay;          /* reserved                        */
  AP_UINT32       max_delay_time;     /* reserved                        */
  AP_UINT32       good_xids;          /* successful XID on LS count      */
  AP_UINT32       bad_xids;           /* unsuccessful XID on LS count    */
} LS_STATS;
```

Parameters

opcode AP_LS_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous LS indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous LS indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous LS indications were lost.

deactivated
Specifies whether the LS has been deactivated or activated. Possible values are:

AP_YES The LS has been deactivated.

AP_NO The LS has been activated.

ls_name
Name of the link station. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

description
A null-terminated text string describing the LS, as specified in the definition of the LS.

adj_cp_name
Fully qualified CP name of the adjacent node. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

adj_node_type
Type of the adjacent node. Possible values are:

AP_END_NODE
End node.

AP_NETWORK_NODE
Network node.

AP_LEN_NODE
LEN node.

AP_VRN Virtual routing node.

act_sess_count
Total number of active sessions (both endpoint and intermediate) using the link.

indication_cause
Cause of the indication. Possible values are:

AP_ACTIVATING
The LS has been activated.

AP_DEACTIVATION_STARTED
Deactivation processing for the LS has started.

AP_DEACTIVATING
The LS has been deactivated.

AP_SESS_COUNT_CHANGING
The number of active sessions using the LS has changed.

AP_CP_NAME_CHANGING
The adjacent node's CP name has changed.

AP_DATA_LOST
A previous indication could not be sent.

AP_FAILED
The LS has failed.

AP_ACTIVATION_STARTED
The LS supports auto-activation, and has been started automatically when required for a session.

AP_ACTIVATION_FAILED
The LS supports auto-activation, but the attempt to start it automatically when required has failed.

AP_LR_ACTIVATING
The LS has failed (or an attempt to activate it has failed), and CS Linux is attempting to reactivate it.

The following parameters are returned only if deactivated is set to AP_YES, indicating that the LS has been deactivated.

ls_stats.in_xid_bytes
Total number of XID (Exchange Identification) bytes received on this link station.

ls_stats.in_msg_bytes
Total number of data bytes received on this link station.

ls_stats.in_xid_frames
Total number of XID (Exchange Identification) frames received on this link station.

ls_stats.in_msg_frames
Total number of data frames received on this link station.

ls_stats.out_xid_bytes
Total number of XID (Exchange Identification) bytes sent on this link station.

ls_stats.out_msg_bytes
Total number of data bytes sent on this link station.

ls_stats.out_xid_frames
Total number of XID (Exchange Identification) frames sent on this link station.

ls_stats.out_msg_frames
Total number of data frames sent on this link station.

ls_stats.in_invalid_sna_frames
Total number of SNA frames that were not valid received on this link station.

ls_stats.in_session_control_frames
Total number of session control frames received on this link station.

ls_stats.out_session_control_frames
Total number of session control frames sent on this link station.

ls_stats.good_xids
Total number of successful XID exchanges that have occurred on this link station since it was started.

ls_stats.bad_xids
Total number of unsuccessful XID exchanges that have occurred on this link station since it was started.

tg_num
Transmission group number associated with the LS.

sense_data
If the LS has failed because of an XID protocol error, this parameter contains the sense data associated with the error. If *indication_cause* is set to any value other than `AP_FAILED`, this parameter is reserved.

brnn_link_type
This parameter applies only if the local node is a Branch Network Node; it is reserved otherwise.

Specifies the branch link type of this link. Possible values are:

AP_UPLINK
The link is an uplink.

AP_DOWNLINK
The link is a downlink.

AP_OTHERLINK
The link is to a VRN.

AP_UNKNOWN_LINK_TYPE
The branch link type is unknown.

AP_BRNN_NOT_SUPPORTED
The link supports PU 2.0 traffic only.

adj_cp_is_brnn
Specifies whether the adjacent node is a Branch Network Node. Possible values are:

AP_YES The adjacent node is a Branch Network Node.

AP_NO The adjacent node is not a Branch Network Node.

AP_UNKNOWN
The adjacent node type is unknown.

ls_type Specifies how this link was defined or discovered. Possible values are:

AP_LS_DEFINED
The link station was defined explicitly by a CS Linux administration program.

AP_LS_DYNAMIC
The link station was created when the local node connected to another node through a connection network.

AP_LS_TEMPORARY
The link station was created temporarily to process an incoming call, but has not yet become active.

AP_LS_IMPLICIT
The link station was defined implicitly when CS Linux received an incoming call that it could not match to a defined link station.

AP_LS_DLUS_DEFINED
The link station is a dynamic link station to a DLUR-served downstream PU, and was defined when the local node received an ACTPU from a DLUS.

LU_0_TO_3_INDICATION

This indication is generated when the session status of a type 0–3 LU changes.

VCB Structure

```
typedef struct lu_0_to_3_indication
{
  AP_UINT16         opcode;                 /* verb operation code         */
  unsigned char     reserv2;                /* reserved                    */
  unsigned char     format;                 /* reserved                    */
  AP_UINT16         primary_rc;             /* primary return code         */
  AP_UINT32         secondary_rc;           /* secondary return code       */
  unsigned char     data_lost;              /* previous indication lost    */
  unsigned char     pu_name[8];             /* PU Name                     */
  unsigned char     lu_name[8];             /* LU Name                     */
  unsigned char     description[32];        /* resource description        */
  unsigned char     reserv1[16];            /* reserved                    */
  unsigned char     nau_address;            /* NAU address                 */
  unsigned char     lu_sscp_sess_active;    /* Is SSCP session active?     */
  unsigned char     appl_conn_active;       /* Is application using LU?    */
  unsigned char     plu_sess_active;        /* Is PLU-SLU session active?  */
  unsigned char     host_attachment;        /* Host attachment             */
  SESSION_STATS     lu_sscp_stats;          /* LU-SSCP session statistics  */
  SESSION_STATS     plu_stats;              /* PLU session statistics      */
  unsigned char     sscp_id[6];             /* SSCP id                     */
} LU_0_TO_3_INDICATION;

typedef struct session_stats
{
  AP_UINT16        rcv_ru_size;          /* session receive RU size          */
  AP_UINT16        send_ru_size;         /* session send RU size             */
  AP_UINT16        max_send_btu_size;    /* maximum send BTU size            */
  AP_UINT16        max_rcv_btu_size;     /* maximum rcv BTU size             */
  AP_UINT16        max_send_pac_win;     /* maximum send pacing window size  */
  AP_UINT16        cur_send_pac_win;     /* current send pacing window size  */
  AP_UINT16        max_rcv_pac_win;      /* maximum receive pacing window    */
                                         /*  size                            */
  AP_UINT16        cur_rcv_pac_win;      /* current receive pacing window    */
                                         /*  size                            */
  AP_UINT32        send_data_frames;     /* number of data frames sent       */
  AP_UINT32        send_fmd_data_frames; /* num fmd data frames sent         */
  AP_UINT32        send_data_bytes;      /* number of data bytes sent        */
  AP_UINT32        rcv_data_frames;      /* number of data frames received   */
  AP_UINT32        rcv_fmd_data_frames;  /* num fmd data frames received     */
  AP_UINT32        rcv_data_bytes;       /* number of data bytes received    */
  unsigned char    sidh;                 /* session ID high byte (from LFSID)*/
  unsigned char    sidl;                 /* session ID low byte (from LFSID) */
```

```
  unsigned char    odai;               /* ODAI bit set                    */
  unsigned char    ls_name[8];         /* Link station name               */
  unsigned char    reserve;            /* reserved                        */
} SESSION_STATS;
```

Parameters

opcode AP_LU_0_TO_3_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous LU 0–3 indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous LU 0–3 indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous LU 0–3 indications were lost.

pu_name
Name of the local PU used by the LU. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 characters.

lu_name
Name of the LU whose session status has changed. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

description
A null-terminated text string describing the LU, as specified in the definition of the LU.

nau_address
Network accessible unit address of the LU.

lu_sscp_sess_active
Specifies whether the SSCP session is active—that is, whether the ACTLU has been successfully processed. Possible values are:

AP_YES The session is active.

AP_NO The session is not active.

appl_conn_active
Specifies whether an application is using the LU. Possible values are:

AP_YES An application is using the LU.

AP_NO No application is using the LU.

plu_sess_active
Specifies whether the PLU-SLU session has been activated. Possible values are:

AP_YES The session is active.

AP_NO The session is not active.

host_attachment
LU host attachment type.

Possible values are:

AP_DIRECT_ATTACHED
LU is directly attached to the host system.

AP_DLUR_ATTACHED
LU is attached to the host system using DLUR

sscp_id For dependent LU sessions, this parameter is the SSCP ID received in the ACTPU from the host for the PU to which the local LU is mapped. For independent LU sessions, this parameter is set to `0` (zero). This value is an array of six bytes displayed as hexadecimal values.

A `session_stats` structure is included for each of the two sessions (LU-SSCP session and PLU-SLU session). If the session goes from active to inactive, the structure contains the following parameters; otherwise these parameters are reserved.

rcv_ru_size
Maximum receive RU size. (In the LU-SSCP session statistics, this parameter is reserved.)

send_ru_size
Maximum send RU size. (In the LU-SSCP session statistics, this parameter is reserved.)

max_send_btu_size
Maximum BTU size that can be sent.

max_rcv_btu_size
Maximum BTU size that can be received.

max_send_pac_win
Maximum size of the send pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

cur_send_pac_win
Current size of the send pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

max_rcv_pac_win
Maximum size of the receive pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

cur_rcv_pac_win
Current size of the receive pacing window on this session. (In the LU-SSCP session statistics, this parameter is reserved.)

send_data_frames
Number of normal flow data frames sent.

send_fmd_data_frames
Number of normal flow FMD data frames sent.

send_data_bytes
Number of normal flow data bytes sent.

rcv_data_frames
Number of normal flow data frames received.

rcv_fmd_data_frames
Number of normal flow FMD data frames received.

rcv_data_bytes
Number of normal flow data bytes received.

sidh Session ID high byte.

sidl Session ID low byte.

odai Origin Destination Assignor Indicator. When bringing up a session, the sender of the BIND sets this field to zero if the local node contains the primary link station, and sets it to one if the BIND sender is the node containing the secondary link station.

ls_name
Link station name associated with statistics. This is an 8-byte ASCII character string, right-padded with spaces if the name is shorter than 8 characters.

MODE_INDICATION

This indication is sent when a local LU and partner LU start to communicate using a particular mode, or when the active session count for the LU-LU-mode combination changes.

VCB Structure

```
typedef struct mode_indication
{
  AP_UINT16        opcode;              /* verb operation code             */
  unsigned char    reserv2;             /* reserved                        */
  unsigned char    format;              /* reserved                        */
  AP_UINT16        primary_rc;          /* primary return code             */
  AP_UINT32        secondary_rc;        /* secondary return code           */
  unsigned char    data_lost;           /* previous indication lost        */
  unsigned char    removed;             /* is entry being removed?         */
  unsigned char    lu_alias[8];         /* LU alias                        */
  unsigned char    plu_alias[8];        /* partner LU alias                */
  unsigned char    fqplu_name[17];      /* fully qualified partner LU name */
  unsigned char    mode_name[8];        /* mode name                       */
  unsigned char    description[32];     /* resource description            */
  unsigned char    reserv1[16];         /* reserved                        */
  AP_UINT16        curr_sess_count;     /* current session count           */
  unsigned char    reserva[20];         /* reserved                        */
} MODE_INDICATION;
```

Parameters

opcode AP_MODE_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous mode indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous mode indications were lost.

AP_NO No previous mode indications were lost.

removed
This parameter is currently not used; a mode indication is generated only when the LUs start to use the mode, and not when they stop using it.

lu_alias
Locally defined LU alias. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

plu_alias
Partner LU alias. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

fqplu_name
Fully qualified name of the partner LU. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

mode_name
Mode name which designates the network properties for a group of sessions. This is an 8-byte type-A EBCDIC string (starting with a letter), padded on the right with spaces if the name is shorter than 8 characters.

description
A null-terminated text string describing the mode, as specified in the definition of the mode.

curr_sess_count
The number of sessions currently active for this LU-LU-mode combination.

NN_TOPOLOGY_NODE_INDICATION

This indication is generated when a node entry in a network node's topology database is activated or deactivated.

VCB Structure

```
typedef struct nn_topology_node_indication
{
    AP_UINT16        opcode;              /* verb operation code            */
    unsigned char    reserv2;             /* reserved                       */
    unsigned char    format;              /* reserved                       */
    AP_UINT16        primary_rc;          /* primary return code            */
    AP_UINT32        secondary_rc;        /* secondary return code          */
    unsigned char    data_lost;           /* previous indication lost       */
    unsigned char    deactivated;         /* has the node become inactive?  */
    unsigned char    node_name[17];       /* node name                      */
    unsigned char    node_type;           /* node type                      */
    unsigned char    branch_aware;        /* is the node branch aware?      */
    unsigned char    reserva[19];         /* reserved                       */
} NN_TOPOLOGY_NODE_INDICATION;
```

Parameters

opcode AP_NN_TOPOLOGY_NODE_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous NN topology node indications have been lost. If CS Linux detects a condition that prevents it from sending an

indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous NN topology node indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous NN topology node indications were lost.

deactivated

Specifies whether the node has been deactivated or activated. Possible values are:

AP_YES The node has been deactivated.

AP_NO The node has been activated.

node_name

Network qualified node name from Network Topology Database. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

node_type

Type of the node. Possible values are:

AP_NETWORK_NODE
Network node.

AP_VRN Virtual routing node.

branch_aware

Specifies whether the node supports branch awareness, APPN Option Set 1120.

AP_NO The node does not support option set 1120.

AP_YES The node supports option set 1120.

NN_TOPOLOGY_TG_INDICATION

This indication is generated when a TG entry in a network node's topology database is activated or deactivated.

VCB Structure

```
typedef struct nn_topology_tg_indication
{
    AP_UINT16        opcode;               /* verb operation code           */
    unsigned char    reserv2;              /* reserved                      */
    unsigned char    format;               /* reserved                      */
    AP_UINT16        primary_rc;           /* primary return code           */
    AP_UINT32        secondary_rc;         /* secondary return code         */
    unsigned char    data_lost;            /* previous indication lost      */
    unsigned char    status;               /* TG status                     */
    unsigned char    owner[17];            /* name of TG owner node         */
    unsigned char    dest[17];             /* name of TG destination node   */
    unsigned char    tg_num;               /* TG number                     */
    unsigned char    owner_type;           /* type of node that owns TG     */
    unsigned char    dest_type;            /* TG destination node type      */
    unsigned char    cp_cp_session_active; /* are CP-CP sessions active?    */
```

```
    unsigned char    branch_tg;           /* is this a branch link?        */
    unsigned char    multilink_tg;        /* reserved                      */
    unsigned char    reserva[15];         /* reserved                      */
} NN_TOPOLOGY_TG_INDICATION;
```

Parameters

opcode AP_NN_TOPOLOGY_TG_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous NN topology TG indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous NN topology TG indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous NN topology TG indications were lost.

status Specifies the status of the TG. This can be AP_NONE, or one or more of the following values (combined using a logical OR):

AP_TG_OPERATIVE

AP_TG_CP_CP_SESSIONS

AP_TG_QUIESCING

owner Name of the TG's originating node (the CS Linux local node name). The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

dest Fully qualified destination node name for the TG. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

tg_num
Transmission group number associated with the TG.

owner_type
Type of node that owns the TG. Possible values are:

AP_NETWORK_NODE

AP_VRN

dest_type
Type of the destination node for the TG. Possible values are:

AP_NETWORK_NODE

AP_VRN

cp_cp_session_active
Specifies whether the owning node's contention winner CP-CP session is active. Possible values are:

AP_YES The CP-CP session is active.

AP_NO The CP-CP session is not active.

AP_UNKNOWN
The CP-CP session status is unknown.

branch_tg
Specifies whether the TG is a branch TG. Possible values are:

AP_YES The TG is a branch TG.

AP_NO The TG is not a branch TG.

AP_UNKNOWN
The TG type is unknown.

NOF_STATUS_INDICATION

This indication is generated when the application can no longer access its connected target (because the CS Linux software on the target computer has been stopped, or because the communications path to the target computer has failed). If the target is the domain configuration file, it is also generated if another server takes over as master (and therefore the connected target file is no longer the master copy of the file).

The application does not need to register explicitly for this indication. CS Linux will return it to any application that has registered for any type of indications on the specified target handle. If the application is currently registered to receive indications using more than one callback routine, CS Linux returns this indication to the first routine registered.

After the application receives an indication that the target can no longer be accessed, all subsequent verbs using the relevant target handle will be rejected, apart from DISCONNECT_NODE or CLOSE_FILE (to end the application's connection to the target). In addition, any registrations for indications on this target handle will be lost; in order to continue receiving indications when the target becomes available, the application must reconnect to the target and reregister for the required indications.

VCB Structure

```
typedef struct nof_status_indication
{
   AP_UINT16        opcode;                /* verb operation code          */
   unsigned char    reserv2;               /* reserved                     */
   unsigned char    format;                /* reserved                     */
   AP_UINT16        primary_rc;            /* primary return code          */
   AP_UINT32        secondary_rc;          /* secondary return code        */
   AP_UINT32        status;                /* status being reported        */
   AP_UINT32        dead_target_handle;    /* Handle of dead connection    */
                                           /*  NULL for system termination */
   unsigned char    reserv1[32];           /* reserved                     */
} NOF_STATUS_INDICATION;
```

Parameters

opcode AP_NOF_STATUS_INDICATION

primary_rc
AP_OK

status Specifies the status change being reported. Possible values are:

AP_LOCAL_ABENDED
The CS Linux software on the local computer has stopped. The application should not attempt to issue any more NOF verbs until the software has been restarted.

AP_TARGET_ABENDED
The CS Linux software on the target computer has stopped or the communications path to it has failed.

AP_MASTER_TAKEOVER
This value is returned only when the application is connected to the master configuration file (specified by the *requested_role* parameter on OPEN_FILE). Another server has now taken over as master, so the target file is no longer the master configuration file. If the application needs to make further changes to the running configuration, it must use CLOSE_FILE to end its connection with the file, and then issue OPEN_FILE again to access the new master configuration file.

dead_target_handle
The target handle of the failed target or of the file that is no longer the master configuration file. The application should not attempt to issue any further verbs for this target handle except DISCONNECT_NODE or CLOSE_FILE.

If *status* is set to AP_LOCAL_ABENDED, this parameter is reserved.

PLU_INDICATION

This indication is generated when a local LU begins to communicate with a partner LU. This occurs either when the first ALLOCATE to this PLU is processed or when the first BIND is received from this PLU. The indication is also generated if the partner LU's CP name changes.

VCB Structure

```
typedef struct plu_indication
{
   AP_UINT16        opcode;                 /* verb operation code        */
   unsigned char    reserv2;                /* reserved                   */
   unsigned char    format;                 /* reserved                   */
   AP_UINT16        primary_rc;             /* primary return code        */
   AP_UINT32        secondary_rc;           /* secondary return code      */
   unsigned char    data_lost;              /* has previous indication    */
                                            /*  been lost?                */
   unsigned char    removed;                /* is entry being removed?    */
   unsigned char    lu_alias[8];            /* LU alias                   */
   unsigned char    plu_alias[8];           /* partner LU alias           */
   unsigned char    fqplu_name[17];         /* fully qualified partner    */
                                            /*  LU name                   */
   unsigned char    description[32];         /* resource description      */
   unsigned char    reserv1[16];            /* reserved                   */
   unsigned char    partner_cp_name[17];    /* partner CP name            */
   unsigned char    partner_lu_located;     /* partner CP name resolved?  */
   unsigned char    reserva[20];            /* reserved                   */
} PLU_INDICATION;
```

Parameters

opcode AP_PLU_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous PLU indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous PLU indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous PLU indications were lost.

removed
This parameter is currently not used; a PLU indication is generated only when the LUs start to communicate, and not when they stop communicating.

lu_alias
Local LU alias. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

plu_alias
Partner LU alias. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

fqplu_name
17-byte fully qualified network name for the partner LU. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

description
A null-terminated text string describing the partner LU, as specified in the definition of the partner LU.

partner_cp_name
17-byte fully qualified network name for the CP associated with the partner LU. This parameter is not used if *partner_lu_located* below is set to AP_NO.

The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

partner_lu_located
Specifies whether the local node has located the CP where the partner LU is located. Possible values are:

AP_YES The partner LU has been located. The *partner_cp_name* parameter contains the CP name of the partner LU.

AP_NO The partner LU has not yet been located. The *partner_cp_name* parameter should not be checked.

PORT_INDICATION

This indication is generated when a port is activated or deactivated.

VCB Structure

```
typedef struct port_indication
{
   AP_UINT16        opcode;              /* verb operation code           */
   unsigned char    reserv2;             /* reserved                      */
   unsigned char    format;              /* reserved                      */
   AP_UINT16        primary_rc;          /* primary return code           */
   AP_UINT32        secondary_rc;        /* secondary return code         */
   unsigned char    data_lost;           /* previous indication lost      */
   unsigned char    deactivated;         /* has session been deactivated? */
   unsigned char    port_name[8];        /* port name                     */
   unsigned char    description[32];     /* resource description          */
   unsigned char    reserv1[16];         /* reserved                      */
   unsigned char    reserva[20];         /* reserved                      */
} PORT_INDICATION;
```

Parameters

opcode AP_PORT_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous port indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous port indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous port indications were lost.

deactivated
Specifies whether the port has been deactivated or activated. Possible values are:

AP_YES The port has been deactivated.

AP_NO The port has been activated.

port_name
Name of port. This is an 8-byte ASCII string, padded on the right with spaces if the name is shorter than 8 bytes.

description
A null-terminated text string describing the port, as specified in the definition of the port.

PU_INDICATION

This indication is generated when the PU-SSCP session status of a local PU changes.

VCB Structure

```
typedef struct pu_indication
{
   AP_UINT16         opcode;              /* verb operation code        */
   unsigned char     reserv2;             /* reserved                   */
   unsigned char     format;              /* reserved                   */
   AP_UINT16         primary_rc;          /* primary return code        */
```

```
   AP_UINT32         secondary_rc;            /* secondary return code      */
   unsigned char     data_lost;               /* previous indication lost   */
   unsigned char     pu_name[8];              /* PU Name                    */
   unsigned char     description[32];         /* resource description       */
   unsigned char     reserv3[16];             /* reserved                   */
   unsigned char     pu_sscp_sess_active;     /* Is SSCP session active?    */
   unsigned char     host_attachment;         /* Host attachment            */
   unsigned char     reserv1[2];              /* reserved                   */
   SESSION_STATS     pu_sscp_stats;           /* PU-SSCP session statistics */
   unsigned char     sscp_id[6];              /* SSCP id                    */
} PU_INDICATION;

typedef struct session_stats
{
  AP_UINT16        rcv_ru_size;           /* session receive RU size         */
  AP_UINT16        send_ru_size;          /* session send RU size            */
  AP_UINT16        max_send_btu_size;     /* maximum send BTU size           */
  AP_UINT16        max_rcv_btu_size;      /* maximum rcv BTU size            */
  AP_UINT16        max_send_pac_win;      /* maximum send pacing window size */
  AP_UINT16        cur_send_pac_win;      /* current send pacing window size */
  AP_UINT16        max_rcv_pac_win;       /* maximum receive pacing          */
                                          /*  window size                    */
  AP_UINT16        cur_rcv_pac_win;       /* current receive pacing          */
                                          /*  window size                    */
  AP_UINT32        send_data_frames;      /* number of data frames sent      */
  AP_UINT32        send_fmd_data_frames;  /* num fmd data frames sent        */
  AP_UINT32        send_data_bytes;       /* number of data bytes sent       */
  AP_UINT32        rcv_data_frames;       /* number of data frames received  */
  AP_UINT32        rcv_fmd_data_frames;   /* num fmd data frames received    */
  AP_UINT32        rcv_data_bytes;        /* number of data bytes received   */
  unsigned char    sidh;                  /* session ID high byte            */
                                          /*  (from LFSID)                   */
  unsigned char    sidl;                  /* session ID low byte (from LFSID)*/
  unsigned char    odai;                  /* ODAI bit set                    */
  unsigned char    ls_name[8];            /* Link station name               */
  unsigned char    reserve;               /* reserved                        */
} SESSION_STATS;
```

Parameters

opcode AP_PU_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous PU indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous PU indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous PU indications were lost.

pu_name
Name of the PU (specified on the DEFINE_LS verb). This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 characters.

description
A null-terminated text string describing the PU, as specified in the definition of the PU.

pu_sscp_sess_active
Specifies whether the PU-SSCP session is active (whether the ACTPU has been successfully processed). Possible values are:

AP_YES The PU-SSCP session is active.

AP_NO The PU-SSCP session is inactive.

host_attachment
Local PU host attachment type.

Possible values are:

AP_DIRECT_ATTACHED
PU is directly attached to the host system.

AP_DLUR_ATTACHED
PU is supported by DLUR.

sscp_id For dependent LU sessions, this parameter is the SSCP ID received in the ACTPU from the host for the PU to which the local LU is mapped. For independent LU sessions, this parameter is set to `0` (zero). This value is an array of six bytes displayed as hexadecimal values.

The following parameters are used only when the session state changes from active to inactive:

pu_sscp_stats.rcv_ru_size
Reserved (always set to zero).

pu_sscp_stats.send_ru_size
Reserved (always set to zero).

pu_sscp_stats.max_send_btu_size
Maximum BTU size that can be sent.

pu_sscp_stats.max_rcv_btu_size
Maximum BTU size that can be received.

pu_sscp_stats.max_send_pac_win
Reserved (always set to zero).

pu_sscp_stats.cur_send_pac_win
Reserved (always set to zero).

pu_sscp_stats.max_rcv_pac_win
Reserved (always set to zero).

pu_sscp_stats.cur_rcv_pac_win
Reserved (always set to zero).

pu_sscp_stats.send_data_frames
Number of normal flow data frames sent.

pu_sscp_stats.send_fmd_data_frames
Number of normal flow FMD data frames sent.

pu_sscp_stats.send_data_bytes
Number of normal flow data bytes sent.

pu_sscp_stats.rcv_data_frames
Number of normal flow data frames received.

pu_sscp_stats.rcv_fmd_data_frames
Number of normal flow FMD data frames received.

pu_sscp_stats.rcv_data_bytes
Number of normal flow data bytes received.

pu_sscp_stats.sidh
Session ID high byte.

pu_sscp_stats.sidl
Session ID low byte.

pu_sscp_stats.odai
Origin Destination Assignor Indicator. When bringing up a session, the sender of the BIND sets this field to zero if the local node contains the primary link station and sets it to one if the BIND sender is the node containing the secondary link station.

pu_sscp_stats.ls_name
Link station name associated with statistics. This is an 8-byte ASCII character string, right-padded with spaces if the name is shorter than 8 characters.

RAPI_CLIENT_INDICATION

This indication is generated when a Remote API Client connects to or disconnects from a CS Linux server. A NOF application can use these indications to keep track of which clients are currently using the server as their master server.

VCB Structure

```
typedef struct rapi_client_indication
{
   AP_UINT16        opcode;                  /* verb operation code          */
   unsigned char    reserv2;                 /* reserved                     */
   unsigned char    format;                  /* reserved                     */
   AP_UINT16        primary_rc;              /* primary return code          */
   AP_UINT32        secondary_rc;            /* secondary return code        */
   unsigned char    data_lost;               /* previous indication lost     */
   unsigned char    reason;                  /* reason for indication        */
   unsigned char    sys_name[128];           /* system name client sends us  */
   SNA_IP_ADDR      rapi_client_origin_ip_addr; /* IP addr client sends us   */
   SNA_IP_ADDR      rapi_client_adj_ip_addr; /* IP addr client comes in on   */
   AP_UINT16        rapi_client_adj_port;    /* port IP client comes in on   */
   unsigned char    reserva[16];             /* reserved                     */
} RAPI_CLIENT_INDICATION;

typedef struct sna_ip_addr
{
   AP_UINT16        family;                   /* IPv4 or IPv6                */
   union
   {
     unsigned char  ipv4_addr[4];
     unsigned char  ipv6_addr[16];
   } ip_addr;
} SNA_IP_ADDR;
```

Parameters

opcode AP_RAPI_CLIENT_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous client indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for

example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous client indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous client indications were lost.

reason Specifies the status change that has occurred for this client. Possible values are:

AP_RAPI_CLIENT_CONNECTED
The client has started and has connected to this CS Linux server as its master server.

AP_RAPI_CLIENT_DISCONNECTED
The client has stopped and has disconnected from the CS Linux server.

sys_name
The fully-qualified system name of the client (such as `newbox.this.co.uk`).

rapi_client_origin_ip_addr
The IP address of the client.

rapi_client_origin_ip_addr.family
The type of TCP/IP address specified for the client. Possible values are as follows. (These are standard TCP/IP values rather than `AP_*` values defined by CS Linux.)

AF_INET
IPv4 address, specified as a dotted-decimal address (such as `193.1.11.100`).

AF_INET6
IPv6 address, specified as a colon-hexadecimal address (such as `2001:0db8:0000:0000:0000:0000:1428:57ab` or `2001:db8::1428:57ab`).

Note: The values `AF_INET` and `AF_INET6` are taken from a system header file, and are not standard `AP_*` values defined by CS Linux. The system header file is **/usr/include/linux/socket.h** on a Linux server or client, and **/usr/include/sys/socket.h** on an AIX client.

If your NOF application needs to test against these values, you should use `#include` to include this system file in addition to the **nof_c.h** header file.

rapi_client_origin_ip_addr.ip_addr.ipv4_addr
This field is used only if the *family* parameter is set to `AF_INET`. The IPv4 (dotted-decimal) address of the client computer.

rapi_client_origin_ip_addr.ip_addr.ipv6_addr
This field is used only if the *family* parameter is set to `AF_INET6`. The IPv6 (colon-hexadecimal) address of the client computer.

rapi_client_adj_ip_addr
The IP address through which the client attaches to CS Linux. This may not be the same as *rapi_client_origin_ip_addr* if one of the following is true.

- The client connects through a Web server.

- The client connects through a TCP/IP proxy or NAT router, such as the Linux iptables tool.
- The client has multiple IP addresses.

rapi_client_adj_ip_addr.family
The type of TCP/IP address through which the client attaches to CS Linux. Possible values are as follows. (These are standard TCP/IP values rather than AP_* values defined by CS Linux.)

AF_INET
IPv4 address, specified as a dotted-decimal address (such as 193.1.11.100).

AF_INET6
IPv6 address, specified as a colon-hexadecimal address (such as 2001:0db8:0000:0000:0000:0000:1428:57ab or 2001:db8::1428:57ab).

Note: The values AF_INET and AF_INET6 are taken from a system header file, and are not standard AP_* values defined by CS Linux. The system header file is **/usr/include/linux/socket.h** on a Linux server or client, and **/usr/include/sys/socket.h** on an AIX client.

If your NOF application needs to test against these values, you should use #include to include this system file in addition to the **nof_c.h** header file.

rapi_client_adj_ip_addr.ip_addr.ipv4_addr
This field is used only if the *family* parameter is set to AF_INET. The IPv4 (dotted-decimal) address through which the client attaches to CS Linux.

rapi_client_adj_ip_addr.ip_addr.ipv6_addr
This field is used only if the *family* parameter is set to AF_INET6. The IPv6 (colon-hexadecimal) address through which the client attaches to CS Linux.

rapi_client_adj_port
The IP port number through which the client attaches to CS Linux.

REGISTRATION_FAILURE

REGISTRATION_FAILURE indicates that an attempt to register resources with the network node server failed.

VCB Structure

```
typedef struct registration_failure
{
   AP_UINT16        opcode;              /* verb operation code            */
   unsigned char    reserv2;             /* reserved                       */
   unsigned char    format;              /* reserved                       */
   AP_UINT16        primary_rc;          /* primary return code            */
   AP_UINT32        secondary_rc;        /* secondary return code          */
   unsigned char    data_lost;           /* previous indication lost       */
   unsigned char    resource_name[17];   /* network qualified resource name */
   AP_UINT16        resource_type;       /* resource type                  */
   unsigned char    description[32];      /* resource description           */
   unsigned char    reserv1[16];         /* reserved                       */
   unsigned char    reserv2b[2];         /* reserved                       */
   AP_UINT32        sense_data;          /* sense data                     */
   unsigned char    reserva[20];         /* reserved                       */
} REGISTRATION_FAILURE;
```

Parameters

opcode AP_REGISTRATION_FAILURE

primary_rc
AP_OK

data_lost
Specifies whether any previous registration failure indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous registration failure indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous registration failure indications were lost.

resource_name
Name of resource that failed to register. The name is a 17-byte EBCDIC string, right-padded with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

resource_type
Resource type of resource that failed to register. One of the following.

AP_NNCP_RESOURCE
Network node.

AP_ENCP_RESOURCE
End node.

AP_LU_RESOURCE
LU.

description
A null-terminated text string describing the resource, as specified in the definition of the resource.

sense_data
Sense data (specified in SNA Formats).

RTP_INDICATION

This indication is generated when one of the following occurs:

- An RTP connection is connected or disconnected.
- The active session count changes.
- The connection performs a path-switch.

When the connection is disconnected, final RTP statistics are returned. At other times the *rtp_stats* parameter is reserved.

VCB Structure

```
typedef struct rtp_indication
{
   AP_UINT16        opcode;             /* Indication operation code        */
   unsigned char    reserv2;            /* reserved                         */
   unsigned char    format;             /* reserved                         */
   AP_UINT16        primary_rc;         /* primary return code              */
```

```
   AP_UINT32        secondary_rc;        /* secondary return code           */
   unsigned char    data_lost;           /* Previous indication lost?       */
   unsigned char    connection_state;    /* current state of the RTP        */
                                         /*  connection                     */
   unsigned char    rtp_name[8];         /* name of the RTP connection      */
   AP_UINT16        num_sess_active;     /* number of active sessions       */
   unsigned char    indication_cause;    /* reason for this indication      */
   unsigned char    connection_type;     /* usage of RTP connection         */
   unsigned char    reserv3[2];          /* reserved                        */
   RTP_STATISTICS   rtp_stats;           /* RTP statistics                  */
} RTP_INDICATION;

typedef struct rtp_statistics
{
   AP_UINT32        bytes_sent;           /* total number of bytes sent       */
   AP_UINT32        bytes_received;       /* total number of bytes received   */
   AP_UINT32        bytes_resent;         /* total number of bytes resent     */
   AP_UINT32        bytes_discarded;      /* total number of bytes discarded  */
   AP_UINT32        packets_sent;         /* total number of packets sent     */
   AP_UINT32        packets_received;     /* total number of packets received */
   AP_UINT32        packets_resent        /* total number of packets resent   */
   AP_UINT32        packets_discarded;    /* total number of packets discarded*/
   AP_UINT32        gaps_detected;        /* gaps detected                    */
   AP_UINT32        send_rate;            /* current send rate                */
   AP_UINT32        max_send_rate;        /* maximum send rate                */
   AP_UINT32        min_send_rate;        /* minimum send rate                */
   AP_UINT32        receive_rate;         /* current receive rate             */
   AP_UINT32        max_receive_rate;     /* maximum receive rate             */
   AP_UINT32        min_receive_rate;     /* minimum receive rate             */
   AP_UINT32        burst_size;           /* current burst size               */
   AP_UINT32        up_time;              /* total uptime of connection       */
   AP_UINT32        smooth_rtt;           /* smoothed round-trip time         */
   AP_UINT32        last_rtt;             /* last round-trip time             */
   AP_UINT32        short_req_timer;      /* SHORT_REQ timer duration         */
   AP_UINT32        short_req_timeouts;   /* number of SHORT_REQ timeouts     */
   AP_UINT32        liveness_timeouts;    /* number of liveness timeouts      */
   AP_UINT32        in_invalid_sna_frames; /* number of invalid SNA frames    */
                                           /*  received                        */
   AP_UINT32        in_sc_frames;         /* number of SC frames received     */
   AP_UINT32        out_sc_frames;        /* number of SC frames sent         */
   AP_INT32         delay_change_sum;     /* delay change sum                 */
   AP_UINT32        current_receiver_threshold;
                                          /* current ARB-R receiver threshold */
   AP_UINT32        minimum_receiver_threshold;
                                          /* minimum ARB-R receiver threshold */
   AP_UINT32        maximum_receiver_threshold;
                                          /* maximum ARB-R receiver threshold */
   AP_UINT32        sent_normals_count;   /* number of NORMALs sent           */
   AP_UINT32        sent_slowdowns_count; /* number of SLOWDOWNs sent         */
   AP_UINT32        rcvd_normals_count;   /* number of NORMALs received       */
   AP_UINT32        rcvd_slowdowns_count; /* number of SLOWDOWNs received     */
   AP_UINT32        dcs_reset_count_non_heal;
                                          /* number of non-healing resets     */
   AP_UINT16        dcs_reset_count_healing;
                                          /* number of self-healing resets    */
   unsigned char    arb_mode;             /* ARB mode (GREEN, YELLOW, RED)    */
   unsigned char    reserve[1];           /* reserved                         */
} RTP_STATISTICS;
```

Parameters

opcode AP_RTP_INDICATION

primary_rc

AP_OK

data_lost
Specifies whether any previous directory indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous directory indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous directory indications were lost.

connection_state
The current state of the RTP connection. Possible values are:

AP_CONNECTING
Connection setup has started but is not yet complete.

AP_CONNECTED
The connection is fully active.

AP_DISCONNECTED
The connection is no longer active.

rtp_name
RTP connection name. This name is an 8-byte string in a locally displayable character set. All eight bytes are significant.

num_sess_active
Number of sessions currently active on the connection.

indication_cause
Cause of the indication. Possible values are:

AP_ACTIVATED
The connection has become active.

AP_DEACTIVATED
The connection has become inactive.

AP_PATH_SWITCHED
The connection has successfully completed a path switch.

AP_SESS_COUNT_CHANGING
The number of active sessions using the connection has changed.

AP_SETUP_FAILED
The connection has failed before becoming fully active.

connection_type
Specifies the type of sessions on the RTP connection. Possible values are:

AP_RTP_CP_CP_SESSION
The RTP connection carries CP-CP sessions.

AP_RTP_LU_LU_SESSION
The RTP connection carries LU-LU sessions.

AP_RTP_ROUTE_SETUP
The RTP connection is used for route setup.

The following parameters are supplied only when the connection becomes inactive (when the *indication_cause* parameter is set to AP_DEACTIVATED or AP_SETUP_FAILED). In all other cases, the following parameters are reserved.

rtp_stats.bytes_sent
Total number of bytes that the local node has sent on this RTP connection.

rtp_stats.bytes_received
Total number of bytes that the local node has received on this RTP connection.

rtp_stats.bytes_resent
Total number of bytes that the local node has resent on this RTP connection because of loss in transit.

rtp_stats.bytes_discarded
Total number of bytes sent by the other end of the RTP connection that were discarded as duplicates of data already received.

rtp_stats.packets_sent
Total number of packets that the local node has sent on this RTP connection.

rtp_stats.packets_received
Total number of packets that the local node has received on this RTP connection.

rtp_stats.packets_resent
Total number of packets that the local node has resent on this RTP connection because of loss in transit.

rtp_stats.packets_discarded
Total number of packets sent by the other end of the RTP connection that were discarded as duplicates of data already received.

rtp_stats.gaps_detected
Total number of gaps detected by the local node. Each gap corresponds to one or more lost frames.

rtp_stats.send_rate
Current send rate on this RTP connection, measured in kilobits per second. This is the maximum allowed send rate as calculated by the ARB algorithm.

rtp_stats.max_send_rate
Maximum send rate on this RTP connection, measured in kilobits per second.

rtp_stats.min_send_rate
Minimum send rate on this RTP connection, measured in kilobits per second.

rtp_stats.receive_rate
Current receive rate on this RTP connection, measured in kilobits per second. This is the actual receive rate calculated over the last measurement interval.

rtp_stats.max_receive_rate
Maximum receive rate on this RTP connection, measured in kilobits per second.

rtp_stats.min_receive_rate
Minimum receive rate on this RTP connection, measured in kilobits per second.

rtp_stats.burst_size
Current burst size on the RTP connection, measured in bytes.

rtp_stats.up_time
Total number of seconds the RTP connection has been active.

rtp_stats.smooth_rtt
Smoothed measure of round-trip time between the local node and the partner RTP node, measured in milliseconds.

rtp_stats.last_rtt
The last measured round-trip time between the local node and the partner RTP node, measured in milliseconds.

rtp_stats.short_req_timer
The current duration used for the SHORT_REQ timer, measured in milliseconds.

rtp_stats.short_req_timeouts
Number of SHORT_REQ timeouts.

rtp_stats.liveness_timeouts
Total number of times the liveness timer has expired for this RTP connection. The liveness timer expires when the connection has been idle for the specified in the *rtp_connection_detail.liveness_timer*.

rtp_stats.in_invalid_sna_frames
Total number of SNA frames received and discarded as not valid on this RTP connection.

rtp_stats.in_sc_frames
Total number of session control frames received on this RTP connection.

rtp_stats.out_sc_frames
Total number of session control frames sent on this RTP connection.

rtp_stats.delay_change_sum
Value of the delay change sum currently held by the ARB-R algorithm on this RTP connection.

rtp_stats.current_receiver_threshold
Value of the receiver threshold currently held by the ARB-R algorithm on this RTP connection.

rtp_stats.minimum_receiver_threshold
Value of the minimum receiver threshold currently held by the ARB-R algorithm on this RTP connection.

rtp_stats.maximum_receiver_threshold
Value of the maximum receiver threshold currently held by the ARB-R algorithm on this RTP connection.

rtp_stats.sent_normals_count
Number of NORMAL feedback ARB-R segments sent by the ARB-R algorithm on this RTP connection.

rtp_stats.sent_slowdowns_count
Number of SLOWDOWN1 and SLOWDOWN2 feedback ARB-R segments sent by the ARB-R algorithm on this RTP connection.

rtp_stats.rcvd_normals_count
Number of NORMAL feedback ARB-R segments received by the ARB-R algorithm on this RTP connection.

rtp_stats.rcvd_slowdowns_count
Number of SLOWDOWN1 and SLOWDOWN2 feedback ARB-R segments received by the ARB-R algorithm on this RTP connection.

rtp_stats.dcs_reset_count_non_heal
Number of delay change sum resets made as a part of normal ARB-R processing on this RTP connection.

rtp_stats.dcs_reset_count_healing
Number of delay change sum resets made to self-heal the ARB-R algorithm on this RTP connection.

rtp_stats.arb_mode
The current ARB-R status mode on this RTP connection. Possible values are:

0 GREEN

1 YELLOW

2 RED

SERVER_INDICATION

This indication is generated when the CS Linux software is started or stopped on another computer on the LAN or when a server's role as master or backup server changes. A NOF application can use these indications to keep track of which servers are currently active or to determine when a new server has successfully taken over as master.

Server indications are also generated (for CS Linux internal use) when the status of other CS Linux components on a server changes. If the application needs to use server indications as described above, it should check the *status* and *flags* parameters for changes; it can ignore any server indications where these parameters do not indicate a change.

The REGISTER_INDICATION_SINK verb used to register for server indications should be issued with a null target handle; it is not associated with any particular target.

VCB Structure

```
typedef struct server_indication
{
    AP_UINT16        opcode;               /* verb operation code          */
    unsigned char    reserv2;              /* reserved                     */
    unsigned char    format;               /* reserved                     */
    AP_UINT16        primary_rc;           /* primary return code          */
    AP_UINT32        secondary_rc;         /* secondary return code        */
    unsigned char    data_lost;            /* previous indication lost     */
    AP_UINT32        status;               /* node status                  */
    AP_UINT32        flags;                /* is server master or backup?  */
    unsigned char    server_name[128];     /* name of server               */
} SERVER_INDICATION;
```

Parameters

opcode AP_SERVER_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous server indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for

example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous server indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous server indications were lost.

status Specifies the status of the SNA software on the indicated server. Possible values are:

AP_ACTIVE
The SNA software has been started.

AP_NOT_ACTIVE
The SNA software has been stopped.

flags Specifies whether the indicated server is the master server or a backup server. The application should use a logical AND operation to check the appropriate values, as follows:

- If the expression "*flags* AND AP_MASTER_FLAG" is nonzero, the indicated server is the master server.
- If the expression "*flags* AND AP_BACKUP_FLAG" is nonzero, the indicated server is a backup server.

server_name
Name of the server on which the SNA software has been started or stopped.

SESSION_INDICATION

This indication is generated when a session is activated or deactivated. When a session is deactivated, the verb returns statistics on the usage of the session.

VCB Structure

```
typedef struct session_indication
{
   AP_UINT16         opcode;             /* verb operation code             */
   unsigned char     reserv2;            /* reserved                        */
   unsigned char     format;             /* reserved                        */
   AP_UINT16         primary_rc;         /* primary return code             */
   AP_UINT32         secondary_rc;       /* secondary return code           */
   unsigned char     data_lost;          /* previous indication lost        */
   unsigned char     deactivated;        /* has session been deactivated?   */
   unsigned char     lu_name[8];         /* LU name                         */
   unsigned char     lu_alias[8];        /* LU alias                        */
   unsigned char     plu_alias[8];       /* partner LU alias                */
   unsigned char     fqplu_name[17];     /* fully qualified partner LU name */
   unsigned char     mode_name[8];       /* mode name                       */
   unsigned char     session_id[8];      /* session ID                      */
   FQPCID            fqpcid;             /* fully qualified procedure       */
                                         /*  correlator ID                  */
   AP_UINT32         sense_data;         /* sense data                      */
   unsigned char     reserv1;            /* reserved                        */
   SESSION_STATS     sess_stats;         /* session statistics              */
   unsigned char     sscp_id[6];         /* SSCP ID                         */
   unsigned char     plu_slu_comp_lvl;   /* compression level PLU->SLU      */
   unsigned char     slu_plu_comp_lvl;   /* compression level SLU->PLU      */
   unsigned char     comp_in_series;     /* reserved                        */
   unsigned char     reserva[11];        /* reserved                        */
} SESSION_INDICATION;
```

```
typedef struct fqpcid
{
   unsigned char     pcid[8];             /* procedure correlator identifier */
   unsigned char     fqcp_name[17];       /* originator's network qualified  */
                                          /*  CP name                        */
   unsigned char     reserve3[3];         /* reserved                        */
} FQPCID;

typedef struct session_stats
{
  AP_UINT16        rcv_ru_size;           /* session receive RU size         */
  AP_UINT16        send_ru_size;          /* session send RU size            */
  AP_UINT16        max_send_btu_size;     /* maximum send BTU size           */
  AP_UINT16        max_rcv_btu_size;      /* maximum rcv BTU size            */
  AP_UINT16        max_send_pac_win;      /* maximum send pacing window size */
  AP_UINT16        cur_send_pac_win;      /* current send pacing window size */
  AP_UINT16        max_rcv_pac_win;       /* maximum receive pacing window   */
                                          /*  size                           */
  AP_UINT16        cur_rcv_pac_win;       /* current receive pacing window   */
                                          /*  size                           */
  AP_UINT32        send_data_frames;      /* number of data frames sent      */
  AP_UINT32        send_fmd_data_frames;  /* num fmd data frames sent        */
  AP_UINT32        send_data_bytes;       /* number of data bytes sent       */
  AP_UINT32        rcv_data_frames;       /* number of data frames received  */
  AP_UINT32        rcv_fmd_data_frames;   /* num fmd data frames received    */
  AP_UINT32        rcv_data_bytes;        /* number of data bytes received   */
  unsigned char    sidh;                  /* session ID high byte            */
                                          /*  (from LFSID)                   */
  unsigned char    sidl;                  /* session ID low byte (from LFSID)*/
  unsigned char    odai;                  /* ODAI bit set                    */
  unsigned char    ls_name[8];            /* Link station name               */
  unsigned char    pacing_type;           /* Pacing type                     */
} SESSION_STATS;
```

Parameters

opcode AP_SESSION_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous session indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous session indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous session indications were lost.

deactivated
Specifies whether the session has been deactivated or activated. Possible values are:

AP_YES The session has been deactivated.

AP_NO The session has been activated.

lu_name
LU name of the local LU, as defined to CS Linux. This is an 8-byte type-A EBCDIC string, padded on the right with spaces if the name is shorter than 8 bytes.

lu_alias
LU alias of the local LU, as defined to CS Linux. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes.

plu_alias
LU alias of the partner LU. This is an 8-byte ASCII string, using any locally displayable characters, padded on the right with spaces if the name is shorter than 8 bytes.

fqplu_name
Fully qualified LU name for the partner LU, as defined to CS Linux. This name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of 1–8 A-string characters, an EBCDIC dot (period) character, and an LU name of 1–8 A-string characters.

mode_name
Name of the mode used by the LUs. This is an 8-byte alphanumeric type-A EBCDIC string (starting with a letter), padded on the right with EBCDIC spaces if the name is shorter than 8 bytes.

session_id
8-byte identifier of the session.

fqpcid.pcid
Procedure Correlator ID. This is an 8-byte hexadecimal string.

fqpcid.fqcp_name
Fully qualified CP name. The name is a 17-byte EBCDIC string, padded on the right with EBCDIC spaces. It consists of a network ID of up to 8 A-string characters, an EBCDIC dot (period) character, and a network name of up to 8 A-string characters.

The following parameters are used only if *deactivated* is set to `AP_YES`:

sense_data
The sense data sent or received on the UNBIND message that ended the session.

duplex_support
The conversation duplex support as negotiated on the BIND. Possible values are:

AP_HALF_DUPLEX
Only half-duplex conversations are supported.

AP_FULL_DUPLEX
Both half-duplex and full-duplex conversations are supported. Expedited data is also supported.

AP_UNKNOWN
Duplex support is not known because the session has deactivated.

sess_stats.rcv_ru_size
Maximum receive RU size.

sess_stats.send_ru_size
Maximum send RU size.

sess_stats.max_send_btu_size
Maximum BTU size that can be sent.

sess_stats.max_rcv_btu_size
Maximum BTU size that can be received.

sess_stats.max_send_pac_win
Maximum size of the send pacing window on this session.

sess_stats.cur_send_pac_win
Current size of the send pacing window on this session.

sess_stats.max_rcv_pac_win
Maximum size of the receive pacing window on this session.

sess_stats.cur_rcv_pac_win
Current size of the receive pacing window on this session.

sess_stats.send_data_frames
Number of normal flow data frames sent.

sess_stats.send_fmd_data_frames
Number of normal flow FMD data frames sent.

sess_stats.send_data_bytes
Number of normal flow data bytes sent.

sess_stats.rcv_data_frames
Number of normal flow data frames received.

sess_stats.rcv_fmd_data_frames
Number of normal flow FMD data frames received.

sess_stats.rcv_data_bytes
Number of normal flow data bytes received.

sess_stats.sidh
Session ID high byte.

sess_stats.sidl
Session ID low byte.

sess_stats.odai
Origin Destination Assignor Indicator. When bringing up a session, the sender of the BIND sets this field to zero if the local node contains the primary link station, and sets it to one if the BIND sender is the node containing the secondary link station.

sess_stats.ls_name
Link station name associated with statistics. This is an 8-byte string in a locally displayable character set. All 8 bytes are significant. This field can be used to correlate the session statistics with the link over which session traffic flows.

sess_stats.pacing_type
The type of receive pacing in use on this session.

sscp_id For dependent LU sessions, the identifier of the SSCP as received in the ACTPU for the PU used by this LU. This parameter is 6 bytes and is used only by dependent LUs. This parameter is set to all zeros for independent LUs.

session_detail.plu_slu_comp_lvl
Specifies the compression level for data sent from the primary LU (PLU) to the secondary LU (SLU). Possible values are:

AP_NONE
Compression is not used.

AP_RLE_COMPRESSION
Run-length encoding (RLE) compression is used.

AP_LZ9_COMPRESSION
LZ9 compression is used.

AP_LZ10_COMPRESSION
LZ10 compression is used.

session_detail.slu_plu_comp_lvl
Specifies the compression level for data sent from the secondary LU (SLU) to the primary LU (PLU). Possible values are:

AP_NONE
Compression is not used.

AP_RLE_COMPRESSION
Run-length encoding (RLE) compression is used.

AP_LZ9_COMPRESSION
LZ9 compression is used.

AP_LZ10_COMPRESSION
LZ10 compression is used.

SNA_NET_INDICATION

This indication is generated when another NOF application or a CS Linux administration tool makes a change to the SNA network file **sna.net**. The target for this verb, identified by the *target_handle* parameter on the REGISTER_INDICATION_SINK verb that registers to receive this indication, must be the **sna.net** file.

VCB Structure

No specific VCB structure is associated with this indication. To register for SNA network indications, the application specifies the value `AP_SNA_NET_INDICATION` as the *indication_opcode* parameter on REGISTER_INDICATION_SINK. When a change is made to the SNA network file, CS Linux then reports this to the application's callback routine by sending a copy of the VCB from the NOF verb (ADD_BACKUP or DELETE_BACKUP) that made the change.

To enable the application to distinguish between SNA network indications and asynchronous responses to its own NOF verbs issued to the SNA network file, CS Linux changes the *primary_rc* parameter in the VCB for an indication. The value `AP_INDICATION` identifies a VCB associated with an SNA network file indication; the value `AP_OK`, or any other value, indicates an asynchronous response to one of the application's own NOF verbs.

TN_REDIRECTION_INDICATION

This indication is generated when a Telnet client starts or ends a session using TN Redirector. It is also generated when the SNA node providing TN Server function is stopped, to notify the application that it will need to re-register for TN Redirection indications; this is because registration for these indications is not maintained when the node stops and restarts.

VCB Structure

```
typedef struct tn_redirection_indication
{
   AP_UINT16        opcode;               /* verb operation code           */
   unsigned char    reserv2;              /* reserved                      */
   unsigned char    format;               /* reserved                      */
   AP_UINT16        primary_rc;           /* primary return code           */
   AP_UINT32        secondary_rc;         /* secondary return code         */
   unsigned char    data_lost;            /* previous indication lost      */
   unsigned char    reason;               /* reason for indication         */
   SNA_IP_ADDR      client_ip_addr;       /* client IP address             */
   AP_UINT16        client_port;          /* client port number            */
   SNA_IP_ADDR      host_ip_addr;         /* host IP address               */
   AP_UINT16        host_port;            /* host port number              */
   unsigned char    client_number;        /* client number                 */
   unsigned char    listen_local_address[46];
                                          /* Local addr client connects to */
   unsigned char    reserva[16];          /* reserved                      */
} TN_REDIRECTION_INDICATION;

typedef struct sna_ip_addr
{
   AP_UINT16        family;                  /* IPv4 or IPv6                */
   union
   {
     unsigned char  ipv4_addr[4];
     unsigned char  ipv6_addr[16];
   } ip_addr;
} SNA_IP_ADDR;
```

Parameters

opcode AP_TN_REDIRECTION_INDICATION

primary_rc
AP_OK

data_lost
Specifies whether any previous TN redirection indications have been lost. If CS Linux detects a condition that prevents it from sending an indication (for example an internal resource shortage), it indicates this by setting the *data_lost* parameter on the next indication after the condition has cleared. Possible values are:

AP_YES One or more previous TN redirection indications were lost. Later fields in this VCB may be set to zeros.

AP_NO No previous TN redirection indications were lost.

reason Specifies the reason for sending this indication. Possible values are:

AP_CONNECTION_ACTIVATED
The Telnet client has started a session using TN Redirector.

AP_CONNECTION_DEACTIVATED
The TN Redirector session has ended.

AP_TN_SERVER_TERMINATED
The node providing TN Server function has stopped. If there were any active TN Redirector sessions using this node, the application will also receive an indication for each session with *reason* set to AP_CONNECTION_DEACTIVATED.

If the application needs to continue receiving TN Redirection indications, it should re-register for these indications when the node restarts.

The following fields are not valid if *reason* is set to AP_TN_SERVER_TERMINATED.

client_ip_addr.family
The type of TCP/IP address specified for the computer on which the Telnet client runs. Possible values are as follows. (These are standard TCP/IP values rather than AP_* values defined by CS Linux.)

AF_INET
IPv4 address, specified as a dotted-decimal address (such as 193.1.11.100).

AF_INET6
IPv6 address, specified as a colon-hexadecimal address (such as 2001:0db8:0000:0000:0000:0000:1428:57ab or 2001:db8::1428:57ab).

Note: The values AF_INET and AF_INET6 are taken from a system header file, and are not standard AP_* values defined by CS Linux. The system header file is **/usr/include/linux/socket.h** on a Linux server or client, and **/usr/include/sys/socket.h** on an AIX client.

If your NOF application needs to test against these values, you should use #include to include this system file in addition to the **nof_c.h** header file.

client_ip_addr.ip_addr.ipv4_addr
This field is used only if *client_ip_addr.family* is set to AF_INET. The IPv4 (dotted-decimal) address of the computer on which the Telnet client runs.

client_ip_addr.ip_addr.ipv6_addr
This field is used only if *client_ip_addr.family* is set to AF_INET6. The IPv6 (colon-hexadecimal) address of the computer on which the Telnet client runs.

client_port
The number of the server TCP/IP port that the Telnet client uses to access the TN Redirector node.

host_ip_addr
The TCP/IP address of the host computer with which the client communicates. This can be either of the following.

- An IPv4 dotted-decimal address (such as 193.1.11.100).
- An IPv6 colon-hexadecimal address (such as 2001:0db8:0000:0000:0000:0000:1428:57ab or 2001:db8::1428:57ab).

host_port
The number of the TCP/IP port that the TN Redirector node uses to access the host.

client_number
A number specific to each client. This can be used to correlate successful redirection indications of type AP_CONNECTION_ACTIVATED with those of type AP_CONNECTION_DEACTIVATED.

listen_local_address
The address on the local TN Server computer to which TN3270 clients connect.

Appendix A. Return Code Values

This appendix lists all the possible return codes in the NOF interface in numerical order. The values are defined in the header file **values_c.h**.

You can use this appendix as a reference to check the meaning of a return code received by your application.

Primary Return Codes

The following primary return codes are used in NOF applications.

AP_OK	0x0000
AP_PARAMETER_CHECK	0x0100
AP_STATE_CHECK	0x0200
AP_INDICATION	0x0210
AP_TP_BUSY	0x02F0
AP_ALLOCATION_ERROR	0x0300
AP_ACTIVATION_FAIL_RETRY	0x0310
AP_COMM_SUBSYSTEM_ABENDED	0x03F0
AP_ACTIVATION_FAIL_NO_RETRY	0x0410
AP_COMM_SUBSYSTEM_NOT_LOADED	0x04F0
AP_DEALLOC_ABEND	0x0500
AP_LU_SESS_LIMIT_EXCEEDED	0x0510
AP_DEALLOC_ABEND_PROG	0x0600
AP_FUNCTION_NOT_SUPPORTED	0x0610
AP_THREAD_BLOCKING	0x06F0
AP_DEALLOC_ABEND_SVC	0x0700
AP_DEALLOC_ABEND_TIMER	0x0800
AP_DATA_POSTING_BLOCKED	0x0810
AP_INVALID_VERB_SEGMENT	0x08F0
AP_DEALLOC_NORMAL	0x0900
AP_PATH_SWITCH_NOT_ALLOWED	0x0910
AP_CP_CP_SESS_ACT_FAILURE	0x0A10
AP_PROG_ERROR_NO_TRUNC	0x0C00
AP_PROG_ERROR_TRUNC	0x0D00
AP_PROG_ERROR_PURGING	0x0E00
AP_CONV_FAILURE_RETRY	0x0F00
AP_CONV_FAILURE_NO_RETRY	0x1000
AP_SVC_ERROR_NO_TRUNC	0x1100
AP_UNEXPECTED_DOS_ERROR	0x11F0
AP_SVC_ERROR_TRUNC	0x1200
AP_SVC_ERROR_PURGING	0x1300
AP_UNSUCCESSFUL	0x1400
AP_STACK_TOO_SMALL	0x15F0
AP_MIXED_API_USED	0x16F0
AP_IN_PROGRESS	0x17F0
AP_CNOS_PARTNER_LU_REJECT	0x1800
AP_COMPLETED	0x18F0
AP_CONVERSATION_TYPE_MIXED	0x1900
AP_NODE_STOPPING	0x1A00
AP_NODE_NOT_STARTED	0x1B00
AP_CANCELLED	0x2100
AP_BACKED_OUT	0x2200
AP_DUPLEX_TYPE_MIXED	0x2300
AP_LS_FAILURE	0x2300
AP_OPERATION_INCOMPLETE	0x4000
AP_OPERATION_NOT_ACCEPTED	0x4100
AP_CONVERSATION_ENDED	0x4200
AP_ERROR_INDICATION	0x4300
AP_EXPD_NOT_SUPPORTED_BY_LU	0x4400

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AP_BUFFER_TOO_SMALL	0x4500
AP_MEMORY_ALLOCATION_FAILURE	0x4600
AP_INVALID_VERB	0xFFFF

Secondary Return Codes

The following secondary return codes are used in NOF applications.

AP_AS_SPECIFIED	0x00000000
AP_ALLOCATION_ERROR_PENDING	0x00000300
AP_DEALLOC_ABEND_PROG_PENDING	0x00000600
AP_DEALLOC_ABEND_SVC_PENDING	0x00000700
AP_DEALLOC_ABEND_TIMER_PENDING	0x00000800
AP_UNKNOWN_ERROR_TYPE_PENDING	0x00001100
AP_BO_NO_RESYNC	0x00002408
AP_TRANS_PGM_NOT_AVAIL_NO_RETRY	0x00004C08
AP_INVALID_SET_PROT	0x00070000
AP_INVALID_DLUS_NAME	0x00900000
AP_SEC_BAD_PASSWORD_EXPIRED	0x00FF0F08
AP_BAD_TP_ID	0x01000000
AP_BO_RESYNC	0x01002408
AP_INVALID_NEW_PROT	0x01070000
AP_DLC_ACTIVE	0x01100000
AP_NO_DEFAULT_DLUS_DEFINED	0x01900000
AP_BAD_TPSID	0x01FF0000
AP_SEC_BAD_PASSWORD_INVALID	0x01FF0F08
AP_BAD_CONV_ID	0x02000000
AP_SEND_ERROR_LOG_LL_WRONG	0x02010000
AP_INVALID_SET_UNPROT	0x02070000
AP_INVALID_NUMBER_OF_NODE_ROWS	0x02080000
AP_DUPLICATE_CP_NAME	0x02100000
AP_INVALID_PU_ID	0x02900000
AP_NOT_OWNER	0x02FF0000
AP_SEC_BAD_USERID_REVOKED	0x02FF0F08
AP_BAD_LU_ALIAS	0x03000000
AP_BAD_DLOAD_ID	0x03000001
AP_BAD_REMOTE_LU_ALIAS	0x03000002
AP_SEND_ERROR_BAD_TYPE	0x03010000
AP_INVALID_NEW_UNPROT	0x03070000
AP_DUPLICATE_DEST_ADDR	0x03100000
AP_PU_ALREADY_ACTIVATING	0x03900000
AP_INSUFFICIENT_PRIVILEGES	0x03FF0000
AP_SEC_BAD_USERID_INVALID	0x03FF0F08
AP_ALLOCATION_FAILURE_NO_RETRY	0x04000000
AP_SEND_ERROR_BAD_STATE	0x04010000
AP_INVALID_SET_USER	0x04070000
AP_NODE_ROW_WGT_LESS_THAN_LAST	0x04080000
AP_CANT_MODIFY_PORT_NAME	0x04100000
AP_PU_ALREADY_DEACTIVATING	0x04900000
AP_INVALID_CALLBACK	0x04FF0000
AP_SEC_BAD_USERID_MISSING	0x04FF0F08
AP_ALLOCATION_FAILURE_RETRY	0x05000000
AP_BAD_ERROR_DIRECTION	0x05010000
AP_INVALID_DATA_TYPE	0x05070000
AP_TG_ROW_WGT_LESS_THAN_LAST	0x05080000
AP_DUPLICATE_PORT_NUMBER	0x05100000
AP_PU_ALREADY_ACTIVE	0x05900000
AP_BAD_TP_TYPE	0x05FF0000
AP_SEC_BAD_PASSWORD_MISSING	0x05FF0F08
AP_INVALID_STATS_TYPE	0x06070000
AP_DUPLICATE_PORT_NAME	0x06100000
AP_PU_NOT_ACTIVE	0x06900000
AP_ALREADY_REGISTERED	0x06FF0000
AP_SEC_BAD_GROUP_INVALID	0x06FF0F08
AP_AS_NEGOTIATED	0x07000000
AP_INVALID_TABLE_TYPE	0x07070000
AP_INVALID_DLC_NAME	0x07100000

AP_DLUS_REJECTED	0x07900000
AP_SEC_BAD_UID_REVOKED_IN_GRP	0x07FF0F08
AP_PORT_DEACTIVATED	0x08070000
AP_INVALID_DLC_TYPE	0x08100000
AP_DLUS_CAPS_MISMATCH	0x08900000
AP_SEC_BAD_UID_NOT_DEFD_TO_GRP	0x08FF0F08
AP_ALLOCATE_NOT_PENDING	0x09050000
AP_INVALID_SET_PASSWORD	0x09070000
AP_INVALID_NUMBER_OF_TG_ROWS	0x09080000
AP_INVALID_LINK_ACTIVE_LIMIT	0x09100000
AP_PU_FAILED_ACTPU	0x09900000
AP_SEC_BAD_UNAUTHRZD_AT_RLU	0x09FF0F08
AP_SNA_DEFD_COS_CANT_BE_CHANGE	0x0A080000
AP_SNA_DEFD_COS_CANT_BE_CHANGED	0x0A080000
AP_PU_NOT_RESET	0x0A900000
AP_SEC_BAD_UNAUTHRZD_FROM_LLU	0x0AFF0F08
AP_INVALID_NUM_PORTS_SPECIFIED	0x0B100000
AP_PU_OWNS_LUS	0x0B900000
AP_SEC_BAD_UNAUTHRZD_TO_TP	0x0BFF0F08
AP_INVALID_PORT_NAME	0x0C100000
AP_INVALID_FILTER_OPTION	0x0C900000
AP_SEC_BAD_INSTALL_EXIT_FAILED	0x0CFF0F08
AP_INVALID_PORT_TYPE	0x0D100000
AP_INVALID_STOP_TYPE	0x0D900000
AP_SEC_BAD_PROCESSING_FAILURE	0x0DFF0F08
AP_UNRECOGNIZED_DEACT_TYPE	0x0E050000
AP_PORT_ACTIVE	0x0E100000
AP_PU_ALREADY_DEFINED	0x0E900000
AP_NO_PORTS_DEFINED_ON_DLC	0x0F100000
AP_DEPENDENT_LU_NOT_SUPPORTED	0x0F900000
AP_INVALID_DLC	0x10050000
AP_COS_NAME_NOT_DEFD	0x10080000
AP_DUPLICATE_PORT	0x10100000
AP_INVALID_DSPU_SERVICES	0x10900000
AP_BAD_CONV_TYPE	0x11000000
AP_SNA_DEFD_COS_CANT_BE_DELETE	0x11080000
AP_SNA_DEFD_COS_CANT_BE_DELETED	0x11080000
AP_STOP_PORT_PENDING	0x11100000
AP_DSPU_SERVICES_NOT_SUPPORTED	0x11900000
AP_BAD_SYNC_LEVEL	0x12000000
AP_LU_NAU_ADDR_ALREADY_DEFD	0x12020000
AP_INVALID_SESSION_ID	0x12050000
AP_LINK_DEACT_IN_PROGRESS	0x12100000
AP_INVALID_DSPU_NAME	0x12900000
AP_BAD_SECURITY	0x13000000
AP_INVALID_NN_SESSION_TYPE	0x13050000
AP_LINK_DEACTIVATED	0x13100000
AP_PARTNER_NOT_FOUND	0x13200000
AP_PARTNER_NOT_RESPONDING	0x13300000
AP_ERROR	0x13400000
AP_DSPU_ALREADY_DEFINED	0x13900000
AP_BAD_RETURN_CONTROL	0x14000000
AP_INVALID_MAX_NEGOT_SESS_LIM	0x14020000
AP_INVALID_SET_COLLECT_STATS	0x14050000
AP_LINK_ACT_BY_REMOTE	0x14100000
AP_INVALID_SOLICIT_SSCP_SESS	0x14900000
AP_INVALID_BACK_LEVEL_SUPPORT	0x15000000
AP_INVALID_MODE_NAME	0x15020000
AP_INVALID_SET_COLLECT_NAMES	0x15050000
AP_LINK_ACT_BY_LOCAL	0x15100000
AP_INVALID_TG_NUMBER	0x15500000
AP_MISSING_CP_NAME	0x15510000
AP_MISSING_CP_TYPE	0x15520000
AP_INVALID_CP_TYPE	0x15520000
AP_DUPLICATE_TG_NUMBER	0x15530000
AP_TG_NUMBER_IN_USE	0x15540000
AP_MISSING_TG_NUMBER	0x15550000

AP_PARALLEL_TGS_NOT_ALLOWED	0x15570000
AP_INVALID_BKUP_DLUS_NAME	0x15900000
AP_PIP_LEN_INCORRECT	0x16000000
AP_INVALID_RECV_PACING_WINDOW	0x16020000
AP_INVALID_SET_COLLECT_RSCVS	0x16050000
AP_SEC_REQUESTED_NOT_SUPPORTED	0x16900000
AP_NO_USE_OF_SNASVCMG	0x17000000
AP_INVALID_CNOS_SLIM	0x17020000
AP_LINK_NOT_DEFD	0x17100000
AP_INVALID_DUPLEX_SUPPORT	0x17900000
AP_UNKNOWN_PARTNER_MODE	0x18000000
AP_INVALID_TARGET_PACING_CNT	0x18020000
AP_PS_CREATION_FAILURE	0x18100000
AP_QUEUE_PROHIBITED	0x18900000
AP_INVALID_MAX_RU_SIZE_UPPER	0x19020000
AP_TP_ACTIVE	0x19100000
AP_INVALID_TEMPLATE_NAME	0x19900000
AP_INVALID_SNASVCMG_MODE_LIMIT	0x1A020000
AP_MODE_ACTIVE	0x1A100000
AP_CLASHING_NAU_RANGE	0x1A900000
AP_PLU_ACTIVE	0x1B100000
AP_INVALID_NAU_RANGE	0x1B900000
AP_INVALID_COS_SNASVCMG_MODE	0x1C020000
AP_INVALID_PLU_NAME	0x1C100000
AP_INVALID_NUM_DSLU_TEMPLATES	0x1C900000
AP_INVALID_DEFAULT_RU_SIZE	0x1D020000
AP_INVALID_SET_NEGOTIABLE	0x1D100000
AP_GLOBAL_TIMEOUT_NOT_DEFINED	0x1D900000
AP_INVALID_MIN_CONWINNERS	0x1E020000
AP_INVALID_MODE_NAME_SELECT	0x1E100000
AP_INVALID_RESOURCE_NAME	0x1E900000
AP_INVALID_RESPONSIBLE	0x1F100000
AP_INVALID_DLUS_RETRY_TIMEOUT	0x1F900000
AP_MODE_SESS_LIM_EXCEEDS_NEG	0x20020000
AP_INVALID_DRAIN_SOURCE	0x20100000
AP_INVALID_DLUS_RETRY_LIMIT	0x20900000
AP_CPSVCMG_ALREADY_DEFD	0x21020000
AP_INVALID_CN_NAME	0x21080000
AP_INVALID_DRAIN_TARGET	0x21100000
AP_TP_NAME_NOT_RECOGNIZED	0x21600810
AP_INVALID_MIN_CONLOSERS	0x21900000
AP_BAD_DUPLEX_TYPE	0x22000000
AP_INVALID_BYPASS_SECURITY	0x22020000
AP_DEF_LINK_INVALID_SECURITY	0x22080000
AP_INVALID_FORCE	0x22100000
AP_SYSTEM_TP_CANT_BE_CHANGED	0x22600810
AP_INVALID_MAX_RU_SIZE_LOW	0x22900000
AP_FDX_NOT_SUPPORTED_BY_LU	0x23000000
AP_TEST_INVALID_FOR_FDX	0x23010000
AP_INVALID_IMPLICIT_PLU_FORBID	0x23020000
AP_INVALID_PROPAGATION_DELAY	0x23080000
AP_SYSTEM_TP_CANT_BE_DELETED	0x23600810
AP_INVALID_MAX_RECV_PACING_WIN	0x23900000
AP_SEND_EXPD_INVALID_LENGTH	0x24010000
AP_INVALID_SPECIFIC_SECURITY	0x24020000
AP_INVALID_EFFECTIVE_CAPACITY	0x24080000
AP_INVALID_CLEANUP_TYPE	0x24100000
AP_INVALID_DYNAMIC_LOAD	0x24600810
AP_RU_SIZE_LOW_UPPER_MISMATCH	0x24900000
AP_RCV_EXPD_INVALID_LENGTH	0x25010000
AP_INVALID_DELAYED_LOGON	0x25020000
AP_INVALID_COS_NAME	0x25100000
AP_INVALID_ENABLED	0x25600810
AP_LU_ALREADY_ACTIVATING	0x25900000
AP_EXPD_BAD_RETURN_CONTROL	0x26010000
AP_INVALID_CNOS_PERMITTED	0x26020000
AP_PW_SUB_NOT_SUPP_ON_SESS	0x26050000

AP_INVALID_SESSION_LIMIT	0x26100000
AP_INVALID_PIP_ALLOWED	0x26600810
AP_LU_DEACTIVATING	0x26900000
AP_EXPD_DATA_BAD_CONV_STATE	0x27010000
AP_INVALID_DRAIN	0x27100000
AP_LU_ALREADY_ACTIVE	0x27900000
AP_INVALID_PRLL_SESS_SUPP	0x28100000
AP_INVALID_MIN_CONTENTION_SUM	0x28900000
AP_INVALID_LU_NAME	0x29100000
AP_COMPRESSION_NOT_SUPPORTED	0x29900000
AP_MODE_NOT_RESET	0x2A100000
AP_INVALID_MAX_COMPRESS_LVL	0x2A900000
AP_MODE_RESET	0x2B100000
AP_INVALID_COMPRESSION	0x2B900000
AP_CNOS_REJECT	0x2C100000
AP_INVALID_EXCEPTION_INDEX	0x2C900000
AP_INVALID_OP_CODE	0x2D100000
AP_INVALID_MAX_LS_EXCEPTION	0x2D900000
AP_INVALID_DISABLE	0x2E900000
AP_INVALID_MODIFY_TEMPLATE	0x2F900000
AP_INVALID_ALLOW_TIMEOUT	0x30900000
AP_CONFIRM_ON_SYNC_LEVEL_NONE	0x31000000
AP_PIP_NOT_ALLOWED	0x31600810
AP_TRANS_PGM_NOT_AVAIL_RETRY	0x31604B08
AP_POST_ON_RECEIPT_BAD_FILL	0x31900000
AP_CONFIRM_BAD_STATE	0x32000000
AP_UNKNOWN_USER	0x32100000
AP_POST_ON_RECEIPT_BAD_STATE	0x32900000
AP_CONFIRM_NOT_LL_BDY	0x33000000
AP_NO_PROFILES	0x33100000
AP_INVALID_HPR_SUPPORT	0x33900000
AP_CONFIRM_INVALID_FOR_FDX	0x34000000
AP_CONVERSATION_TYPE_MISMATCH	0x34600810
AP_INVALID_LU_MODEL	0x34900000
AP_INVALID_MODEL_NAME	0x35900000
AP_TOO_MANY_PROFILES	0x36100000
AP_INVALID_CRYPTOGRAPHY	0x36900000
AP_INVALID_UPDATE_TYPE	0x37100000
AP_INVALID_CLU_CRYPTOGRAPHY	0x37900000
AP_DIR_ENTRY_PARENT	0x38100000
AP_INVALID_RESOURCE_TYPES	0x38900000
AP_NODE_ALREADY_STARTED	0x39100000
AP_CHECKSUM_FAILED	0x39900000
AP_NODE_FAILED_TO_START	0x3A100000
AP_DATA_CORRUPT	0x3A900000
AP_LU_ALREADY_DEFINED	0x3B100000
AP_INVALID_RETRY_FLAGS	0x3B900000
AP_IMPLICIT_LU_DEFINED	0x3C100000
AP_DELAYED_VERB_PENDING	0x3C900000
AP_PORT_INACTIVE	0x3D100000
AP_DSLU_ACTIVE	0x3D900000
AP_ACTIVATION_LIMITS_REACHED	0x3E100000
AP_ACTIVATION_LIMITS_REACHED	0x3E100000
AP_INVALID_BRANCH_LINK_TYPE	0x3E900000
AP_PARALLEL_TGS_NOT_SUPPORTED	0x3F100000
AP_INVALID_BRNN_SUPPORT	0x3F900000
AP_DLC_INACTIVE	0x40100000
AP_BRNN_SUPPORT_MISSING	0x40900000
AP_CONFIRMED_BAD_STATE	0x41000000
AP_NO_LINKS_DEFINED	0x41100000
AP_SYNC_LEVEL_NOT_SUPPORTED	0x41600810
AP_INVALID_UPLINK	0x41900000
AP_CONFIRMED_INVALID_FOR_FDX	0x42000000
AP_STOP_DLC_PENDING	0x42100000
AP_INVALID_DOWNLINK	0x42900000
AP_INVALID_LS_ROLE	0x43100000
AP_INVALID_IMPLICIT_UPLINK	0x43900000

AP_INVALID_BTU_SIZE	0x44100000
AP_INVALID_ROCP_NAME	0x44900000
AP_LAST_LINK_ON_ACTIVE_PORT	0x45100000
AP_INVALID_REG_WITH_NN	0x45900000
AP_DYNAMIC_LOAD_ALREADY_REGD	0x46100000
AP_LS_PENDING_RETRY	0x46900000
AP_INVALID_LIST_OPTION	0x47100000
AP_INVALID_COS_TABLE_VERSION	0x47900000
AP_INVALID_RES_NAME	0x48100000
AP_CFRTP_REQUIRED_FOR_MLTG	0x48900000
AP_INVALID_RES_TYPE	0x49100000
AP_INVALID_MLTG_PAC_ALGORITHM	0x49900000
AP_INVALID_ADJ_NNCP_NAME	0x4A100000
AP_LIM_RESRCE_INVALID_FOR_MLTG	0x4A900000
AP_INVALID_NODE	0x4B100000
AP_AUTO_ACT_INVALID_FOR_MLTG	0x4B900000
AP_INVALID_ORIGIN_NODE	0x4C100000
AP_MLTG_LS_VISIBILITY_MISMATCH	0x4C900000
AP_INVALID_TG	0x4D100000
AP_SLTG_LINK_ACTIVE	0x4D900000
AP_INVALID_FQPCID	0x4E100000
AP_MLTG_LINK_PROPERTIES_DIFFER	0x4E900000
AP_INVALID_POOL_NAME	0x4F100000
AP_INVALID_ADJ_CP_NAME	0x4F900000
AP_BAD_TYPE	0x50020000
AP_INVALID_NAU_ADDRESS	0x50100000
AP_INVALID_ENABLE_POOL	0x50300000
AP_INVALID_SEND_TERM_SELF	0x50900000
AP_DEALLOC_BAD_TYPE	0x51000000
AP_LU_NAME_POOL_NAME_CLASH	0x51100000
AP_SECURITY_NOT_VALID	0x51600F08
AP_INVALID_TERM_METHOD	0x51900000
AP_DEALLOC_FLUSH_BAD_STATE	0x52000000
AP_INVALID_PRIORITY	0x52100000
AP_INVALID_DISABLE_BRANCH_AWRN	0x52900000
AP_DEALLOC_CONFIRM_BAD_STATE	0x53000000
AP_INVALID_DNST_LU_NAME	0x53100000
AP_INVALID_SHARING_PROHIBITED	0x53900000
AP_INVALID_HOST_LU_NAME	0x54100000
AP_INVALID_LINK_SPEC_FORMAT	0x54900000
AP_DEALLOC_NOT_LL_BDY	0x55000000
AP_PU_NOT_DEFINED	0x55100000
AP_INVALID_CN_TYPE	0x55900000
AP_INVALID_PU_NAME	0x56100000
AP_INVALID_PU_TYPE	0x56600000
AP_INCONSISTENT_BEST_EFFORT	0x56900000
AP_DEALLOC_LOG_LL_WRONG	0x57000000
AP_CNOS_MODE_NAME_REJECT	0x57010000
AP_INVALID_MAX_IFRM_RCVD	0x57100000
AP_INVALID_CN_TG	0x57900000
AP_INVALID_SYM_DEST_NAME	0x58100000
AP_SEC_BAD_PROTOCOL_VIOLATION	0x58600F08
AP_INVALID_LINK_SPEC_DATA	0x58900000
AP_INVALID_LENGTH	0x59100000
AP_DLC_UI_ONLY	0x59900000
AP_INVALID_ISR_THRESHOLDS	0x5A100000
AP_ADJ_CP_WRONG_TYPE	0x5A900000
AP_BAD_PARTNER_LU_ALIAS	0x5B010000
AP_INVALID_NUM_LUS	0x5B100000
AP_CP_CP_SESS_ALREADY_ACTIVE	0x5B900000
AP_EXCEEDS_MAX_ALLOWED	0x5C010000
AP_CANT_DELETE_ADJ_ENDNODE	0x5C100000
AP_NO_ACTIVE_CP_CP_LINK	0x5C900000
AP_LU_MODE_SESSION_LIMIT_ZERO	0x5D010000
AP_INVALID_RESOURCE_TYPE	0x5D100000
AP_PU_CONC_NOT_SUPPORTED	0x5E100000
AP_INVALID_IMPL_APPN_LINKS_LEN	0x5E900000

AP_CNOS_COMMAND_RACE_REJECT	0x5F010000
AP_DLUR_NOT_SUPPORTED	0x5F100000
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AP_P_TO_R_NOT_SEND_STATE	0xA3000000
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AP_RCV_AND_WAIT_BAD_FILL	0xB5000000
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AP_INVALID_MESSAGE_TYPE	0xB7060000
AP_CANT_DELETE_CP_LU	0xB7070000
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Appendix B. Common Return Codes

This appendix describes the primary and secondary return codes that are common to all NOF verbs.

Return codes that are specific to a particular verb, or a group of verbs, are described in the individual verb descriptions in Chapter 3, "NOF API Verbs," on page 43.

Communications Subsystem Not Active

If the verb does not execute because a required component is not active, CS Linux returns the following parameters:

primary_rc
AP_COMM_SUBSYSTEM_ABENDED

secondary_rc
One of the following:

AP_LOCAL_ABENDED
The CS Linux software has stopped.

AP_TARGET_ABENDED
The target node has stopped or the communication path to it has failed.

primary_rc

AP_COMM_SUBSYSTEM_NOT_LOADED
The CS Linux software is not active.

secondary_rc
Not used.

primary_rc

AP_NODE_NOT_STARTED
The target node has not been started.

secondary_rc
Not used.

primary_rc

AP_NODE_STOPPING
The target node is in the process of stopping (as a result of a TERM_NODE verb).

secondary_rc
Not used.

Indication

This return code does not signify an error.

If the application has registered using REGISTER_INDICATION_SINK to receive configuration indications or SNA network file indications, CS Linux sends an indication each time another NOF API application or a CS Linux component

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modifies the target file or the target node's configuration. The format of this indication is the same as the returned VCB for the NOF verb that modified the configuration. CS Linux sets this primary return code to indicate that the VCB being returned is a configuration indication or an SNA network file indication, rather than the response to a verb issued by the application; this enables the application to distinguish between its own verb returns and indications resulting from verbs issued by other applications.

primary_rc
AP_INDICATION

secondary_rc
Possible values are:

AP_EXTRA_DATA_LOST
CS Linux was unable to allocate sufficient storage to return the complete VCB for this indication; the returned information is incomplete. The application should issue the appropriate QUERY_* verb to obtain more information about the modified component.

(zero) The complete VCB for this indication is being returned.

Invalid Function

If the verb does not execute because the node does not recognize it as a valid verb, CS Linux returns the following parameters:

primary_rc

AP_INVALID_VERB
The *opcode* parameter was not set to the operation code of any NOF verb, or the verb identified by this parameter cannot be used because this version of CS Linux does not support it.

secondary_rc
Not used.

primary_rc

AP_FUNCTION_NOT_SUPPORTED
The NOF verb identified by the specified *opcode* parameter cannot be used because the target node's configuration does not support it.

secondary_rc
Not used.

Invalid Verb Segment

WINDOWS

If the verb does not execute because the VCB was not contained within a data segment, CS Linux returns the following parameters:

primary_rc

AP_INVALID_VERB_SEGMENT
The verb control block extended beyond the end of a data segment. The verb did not execute.

A secondary return code is not returned.

Parameter Check

If the verb does not execute because of a parameter error, CS Linux returns the following parameters:

primary_rc
AP_PARAMETER_CHECK

secondary_rc
One of the following:

AP_INVALID_FORMAT
The reserved parameter *format* was not set to zero.

AP_INVALID_TARGET_HANDLE
The supplied target handle is not valid.

AP_INVALID_TARGET
The verb cannot be issued to the specified target. For example, QUERY_PARTNER_LU, which returns information about an LU's current usage, can be issued only to a running node; it is not valid when issued to a file.

AP_INVALID_TARGET_MODE
The verb cannot be issued in the current mode. For example, only QUERY_* verbs can be issued in read-only mode; DEFINE_*, DELETE_*, START_*, and STOP_* verbs are not valid in this mode.

AP_NOT_SERVER
This return code occurs only when you are running the NOF application program on a client. The verb that you issued is not valid on a client; it can be issued only on a server.

AP_SYNC_NOT_ENABLED
The application issued this verb within a callback routine, using the synchronous NOF entry point. Any verb issued from a callback routine must use the asynchronous entry point.

State Check

If the verb does not execute because of a state check, CS Linux returns the following parameters.

primary_rc
AP_STATE_CHECK

secondary_rc
One of the following:

AP_CANT_MODIFY_VISIBILITY
You have attempted to define a resource with a name that is reserved for use internally by CS Linux. Please choose a different name.

AP_FILE_LOCK_FAILED
The application issued SET_PROCESSING_MODE to change to

commit mode, but CS Linux failed to get a lock on the configuration file. This can be because another NOF API application or CS Linux component is already accessing the file.

AP_FILE_UNLOCK_FAILED
The application issued SET_PROCESSING_MODE to change from commit mode to one of the other modes, but CS Linux failed to release its lock on the configuration file. In order to free the file when this error occurs, CS Linux closes the application's handle to the file. The application must issue OPEN_FILE again, to obtain a new file handle, before attempting to issue any more verbs to this file.

AP_FILE_UNAVAILABLE
The connection to the target file has been lost.

AP_NOT_MASTER
The target file is a copy of the domain configuration file, or of the **sna.net** file, on a server that is not the master server. Verbs that modify these files must be issued to the master server's copy of the files.

AP_SYNC_PENDING
This verb was issued using the synchronous NOF API entry point, but another synchronous verb was in progress. Only one synchronous verb can be in progress at any time.

System Error

If the verb does not execute because of an operating system error, CS Linux returns the following parameters:

primary_rc

AP_UNEXPECTED_SYSTEM_ERROR
An operating system call failed during processing of the verb.

secondary_rc
The secondary return code in this case is the return code from the operating system call.

UNIX

For the meaning of the operating system return code, see the file **/usr/include/errno.h** on the computer where the error occurred. Typically, the return code will indicate a condition such as memory shortage.

WINDOWS

For the meaning of the operating system return code, refer to your operating system documentation.

If the problem persists, consult your System Administrator.

If the verb was issued to change the target configuration (such as DEFINE_* or DELETE_*), or to perform an action (such as START_*), the application should issue the appropriate QUERY_* verb to determine

whether the change or action succeeded. In particular, if this error occurs while processing a DEFINE_* or DELETE_* verb containing multiple data structures, the change can be incomplete.

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- CS Linux, Version 7.0
- Systems Network Architecture (SNA)
- Host configuration
- z/OS® Communications Server
- Transmission Control Protocol/Internet Protocol (TCP/IP)
- X.25
- Advanced Program-to-Program Communication (APPC)
- Programming
- Other IBM networking topics

For books in the CS Linux library, brief descriptions are provided. For other books, only the titles and order numbers are shown here.

CS Linux Version 7.0 Publications

The CS Linux library comprises the following books. In addition, softcopy versions of these documents are provided on the CD-ROM. See *IBM Communications Server for Data Center Deployment on Linux Quick Beginnings* for information about accessing the softcopy files on the CD-ROM. To install these softcopy books on your system, you require 9–15 MB of hard disk space (depending on which national language versions you install).

- *IBM Communications Server for Data Center Deployment on Linux Quick Beginnings* (GC31-6768 and GC31-6769)

  This book is a general introduction to CS Linux, including information about supported network characteristics, installation, configuration, and operation. There are two versions of this book:

  GC31-6768 is for CS Linux on the i686, x86_64, and ppc64 platforms
  GC31-6769 is for CS Linux for System z.

- *IBM Communications Server for Data Center Deployment on Linux Administration Guide* (SC31-6771)

  This book provides an SNA and CS Linux overview and information about CS Linux configuration and operation.

- *IBM Communications Server for Data Center Deployment on Linux Administration Command Reference* (SC31-6770)

  This book provides information about SNA and CS Linux commands.

- *IBM Communications Server for Data Center Deployment on AIX or Linux CPI-C Programmer's Guide* (SC23-8591)

  This book provides information for experienced "C" or Java programmers about writing SNA transaction programs using the CS Linux CPI Communications API.

- *IBM Communications Server for Data Center Deployment on AIX or Linux APPC Programmer's Guide* (SC23-8592)

  This book contains the information you need to write application programs using Advanced Program-to-Program Communication (APPC).

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- *IBM Communications Server for Data Center Deployment on AIX or Linux LUA Programmer's Guide* (SC23-8590)

  This book contains the information you need to write applications using the Conventional LU Application Programming Interface (LUA).
- *IBM Communications Server for Data Center Deployment on AIX or Linux CSV Programmer's Guide* (SC23-8589)

  This book contains the information you need to write application programs using the Common Service Verbs (CSV) application program interface (API).
- *IBM Communications Server for Data Center Deployment on AIX or Linux MS Programmer's Guide* (SC23-8596)

  This book contains the information you need to write applications using the Management Services (MS) API.
- *IBM Communications Server for Data Center Deployment on Linux NOF Programmer's Guide* (SC31-6778)

  This book contains the information you need to write applications using the Node Operator Facility (NOF) API.
- *IBM Communications Server for Data Center Deployment on Linux Diagnostics Guide* (SC31-6779)

  This book provides information about SNA network problem resolution.
- *IBM Communications Server for Data Center Deployment on AIX or Linux APPC Application Suite User's Guide* (SC23-8595)

  This book provides information about APPC applications used with CS Linux.
- *IBM Communications Server for Data Center Deployment on Linux Glossary* (GC31-6780)

  This book provides a comprehensive list of terms and definitions used throughout the CS Linux library.

Systems Network Architecture (SNA) Publications

The following books contain information about SNA networks:

- *Systems Network Architecture: Format and Protocol Reference Manual—Architecture Logic for LU Type 6.2* (SC30-3269)
- *Systems Network Architecture: Formats* (GA27-3136)
- *Systems Network Architecture: Guide to SNA Publications* (GC30-3438)
- *Systems Network Architecture: Network Product Formats* (LY43-0081)
- *Systems Network Architecture: Technical Overview* (GC30-3073)
- *Systems Network Architecture: APPN Architecture Reference* (SC30-3422)
- *Systems Network Architecture: Sessions between Logical Units* (GC20-1868)
- *Systems Network Architecture: LU 6.2 Reference—Peer Protocols* (SC31-6808)
- *Systems Network Architecture: Transaction Programmer's Reference Manual for LU Type 6.2* (GC30-3084)
- *Systems Network Architecture: 3270 Datastream Programmer's Reference* (GA23-0059)
- *Networking Blueprint Executive Overview* (GC31-7057)
- *Systems Network Architecture: Management Services Reference* (SC30-3346)

Host Configuration Publications

The following books contain information about host configuration:

- *ES/9000, ES/3090 IOCP User's Guide Volume A04* (GC38-0097)
- *3174 Establishment Controller Installation Guide* (GG24-3061)
- *3270 Information Display System 3174 Establishment Controller: Planning Guide* (GA27-3918)
- *OS/390 Hardware Configuration Definition (HCD) User's Guide* (SC28-1848)

z/OS Communications Server Publications

The following books contain information about z/OS Communications Server:

- *z/OS V1R7 Communications Server: SNA Network Implementation Guide* (SC31-8777)
- *z/OS V1R7 Communications Server: SNA Diagnostics* (Vol 1: GC31-6850, Vol 2: GC31-6851)
- *z/OS V1R6 Communications Server: Resource Definition Reference* (SC31-8778)

TCP/IP Publications

The following books contain information about the Transmission Control Protocol/Internet Protocol (TCP/IP) network protocol:

- *z/OS V1R7 Communications Server: IP Configuration Guide* (SC31-8775)
- *z/OS V1R7 Communications Server: IP Configuration Reference* (SC31-8776)
- *z/VM V5R1 TCP/IP Planning and Customization* (SC24-6125)

X.25 Publications

The following books contain information about the X.25 network protocol:

- *Communications Server for OS/2 Version 4 X.25 Programming* (SC31-8150)

APPC Publications

The following books contain information about Advanced Program-to-Program Communication (APPC):

- *APPC Application Suite V1 User's Guide* (SC31-6532)
- *APPC Application Suite V1 Administration* (SC31-6533)
- *APPC Application Suite V1 Programming* (SC31-6534)
- *APPC Application Suite V1 Online Product Library* (SK2T-2680)
- *APPC Application Suite Licensed Program Specifications* (GC31-6535)
- *z/OS V1R2.0 Communications Server: APPC Application Suite User's Guide* (SC31-8809)

Programming Publications

The following books contain information about programming:

- *Common Programming Interface Communications CPI-C Reference* (SC26-4399)
- *Communications Server for OS/2 Version 4 Application Programming Guide* (SC31-8152)

Other IBM Networking Publications

The following books contain information about other topics related to CS Linux:

- *SDLC Concepts* (GA27-3093)
- *Local Area Network Concepts and Products: LAN Architecture* (SG24-4753)
- *Local Area Network Concepts and Products: LAN Adapters, Hubs and ATM* (SG24-4754)
- *Local Area Network Concepts and Products: Routers and Gateways* (SG24-4755)
- *Local Area Network Concepts and Products: LAN Operating Systems and Management* (SG24-4756)
- *IBM Network Control Program Resource Definition Guide* (SC30-3349)

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