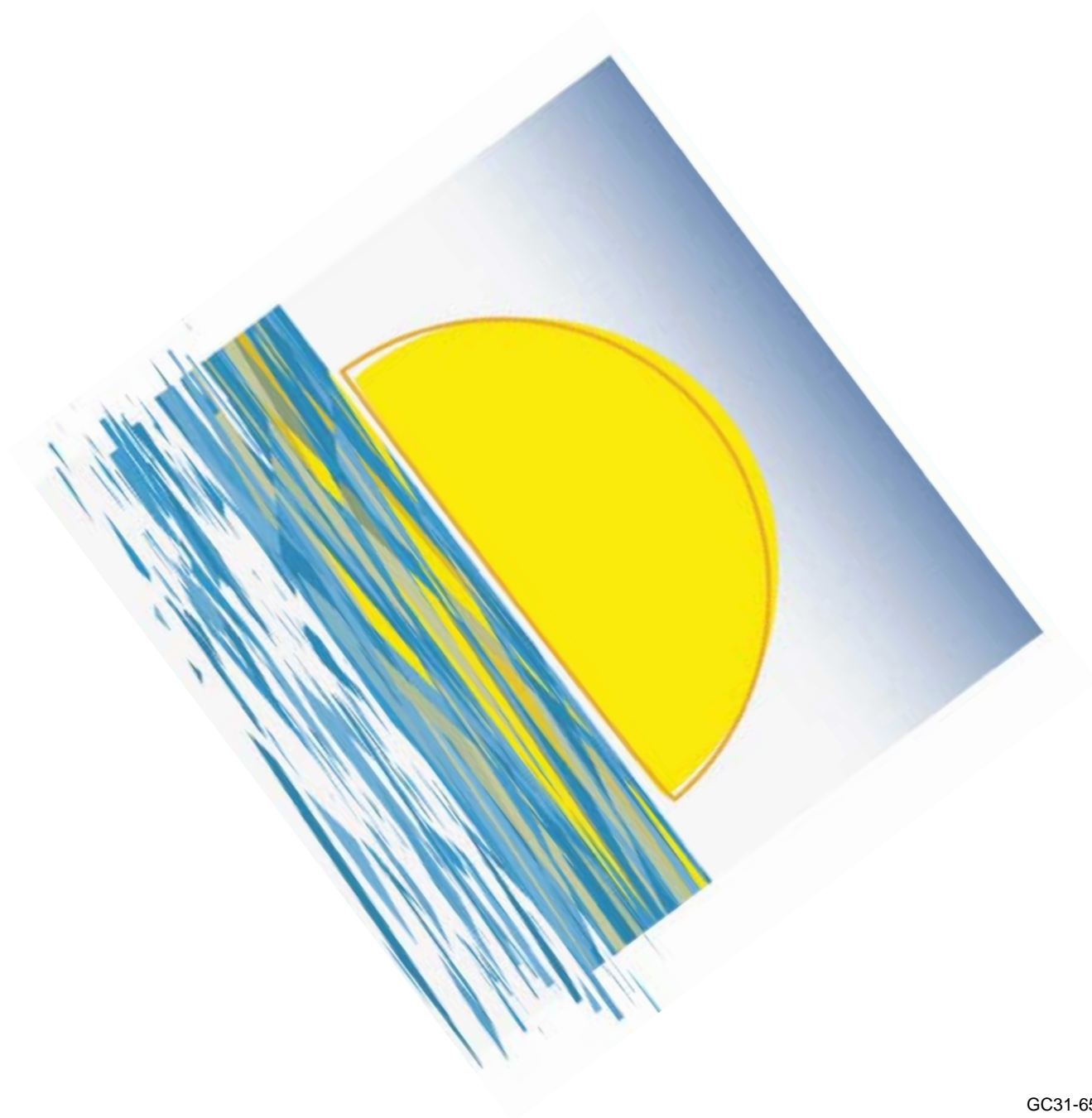


VTAM™



# Release Guide

*Version 4 Release 4 for MVS/ESA*





VTAM™



# Release Guide

*Version 4 Release 4 for MVS/ESA*

**Note!**

Before using this document, read the general information under "Notices" on page ix.

**First Edition (March 1997)**

This edition applies to the Advanced Communications Function for Virtual Telecommunications Access Method (ACF/VTAM), an IBM licensed program, VTAM Version 4 Release 4 for MVS/ESA (program number 5695-117) and to OS/390 (5645-001).

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First Failure Support technology	NTuneNCP
FFST	OS/2
IBM	VM/ESA
IBMLINK	VSE/ESA
MVS/ESA	VTAM



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## About This Book

This book helps the system planner and the system programmer decide which functions of VTAM\* V4R4 to plan for and to implement.

---

## Who Should Use This Book

This book is for current VTAM users who are familiar with the basic functions of VTAM and are planning to install VTAM V4R4. You can use this book to evaluate the new functions and determine how they fit into your network.

Before using this book, you should be familiar with the basic concepts of telecommunication, Systems Network Architecture (SNA), Advanced Peer-to-Peer Networking\* (APPN\*), and VTAM. For information on SNA and APPN, refer to the *Systems Network Architecture Technical Overview*. For information on VTAM, see the VTAM publications listed in "Bibliography" on page 197.

---

## How to Use This Book

This book and the *VTAM Installation and Migration Guide* are companion books and can be used in the following order:

1. Before you install VTAM V4R4, use this book to learn about the benefits of the new functions and to estimate the changes each function requires.
2. If you are migrating from a previous release, or if you are planning the installation of VTAM V4R4, use the *VTAM Installation and Migration Guide* to learn about changes required for VTAM V4R4 and to learn about how to install VTAM V4R4.
3. After you have installed VTAM V4R4, use this book and the *VTAM Network Implementation Guide* to plan the implementation of new functions over time.

## How This Book is Organized

This book is an overview of the new functions in VTAM V4R4. It provides the following information:

**Part 1, "Introduction to VTAM V4R4" on page 1**

Categorizes and lists the functions that are new in VTAM V4R4.

**Part 2, "VTAM V4R4 Functions" on page 7**

Describes the functions that are new in VTAM V4R4. For each function, the following information is provided, if appropriate:

- Description of the function
- What the function enables you to do
- Summary of changes
- Programming requirements
- Planning considerations
- Where to find more information.

**Part 3, "Bibliography and Index" on page 195**

Provides order numbers for books referred to in this book, and provides page numbers for topics covered in this book.

# Artwork Used in This Book

Figure 1 shows the conventions used in this book to illustrate the parts of a network.

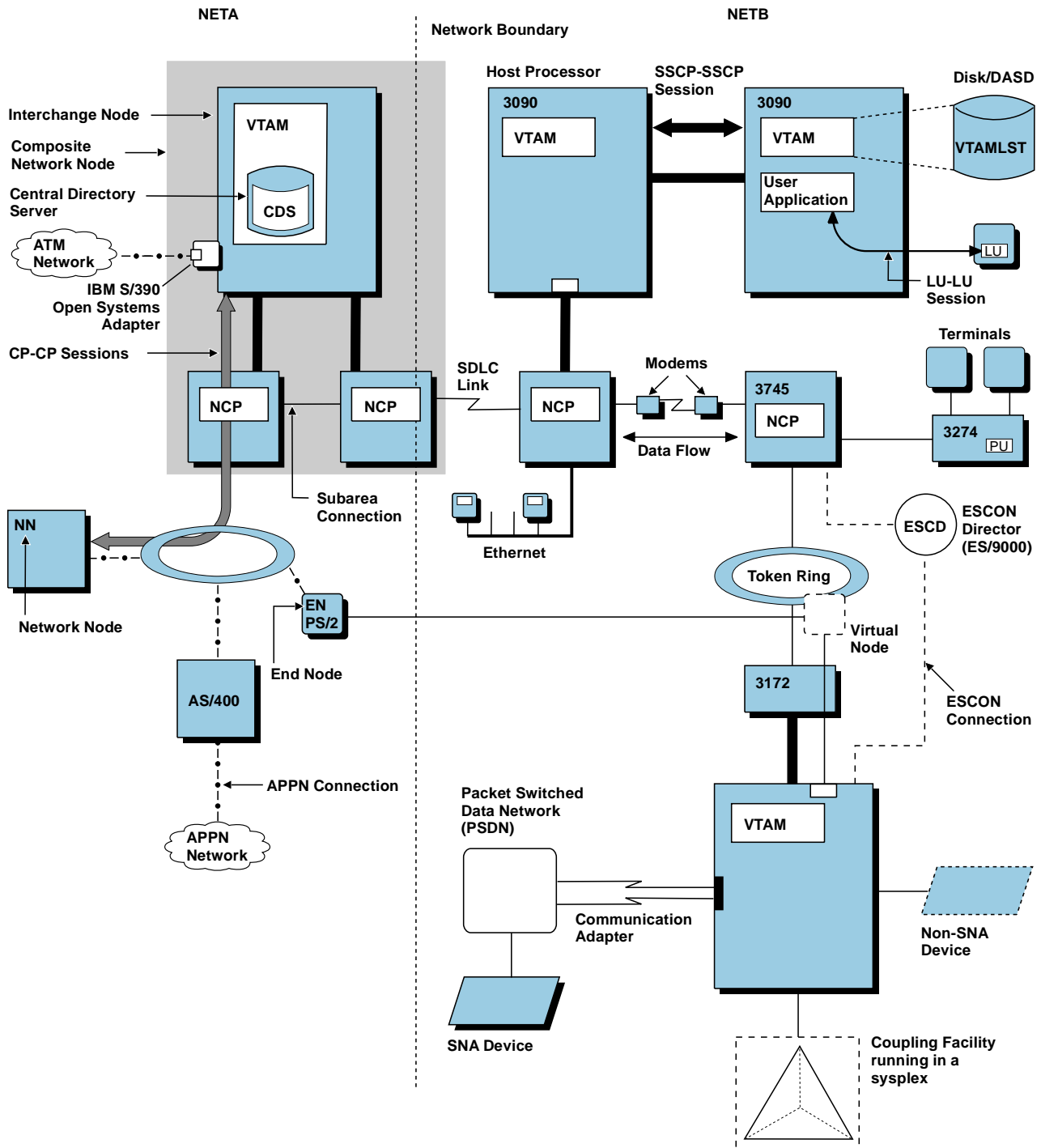


Figure 1. Conventions Used in Network Illustrations

---

## Where to Find Information about VTAM

“Bibliography” on page 197 describes the books in the VTAM V4R4 library, arranged according to related tasks. The bibliography also lists the titles and order numbers of books related to this book or cited by name in this book.

You can read more about VTAM, OS/390, and IBM on these Web pages:

**Home Page**

VTAM MVS/ESA

OS/390

IBM Networking

IBM

**Uniform Resource Locator (URL)**

<http://www.networking.ibm.com/vta/vtaprod.html>

<http://www.s390.ibm.com/os390/>

<http://www.networking.ibm.com/>

<http://www.ibm.com/>

For definitions of the terms and abbreviations used in VTAM books, refer to the *VTAM Glossary*. You can also view or download the latest *IBM Networking Softcopy Glossary* at the following URL:

<http://www.networking.ibm.com/nsg/nsggls.htm>





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## Chapter 1. Introduction to VTAM V4R4

VTAM V4R4 is a network communication access method that implements System Network Architecture (SNA), including advanced peer-to-peer networking (APPN), and high performance routing (HPR). It provides the interface between application programs in a host processor and other resources in an SNA network, and links peer users of the network. VTAM's multiprotocol support is significantly enhanced in VTAM V4R4 through TCP/IP data link control (DLC) provision and asynchronous transfer mode (ATM) support.

VTAM V4R4 includes functions introduced in earlier versions and releases, as well as enhancements described in this book.

### A Letter to VTAM Users

Dear Users,

As many of you know, we witnessed a major breakthrough in the capabilities of VTAM with the release of Version 4 in 1993. Since then, we have been working harder than ever to provide you with the communications support you need to build the world's premier computer networks.

Our goal is to enable users to take full advantage of the new functions available in Version 4, and many of you are well on your way. Today, you can easily add, delete, or change processors; quickly change applications; distribute workload among processors; transfer data faster; route around network and data host failures; and use cutting edge attachments to your server. No other communications product provides the broad range and diversity of function that VTAM does, and those of us on the VTAM product team are immensely proud of what we have accomplished with Version 4.

With each release of VTAM Version 4, we have included improvements large and small while also addressing new features we felt should be incorporated in a top-notch network server. Some releases focused on improving performance, others on simplifying scale-up of VTAM in a large network, and still others on enabling you to build fault tolerant networks. We have kept in close communication with you, the VTAM users, through briefings, conferences, phone, and e-mail. As the collective vision of the ultimate network took shape, we endeavored to make this vision a reality. While certain aspects of the endeavor have provided a challenge for our product team, an innovative and determined approach has once again borne fruit.

We are now pleased to bring you Release 4, representing a smooth integration of all the Version 4 improvements to date, plus several exciting new features, including support for high bandwidth networking. What this means for you is added capabilities in building state-of-the-art data centers. You will also see changes in the packaging of VTAM as we move into the future. As you might know, VTAM is now shipped as an integral part of the Communications Server component of OS/390. Our intent is to provide an integrated package for all of your network needs.

We look forward to supporting you in your migration undertakings and in helping to put all the latest VTAM features to work for you.

The VTAM Product Team

---

## APPN Enhancements

The following functions enhance the capabilities of VTAM APPN support:

- “Asynchronous Transfer Mode (ATM) Support” on page 21
- “Enhanced Topology Database Garbage Collection” on page 13
- “Locate Congestion Control” on page 15
- “QUIESCE Function for MODIFY TOPO Command” on page 17

- “Search Order Enhancement” on page 18.

---

## High Bandwidth Networking Support

The following functions provide support for high bandwidth networking:

- “Asynchronous Transfer Mode (ATM) Support” on page 21
- “High Performance Data Transfer for APPC” on page 42
- “High Performance Data Transfer MPC” on page 61.

---

## HPR Enhancements

The following function enhances the capabilities of VTAM HPR support:

- “HPR Extensions for Border Node and CNN” on page 69.

---

## LU 6.2 Application Program Interface (API) Enhancements

The following functions enhance LU 6.2 processing:

- “APPCCMD Macroinstruction Enhancements” on page 77
- “APPC Enhancements for the Distributed Computing Environment” on page 81
- “Buffer Tracing Enhancements for LU 6.2 Conversations” on page 117
- “Conversations between Programs Located on the Same LU” on page 86
- “Deleting Unusable Entries from the LU-Mode Table” on page 88
- “Extended Security Sense Codes” on page 89
- “Password Substitution” on page 93
- “STOKEN for Workload Balancing” on page 97.

---

## Network Dynamics

The following functions enable dynamic access to the network. These functions can eliminate or reduce the need to predefine resources in your network, and provide increased end-user availability and automatic backup:

- “Dynamic LU Alias for CDRSCs” on page 99
- “Enhancements to Dynamic Definition of VTAM Application Programs” on page 100
- “Multiple Dynamic Switched Major Nodes” on page 102.

---

## Operator Interface Enhancements

The following functions enhance the VTAM operator interface:

- “DISPLAY SRCHINFO Command” on page 183
- “DISPLAY VTAMSTOR Command” on page 185
- “Displaying Active Resources with Sessions” on page 105
- “Limiting Output from the DISPLAY STORUSE Command” on page 106
- “MODIFY EXIT Command Enhancement” on page 107
- “QUIESCE Function for MODIFY TOPO Command” on page 17.

---

## Performance Enhancements

The following functions enhance VTAM performance:

- “Asynchronous Transfer Mode (ATM) Support” on page 21
- “BUFF Entry for 8K External Buffer” on page 115
- “DELAY Operand Default Change” on page 109
- “Enhanced Adaptive Pacing Support” on page 109
- “New Component Recovery Area (CRA) Buffer Pools” on page 111
- “Multiple Statements in Start and Configuration Decks” on page 111
- “Verifying Communication or Cluster Controller Channel Connections” on page 112
- “Verifying External Communication Adapter Connection Reliability” on page 113.

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## Problem Diagnosis

The following functions are an enhancement to VTAM's problem determination and isolation capabilities:

- “BUFF Entry for 8K External Buffer” on page 115
- “Buffer Tracing Enhancements for LU 6.2 Conversations” on page 117
- “DISPLAY SRCHINFO Command” on page 183
- “DISPLAY VTAMSTOR Command” on page 185
- “Elimination of Duplicate VTAM Dumps” on page 117
- “IST605I Message Group Enhancement” on page 117
- “Locate Congestion Control” on page 15
- “Tracing Resource States with Start List” on page 119
- “Unformatted System Services (USS) Message Text Enhancements” on page 120
- “XID Message Group Enhancement” on page 188
- “XNETALS Start Option Enhancements” on page 190.

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## Security Enhancements

The following functions provide security enhancements to VTAM performance:

- “Enhanced Cryptographic Authentication” on page 123
- “Message Authentication Support and Cryptographic Enhancements” on page 126.

---

## Sysplex Functions

The following functions utilize the MVS sysplex environment:

- “Central Directory Server Enhancement for Generic Resources” on page 135
- “Dynamic Definition of VTAM-to-VTAM Connections” on page 137
- “Enhancements to Dynamic Definition of VTAM Application Programs” on page 100
- “Generic Resource Name for Security Management Profile” on page 144
- “Generic Resources Enhancements” on page 144
- “Multinode Persistent Sessions” on page 146
- “STOKEN for Workload Balancing” on page 97
- “TSO-Generic Resources” on page 156.

---

## System and Configuration Management

The following functions enhance your ability to set up, manage, and control resources in your network using the VTAM program:

- “Applying VTAM Maintenance without Re-IPLing MVS” on page 161
- “Asynchronous Transfer Mode (ATM) Support” on page 21
- “Choice of Communication Network Management (CNM) Routing Tables” on page 166
- “Delayed Disconnection When No LU-LU Session Is Established” on page 168
- “Dynamic Reconfiguration of Switched Resources” on page 169
- “Filtering Initiation Failures From Session Awareness (SAW) Data” on page 171
- “Interpret Table Enhancement” on page 173
- “High Performance Data Transfer MPC” on page 61
- “Applying VTAM Maintenance without Re-IPLing MVS” on page 161
- “Reset LU Enhancement” on page 175
- “Search Retry After Dial-Out Failure” on page 176
- “Support for OS/390 Data Set Concatenation” on page 177
- “TCP/IP DLC Provision” on page 178
- “31-Bit UCB Support” on page 182.

---

## Usability Enhancements

The following functions enhance the usability of VTAM:

- “DISPLAY SRCHINFO Command” on page 183
- “DISPLAY VTAMSTOR Command” on page 185
- “Dynamic LU Alias for CDRSCs” on page 99
- “Prevention of Subtask Detach” on page 187
- “Dynamic Reconfiguration of Switched Resources” on page 169
- “XID Message Group Enhancement” on page 188
- “XNETALS Start Option Enhancements” on page 190.

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## Chapter 2. APPN Enhancements

The following functions enhance VTAM's advanced peer-to-peer networking (APPN) support:

- “Enhanced Topology Database Garbage Collection”
- “Locate Congestion Control” on page 15
- “QUIESCE Function for MODIFY TOPO Command” on page 17
- “Search Order Enhancement” on page 18.

---

### Enhanced Topology Database Garbage Collection

In pre-V4R4 releases, old topology information is deleted from topology databases (garbage collected) when an entry has not been updated in 15 days. However, in dynamic networks, old topology information is exchanged between network nodes regularly. During the topology exchange, an entry that has been deleted from the local topology database can be inserted as a new entry. The MODIFY TOPO command allows the operator to delete entries from the topology database at the local node, but the entry could be added to the database again if a topology database update (TDU) about the resource is received from another network node.

In VTAM V4R4, when a local topology database entry has not been updated for 15 days, garbage collection processing broadcasts a TDU to inform all other network nodes that the resource is being deleted from the topology database. The other network nodes mark that resource in their local topology databases as unusable for route calculation. Each network node supporting enhanced topology database garbage collection deletes the resource during its next garbage collection cycle. Network nodes that do not support enhanced topology database garbage collection reset the time left value to 15 days. Garbage collection occurs once every 24 hours.

If all adjacent network nodes support enhanced topology database garbage collection, VTAM includes the time left value for the resource in each topology database update. When an adjacent network node updates its topology database, the resource entry contains the same time left value as the node sending the update.

The MODIFY TOPO command can initiate the enhanced topology database garbage collection processing before an entry reaches the age of 15 days. When the MODIFY TOPO command is issued with the SCOPE=NETWORK operand, the resource is marked as unusable for route calculation in the topology databases of other network nodes. As with garbage collection processing, each network node supporting enhanced topology database garbage collection deletes the resource during its next garbage collection cycle. Network nodes that do not support enhanced topology database garbage collection reset the time left value to 15 days.

The output of the DISPLAY TOPO command now displays the time left before the resource is deleted from the topology database.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

There are no implementation considerations for this function.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- VTAM network operator commands
- VTAM network operator messages.

### Changed VTAM Network Operator Commands

Table 1 shows VTAM network operator commands that have changed for this function. For information about how to use these VTAM network operator commands, refer to *VTAM Operation*.

Table 1. Changed VTAM Network Operator Commands

Command	Operand	Description
DISPLAY TOPO		The output for nodes and transmission groups now displays the time left before the resource is removed from the topology database.
MODIFY TOPO	SCOPE	This new operand allows the operator to specify whether the request for deletion of a resource is for the local topology database or for all topology databases in the network.

## New and Changed VTAM Network Operator Messages

This section shows messages for VTAM network operators that have been added or changed for this function. For complete descriptions of these messages, refer to *VTAM Messages*.

**New Message:** The following message for VTAM network operators has been added:

---

### IST1579I

**Explanation:** This message is a separator line to improve readability of the IST1295I message group.

**Changed Messages:** The following messages for VTAM network operators have changed:

---

### IST1163I                      RSN                      HPR                      TIME LEFT

**Explanation:** This message is a header for the information in message IST1164I. The TIME LEFT heading has been added.

---

### IST1164I                      *rsn*                      *hpr*                      *timeleft*

**Explanation:** The *timeleft* field has been added.

---

### IST1223I                      BN                      NATIVE                      TIME LEFT

**Explanation:** This message is a header for the information in message IST1224I. The TIME LEFT heading has been added.

---

### IST1224I                      *bn*                      *native*                      *timeleft*

**Explanation:** The *timeleft* field has been added.

---

### IST1295I                      CP NAME                      NODETYPE                      ROUTERES                      CONGESTION                      CP-CP                      WEIGHT

**Explanation:** This message group contains the updated messages and the descriptions of the new fields.

---

## Locate Congestion Control

In pre-V4R4 releases, private storage can become exhausted due to a congested (or hung) adjacent APPN node. VTAM continues to queue locate searches to the congested node until either the pools fill up VTAM private storage or the CP-CP session with the adjacent node is terminated. VTAM currently implements a locate search timeout mechanism via the 'IOPURGE' start option, but it does not clean up the searches waiting in the queue to be sent to the congested node.

In V4R4, the locate congestion control mechanism allows VTAM to detect that an adjacent APPN node is highly congested (or not responding), and will stop attempting to send new searches to that node. VTAM will also detect when a congested node has recovered, and will resume sending locate searches to the node. Lastly, locate searches that have timed out (via IOPURGE) will be removed from VTAM's send queue and the associated control blocks will be freed.

**Note:** This solution does not address the general problem of having VTAM detect and adjust to its storage nearing maximum private storage. VTAM private may still be exhausted during periods of high activity.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

### Implementation Overview

The maximum threshold value is used by VTAM to determine if an adjacent node is considered congested for locate searches. This threshold value is controlled by the MAXLOCAT start option. For more detailed information, see the *VTAM Resource Definition Reference*. The values that have been specified in VTAM's start options can be changed using the MODIFY VTAMOPTS command.

### New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Start options
- VTAM network operator commands
- VTAM network operator messages.

#### New Start Option

Table 2 shows a new start option for this function. For information about how to specify this start option, refer to the *VTAM Resource Definition Reference*.

*Table 2. New Start Option*

<b>Start Option</b>	<b>Operand</b>	<b>Description</b>
APPN	MAXLOCAT	Specifies the maximum threshold value to be reached before VTAM suspends sending APPN search requests to an adjacent node.





<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

The FUNCTION parameter in the MODIFY TOPO command has two new functions. You can specify FUNCTION=QUIESCE to indicate that the specified resource is to be quiesced and not used for route calculation, or you can specify FUNCTION=NORMAL to indicate that the specified resource is to be returned to a normal state and available for route calculation. FUNCTION=DELETE is the default and specifies that a resource is to be removed from the topology database.

If SCOPE=NETWORK is specified on the MODIFY TOPO command, then the change in resource status to quiesced or back to normal will be broadcast to the network through topology database updates. If SCOPE=LOCAL is specified (or defaults), then the change in status will only be reflected in the local topology database.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include a VTAM network operator command that has been changed.

Table 4 shows the VTAM network operator command that has been changed for this function. For information about how to use this VTAM network operator command, refer to *VTAM Operation*.

*Table 4. Changed VTAM Network Operator Command*

<b>Command</b>	<b>Operand</b>	<b>Description</b>
MODIFY TOPO	FUNCTION	This operand is new to specify whether an entry in the topology database is to be deleted, quiesced (not used for route calculation), or returned to a normal state after being quiesced.

## Search Order Enhancement

In pre-V4R4 releases, APPN is not always searched first when SORDER = APPN is specified. In some cases, CDRMs may be searched before APPN.

In VTAM V4R4, the SORDER=APPNFRST start option causes the APPN network to always be searched first, regardless of whether the owning CDRM is known.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

By specifying SORDER=APPNFRST, the APPN network will always be searched first, regardless of whether the operand ISTAPNCP is coded in the adjacent SSCP table or whether the owning CDRM or previously successful CDRMs are known.

As before, SORDER only affects searches that are initiated by this VTAM and searches that are received from adjacent CDRMs. (SORDER does not affect searches that are received by this VTAM from the APPN network.)

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Start options
- VTAM network operator commands.

### New Start Option

Table 5 on page 20 shows a new start option for this function. For information about how to specify this start option, refer to the *VTAM Resource Definition Reference*.

Table 5. New Start Option

Start Option	Operand	Description
SORDER	APPNFRST	Controls the order in which the APPN and subarea networks are searched when a network search request is received from the subarea network. This search order is overridden if the target LU's location is already identified and SSCPORD=PRIORITY is specified. SORDER is valid only for network nodes (NODETYPE=NN), and end nodes functioning as migration data hosts. For further information on the interaction of the CORDER start option with other start options, see the <i>VTAM Network Implementation Guide</i> .

### Changed VTAM Network Operator Commands

Table 6 shows VTAM network operator commands that have been changed for this function. For information about how to use these VTAM network operator commands, refer to *VTAM Operation*.

Table 6. Changed VTAM Network Operator Commands

Command	Operand	Description
DISPLAY VTAMOPTS	SORDER	Displays APPNFRST if that start option value has been set by the start list or as the result of a MODIFY VTAMOPTS.
MODIFY VTAMOPTS	SORDER	SORDER=APPNFRST can now be specified to change the value of the SORDER start option.
START	SORDER	SORDER=APPNFRST can now be specified as the value of the SORDER start option.

## Chapter 3. High Bandwidth Networking Support

The following functions provide support for high bandwidth networking:

- “Asynchronous Transfer Mode (ATM) Support”
- “High Performance Data Transfer for APPC” on page 42
- “High Performance Data Transfer MPC” on page 61.

### Asynchronous Transfer Mode (ATM) Support

Asynchronous transfer mode (ATM) is a switching technology that provides the high bandwidth required for fast, reliable, simultaneous transfer of voice, video, and data.

#### Where to Find Information about ATM

ATM technology is a broad topic, too broad to cover in VTAM books. While IBM cannot refer you to every source of information on ATM, we can recommend the following sources as good starting points:

- *Asynchronous Transfer Mode (Broadband ISDN) Technical Overview*, GG24-4330
- *ATM User-Network Interface (UNI) Specification*, published by The ATM Forum
- The IBM Networking home page, available at the following uniform resource locator (URL):  
<http://www.networking.ibm.com>
- The ATM Forum home page, available at the following URL:  
<http://www.atmforum.com>
- The International Telecommunication Union home page, available at the following URL:  
<http://www.itu.ch>

**Note:** If you view this book through IBM BookManager BookServer, you can click on the highlighted links above and connect directly to the referenced home pages on the World Wide Web.

VTAM supports ATM in two important ways:

- By enabling subarea and advanced peer-to-peer networking (APPN) data to be routed across ATM networks—both public (wide area networks [WANs]) and private (campus networks)—through local area network (LAN) emulation access.
- By enabling high performance routing (HPR) APPN data to be routed across ATM networks—both public and private—through native access.

In pre-V4R4 releases, VTAM routes subarea and APPN data across ATM networks only through LAN emulation access. ATM networks accessed through LAN emulation are attached to VTAM through the IBM S/390 Open Systems Adapter. However, they are defined to VTAM as though they are Ethernets or Ethernet-type LANs or token-ring (full duplex) networks. Although sessions occurring over ATM LAN emulation connections enjoy the benefits of fast transfer of data, they cannot exploit the full functions of guaranteed bandwidth and quality of service (QoS) offered by ATM networks. Generally, ATM networks accessed through LAN emulation appear to VTAM to be, and to offer the capabilities of, Ethernet or Ethernet-type LANs or token-ring networks.

In VTAM V4R4, VTAM routes APPN data across ATM networks through LAN emulation access and native access. VTAM can route only HPR APPN data

across ATM native connections. Routing of subarea and non-HPR APPN data across ATM networks requires ATM LAN emulation connections. ATM networks accessed through native ATM are also attached to VTAM through the IBM S/390 Open Systems Adapter. They are defined to VTAM as ATM networks. HPR APPN sessions occurring over native ATM connections can exploit the full services of ATM networks, such as guaranteed bandwidth and quality of service.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

---

<b>Storage Requirements</b>	Use the estimating storage worksheets in Appendix A, "Estimating Storage" in the <i>VTAM Installation and Migration Guide</i> to determine the total amount of storage you need for VTAM V4R4.
<b>Software Requirements</b>	<p>To use ATM support, both LAN emulation and native, you must have, at a minimum, the IBM S/390 Open Systems Adapter/Support Facility (OSA/SF) V1R2.</p> <p>OSA/SF has its own software requirements; for example, to use the graphical user interface associated with OSA/SF, you must have, at a minimum, OS/2 2.1. For information about the software requirements of OSA/SF, refer to <i>OSA Planning</i>.</p>
<b>Hardware Requirements</b>	<p>To use ATM support, you must have, at a minimum, the following hardware products:</p> <p><b>For ATM LAN Emulation Support</b></p> <ul style="list-style-type: none"><li>• IBM S/390 Open Systems Adapter ATM OSA-2 feature.</li></ul> <p><b>For ATM Native Support</b></p> <ul style="list-style-type: none"><li>• IBM S/390 Open Systems Adapter ATM OSA-2 feature</li><li>• Private and public ATM network equipment, such as the IBM 8260 Nways Multiprotocol Intelligent Switching Hub.</li></ul> <p>The IBM S/390 Open Systems Adapter has its own hardware requirements. For information about these requirements, refer to <i>OSA Planning</i>.</p>
<b>Configuration Requirements</b>	<p>VTAM and the remote node to which it is connected through a native ATM connection must be HPR nodes that are rapid transport protocol (RTP) capable. Each transmission group (TG) that routes data through native ATM access across ATM networks must also be RTP capable.</p> <p>ATM native connections do not support:</p> <ul style="list-style-type: none"><li>• Subarea links</li><li>• Non-HPR APPN (FID2) links.</li></ul>

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<b>Migration Impacts</b>	<p>Full exploitation of ATM native support requires new APPN class-of-service (COS) definitions, especially when multiple types of connections with different transmission group (TG) characteristics—for example, channel-to-channel, token-ring network, FDDI LAN, ATM—are used in the network.</p> <p>These new COS definitions are made up of 8-row LINEROW entries for all classes of service except #BATCH, #BATCHSC, #INTER, and #INTERSC—which are made up of 12-row LINEROW entries—and 8-row NODEROW entries for all classes of service. Twelve-row LINEROW entries better enable VTAM to select an optimal route for a session, especially when multiple types of connections with different TG characteristics are used in the network.</p> <p>Refer to “What are the IBM-supplied default classes of service?” in the <i>VTAM Network Implementation Guide</i> for information on COS definitions with 12-row LINEROW entries.</p> <p><b>Very Important:</b> COS definitions with 12-row LINEROW entries should be activated on each network node in the network for optimal routing in networks that include ATM native connections.</p> <p>Not all HPR APPN products support COS definitions with 12-row LINEROW entries. This could affect your ability to optimally use native ATM connections among the nodes in your network. Consult technical representatives for the HPR APPN products in your network to determine if those products support COS definitions with 12-row LINEROW entries.</p> <p>If you use COS definitions with 12-row LINEROW entries, routes selected for non-native ATM sessions could be different than those selected when you use COS definitions with 8-row LINEROW entries.</p>
<b>Performance Impacts</b>	<p>ATM native connections enable fast, reliable, simultaneous transfer of voice, video, and data.</p>

## Implementation Overview

Because ATM networks are attached to VTAM through the IBM S/390 Open Systems Adapter, the IBM S/390 Open Systems Adapter must be configured in the appropriate mode of operation (SNA mode for ATM LAN emulation connections; HPDT ATM native mode for ATM native connections) before VTAM can route data across ATM networks. The IBM S/390 Open Systems Adapter is configured in its modes of operation with OSA/SF. For information about using OSA/SF to configure the IBM S/390 Open Systems Adapter in its modes of operation, refer to the following books:

- *OSA Planning*
- *OSA/SF User's Guide*
- *Using the S/390 Open Systems Adapter Support Facility for MVS/ESA.*

To establish sessions across an ATM network through LAN emulation access, you must define the ATM network to VTAM as though it were an Ethernet or Ethernet-type LAN or a token-ring network. To define ATM LAN emulation connections through the IBM S/390 Open Systems Adapter, apply the information

## High Bandwidth Networking Support

about defining LAN connections through the IBM 3172 Nways Interconnect Controller, found in the *VTAM Network Implementation Guide*.

To establish sessions across an ATM network accessed through native ATM, you must first define the following resources to VTAM:

- VTAM's connection to the IBM S/390 Open Systems Adapter
- The port on the IBM S/390 Open Systems Adapter through which the ATM network is accessed
- The transmission groups (TGs) that route data:
  - Across the ATM network over permanent virtual channels (PVCs)
  - Across the ATM network over switched virtual channels (SVCs)
  - To connection networks.

For complete information about how to define these resources to VTAM, refer to the *VTAM Network Implementation Guide* and the *VTAM Resource Definition Reference*.

After defining these resources to VTAM, you must activate them. For complete information about how to activate these resources, refer to the *VTAM Network Implementation Guide* and *VTAM Operation*.

To fully exploit ATM native support, you should activate APPN COS definitions with 12-row LINEROW entries on each network node in the network. For complete information about APPN COS definitions, refer to the *VTAM Network Implementation Guide* and the *VTAM Resource Definition Reference*.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Definition statements for major nodes
  - External communication adapter (XCA) major node
  - Switched major node
  - Transport resource list (TRL) major node
- Definition statements for advanced peer-to-peer networking (APPN) classes of service (COS)
- IBM-supplied APPN class-of-service definitions
- IBM-supplied APPN transmission group profiles (TGPs)
- VTAM network operator commands
- VTAM network operator messages
- Codes
  - Sense codes
  - ATM network-generated cause and diagnostic codes
- First Failure Support Technology (FFST) probes
- VTAMMAP verb exit routine options
- VTAM topology agent attributes.



Because VTAM's support of APPN sessions across ATM networks accessed through native ATM is based on high performance data transfer (HPDT) multipath channel (MPC) connections, which are also introduced in VTAM V4R4, you might see additional new and changed user interfaces associated with HPDT MPC, such as messages, codes, buffer pools, and VIT entries. For information about these additional new and changed user interfaces, see "High Performance Data Transfer MPC" on page 61.

### Changed Definition Statements for Major Nodes

The definition statements used to define the following major nodes have changed for this function:

- External communication adapter (XCA)
- Switched
- Transport resource list (TRL).

For information about how to code these definition statements, refer to the *VTAM Resource Definition Reference*.

**External Communication Adapter Major Node:** The XCA major node is now used to define ATM native connections through the IBM S/390 Open Systems Adapter.

Table 7 on page 26 shows definition statements used to define the XCA major node that have changed for this function.

Table 7 (Page 1 of 6). Changed Definition Statements for the External Communication Adapter Node

Definition Statement	Operand	Description
GROUP	ANSWER	The ANSWER operand now specifies whether PUs can dial into VTAM over ATM native connections.
	AUTOGEN	The AUTOGEN operand can now be used to specify that VTAM automatically generate LINE and PU definition statements for ATM native connections.
	CALL	The CALL operand now specifies whether physical units, or VTAM, or both, can initiate calls over ATM native connections.
	CAPACITY	The CAPACITY operand has been added to the GROUP definition statement. It specifies the effective capacity of a link that comprises a TG to an ATM native connection network.
	COSTBYTE	The COSTBYTE operand has been added to the GROUP definition statement. It specifies the cost-per-byte-transmitted to be associated with a TG to an ATM native connection network.
	COSTTIME	The COSTTIME operand has been added to the GROUP definition statement. It specifies the cost-per-unit-of-time to be associated with a TG to an ATM native connection network.
	DLCADDR	The DLCADDR operand has been added to the GROUP definition statement. It specifies the signaling information to be associated with a TG to an ATM native connection network.
	DYNPU	The DYNPU operand now specifies whether dynamic PUs can be created for ATM native connections.
	DYNPUPFX	The DYNPUPFX operand now specifies characters assigned to names for PUs dynamically defined for ATM native connections.

*Table 7 (Page 2 of 6). Changed Definition Statements for the External Communication Adapter Node*

Definition Statement	Operand	Description
GROUP (continued)	HPR	The HPR operand has been added to the GROUP definition statement. It specifies that high performance routing (HPR) is enabled for ATM native connections.
	LIMRES	The LIMRES operand now specifies whether a group of lines is to be treated as a limited resource for ATM native connections.
	PDELAY	The PDELAY operand has been added to the GROUP definition statement. It specifies the maximum propagation delay to be associated with a TG to an ATM native connection network.
	SECURITY	The SECURITY operand has been added to the GROUP definition statement. It specifies the security level of a TG to an ATM native connection network.
	SWNORDER	The SWNORDER operand now specifies the way VTAM locates a switched PU connected through an ATM native connection.
	TGP	The TGP operand has been added to the GROUP definition statement. It specifies the name of a TG profile definition used to define the characteristics of a TG to an ATM native connection network.
	UPARM1	The UPARM1 operand has been added to the GROUP definition statement. It specifies a user-defined operand value for a TG to an ATM native connection network.
	UPARM2	The UPARM2 operand has been added to the GROUP definition statement. It specifies a user-defined operand value for a TG to an ATM native connection network.
	UPARM3	The UPARM3 operand has been added to the GROUP definition statement. It specifies a user-defined operand value for a TG to an ATM native connection network.

*Table 7 (Page 3 of 6). Changed Definition Statements for the External Communication Adapter Node*

<b>Definition Statement</b>	<b>Operand</b>	<b>Description</b>
LINE	ANSWER	The ANSWER operand now specifies whether PUs can dial into VTAM over ATM native connections.
	CALL	The CALL operand now specifies whether PUs, or VTAM, or both, can initiate calls over ATM native connections.
	LIMRES	The LIMRES operand now specifies whether a line is to be treated as a limited resource for ATM native connections.
	PVCNAME	The new PVCNAME operand on the LINE definition statement specifies the name of a permanent virtual channel (PVC) from the IBM S/390 Open Systems Adapter to a switched PU connected through an ATM native connection.
	SWNORDER	The SWNORDER operand now specifies the way VTAM locates a switched PU connected through an ATM native connection.
	USER	The USER operand now specifies the owner of a line associated with a TG over a PVC for ATM native connections.
PORT	MEDIUM	A new value, ATM, has been added to the MEDIUM operand.
	PORTNAME	The new PORTNAME operand on the PORT definition statement specifies the name of a port on the IBM S/390 Open Systems Adapter through which an ATM native connection is made.
	SAPADDR	The SAPADDR operand now specifies the service access point address of a local VTAM node connected to an ATM network through an ATM native connection.

Table 7 (Page 4 of 6). Changed Definition Statements for the External Communication Adapter Node

Definition Statement	Operand	Description
PU	AUTHLEN	The AUTHLEN operand has been added to the PU definition statement. It specifies whether VTAM should pass the transmission priority field specified by this PU to another PU.
	CAPACITY	The CAPACITY operand has been added to the PU definition statement. It specifies the effective capacity of a link that comprises a TG to an ATM native connection network.
	CONNTYPE	The CONNTYPE operand has been added to the PU definition statement. It specifies that an ATM native connection is to be established as an APPN connection.
	COSTBYTE	The COSTBYTE operand has been added to the PU definition statement. It specifies the cost-per-byte-transmitted to be associated with a TG to an ATM native connection network.
	COSTTIME	The COSTTIME operand has been added to the PU definition statement. It specifies the cost-per-unit-of-time to be associated with a TG to an ATM native connection network.
	CPCP	The CPCP operand has been added to the PU definition statement. It specifies whether CP-CP sessions are supported on an ATM native connection.
	CPNAME	The CPNAME operand has been added to the PU definition statement. It specifies a resource's owning control point name.
	DYNADJCP	The DYNADJCP operand has been added to the PU definition statement. It specifies whether an adjacent CP can be created dynamically for an adjacent node.

*Table 7 (Page 5 of 6). Changed Definition Statements for the External Communication Adapter Node*

<b>Definition Statement</b>	<b>Operand</b>	<b>Description</b>
PU (continued)	DYNLU	The DYNLU operand has been added to the PU definition statement. It specifies whether dynamic allocation of cross-domain resource definitions is supported.
	HPR	The HPR operand has been added to the GROUP definition statement. It specifies that HPR is enabled.
	NATIVE	The NATIVE operand has been added to the PU definition statement. It specifies whether a link station represents a connection to a native node.
	NETID	The NETID operand has been added to the PU definition statement. It specifies a 1–8 character network identifier.
	NN	The NN operand has been added to the PU definition statement. It specifies whether an adjacent node is expected to be a network node.
	PDELAY	The PDELAY operand has been added to the PU definition statement. It specifies the maximum propagation delay to be associated with a TG to an ATM native connection network.
	PUTYPE	A new value, 2, has been added to the PUTYPE operand on the PU definition statement. 2 is the default value for ATM native connections.
	SECURITY	The SECURITY operand has been added to the PU definition statement. It specifies the security level of a TG to an ATM native connection network.
	SAPADDR	The SAPADDR operand now specifies the service access point address of a remote VTAM node connected to an ATM network through an ATM native connection.

*Table 7 (Page 6 of 6). Changed Definition Statements for the External Communication Adapter Node*

Definition Statement	Operand	Description
PU (continued)	TGN	The default value for the TGN operand on the PU definition statement is ANY for ATM native connections. The default value for LAN and ATM LAN emulation connections remains the same.
	TGP	The TGP operand has been added to the PU definition statement. It specifies the name of a TG profile definition used to define the characteristics of a TG to an ATM native connection network.
	TOPO	The TOPO operand has been added to the PU definition statement. It specifies the way APPN connections using a link station will be reported to APPN topology and routing services for inclusion into APPN functions.
	UPARM1	The UPARM1 operand has been added to the PU definition statement. It specifies a user-defined operand value for a TG to an ATM native connection network.
	UPARM2	The UPARM2 operand has been added to the PU definition statement. It specifies a user-defined operand value for a TG to an ATM native connection network.
	UPARM3	The UPARM3 operand has been added to the PU definition statement. It specifies a user-defined operand value for a TG to an ATM native connection network.
	VERALSID	The VERALSID operand has been added to the PU definition statement. It specifies whether an adjacent link station name should be used to determine a link station.
	XID	The XID operand has been added to the PU definition statement. It specifies that a PU type 2.1 channel contact procedure is to be used.

**Switched Major Node:** Table 8 on page 32 shows definition statements used to define the switched major node that have changed for this function.

*Table 8. Changed Definition Statements for the Switched Major Node*

<b>Definition Statement</b>	<b>Operand</b>	<b>Description</b>
PATH	DLCADDR	The DLCADDR operand on the PATH definition statement can now be used to specify signaling information used to establish an ATM native connection made with a particular LINE statement.
PU	DISCNT	The DISCNT operand now enables you to specify a time interval, after which, if there is no session traffic on an ATM native link, the link is disconnected.

**Transport Resource List Major Node:** The transport resource list major node is now used to define HPDT MPC connections between VTAM and the IBM S/390 Open Systems Adapter for ATM native connections.

Table 9 on page 33 shows definition statements used to define the transport resource list major node that have been added or changed for this function.



Table 9. Changed Definition Statements for the Transport Resource List Major Node

Definition Statement	Operand	Description
TRLE	LNCTL	MPC is the default value for connections to an IBM S/390 Open Systems Adapter through which an ATM native connection is made.
	name	The <i>name</i> field can now be used to specify the name of an IBM S/390 Open Systems Adapter through which an ATM native connection is made.
	PORTNAME	The PORTNAME operand has been added to the TRLE definition statement. It specifies the name of a port on an IBM S/390 Open Systems Adapter through which an ATM native connection is made.
	READ	The READ operand is now used to specify the subchannel address used to read data from an IBM S/390 Open Systems Adapter through which an ATM native ATM connection is made.
	REPLYTO	The REPLYTO operand is now used to specify how long VTAM waits for completion of an MPC XID I/O operation after starting a channel program for a connection to an IBM S/390 Open Systems Adapter through which an ATM native connection is made.
	WRITE	The WRITE operand is now used to specify the subchannel address used to write data to an IBM S/390 Open Systems Adapter through which an ATM native connection is made.

### Changed Definition Statements for APPN Classes of Service

Table 10 on page 34 shows definition statements used to define advanced peer-to-peer networking (APPN) classes of service (COS) that have changed for this function. For information about how to code these definition statements, refer to the *VTAM Resource Definition Reference*.

Table 10. Changed Definition Statements for APPN Classes of Service

Definition Statement	Operand	Description
APPNCOS	NUMBER	The NUMBER operand has been added to the APPNCOS definition statement. It enables you to specify which set of default values is to be used for the APPN COS table.
LINEROW	CAPACITY	New default values have been added for 12-row definitions.
	COSTBYTE	New default values have been added for 12-row definitions.
	COSTTIME	New default values have been added for 12-row definitions.
	NUMBER	The maximum number that can now be specified on the NUMBER operand is 12.
	PDELAY	New default values have been added for 12-row definitions.
	WEIGHT	New default values have been added for 12-row definitions.

### New IBM-Supplied APPN Class-of-Service Definitions

New IBM-supplied APPN class-of-service (COS) definitions have been added for this function. These new COS definitions have 12-row LINEROW entries for the following classes of service: #BATCH, #BATCHSC, #INTER, and #INTERSC. Twelve-row LINEROW entries better enable VTAM to select an optimal route for a session. This is most useful when multiple types of connections with different TG characteristics—for example, channel-to-channel, token-ring network, FDDI LAN, ATM—are used in the network.

The new IBM-supplied APPN COS definitions are in the distribution library, SYS1.ASAMPLIB, under the name ISTACST2. For examples of the IBM-supplied APPN COS definitions, refer to “APPN Class-of-Service (COS) Definitions (COSAPPN)” in the *VTAM Resource Definition Reference*.

### New IBM-Supplied APPN Transmission Group Profiles

New IBM-supplied APPN transmission group profiles (TGPs) have been added for the following ATM TGs:

- TGs over PVCs
  - Campus (private) ATM best effort
  - Campus ATM reserved bandwidth
  - WAN (public) ATM best effort
  - WAN ATM reserved bandwidth
- TGs over SVCs
  - Campus ATM best effort
  - Campus ATM reserved bandwidth
  - WAN ATM best effort
  - WAN ATM reserved bandwidth.

The new IBM-supplied APPN TG profiles are in the distribution library SYS1.ASAMPLIB under the name ISTTGPS. For examples of the IBM-supplied APPN TG profiles, refer to “APPN Transmission Group (TG) Profile Definitions (IBMTGPS)” in the *VTAM Resource Definition Reference*.

### New and Changed VTAM Network Operator Commands

Table 11 shows VTAM network operator commands that have been added or changed for this function. For information about how to use these VTAM network operator commands, refer to *VTAM Operation*.

Table 11. New and Changed VTAM Network Operator Commands

Command	Operand	Description
DISPLAY ID		Can now display information about ATM native ports, PVCs, SVCs, and remote nodes.

### New and Changed VTAM Network Operator Messages

This section shows messages for VTAM network operators that have been added and changed for this function. For complete descriptions of these messages, refer to *VTAM Messages*.

**New Messages:** The following messages for VTAM network operators have been added:

IST1553I	<i>atm_address address_type address_format</i>
IST1554I	<b>PVCNAME =</b> <i>pvc_name</i>
IST1555I	<b>VPCI/VCI =</b> <i>vpci_vci</i>
IST1556I	<b>ATM connection_type FAILURE: ID =</b> <i>node_name</i> <b>STATUS =</b> <i>status_code</i>
IST1557I	<b>MEDIUM =</b> <i>medium</i> , <b>PORT NAME =</b> <i>port_name</i>
IST1558I	<b>DIAG =</b> <i>diagnostic_code</i>
IST1559I	<b>ATM ADDRESS</b> <i>statement_name</i> <b>TYPE</b> <b>FORMAT</b>
IST1560I	<b>VARY ACT</b> <i>statement_name</i> <b>CHANGE FAILED</b>
IST1561I	<b>PORTNAME ON TRLE NOT VALID</b>
IST1562I	<b>CAUSE =</b> <i>cause_code</i>
IST1622I	<b>DLCADDR SUBFIELD</b> <i>subfield_id</i> <b>NOT VALID -</b> <i>subfield_description</i>
IST1623I	<b>DUPLICATE DLCADDR SUBFIELD</b> <i>subfield_id</i> - <i>subfield_description</i>
IST1624I	<b>DLCADDR SUBFIELD</b> <i>subfield_id</i> <b>NOT SPECIFIED -</b> <i>subfield_description</i>

**Changed Messages:** The following messages for VTAM network operators have changed:

IST134I	<b>GROUP =</b> <i>groupname</i> , <b>MAJOR NODE =</b> <i>nodename</i>
---------	-----------------------------------------------------------------------

**Explanation:** This message is now issued when an activation of a native ATM connection network fails.



Table 12 (Page 2 of 5). New Sense Codes

Category and Modifier (in hexadecimal)	Sense-Code Specific Information	Type	Description
086B	6991	Request reject	Indicates that ATM dial information does not indicate ATMSVC or SHARE/EXCLUSIVE.
	6997		Indicates that the ATM traffic description is not valid.
	6998		Indicates that the ATM QoS class is not valid.
	6999		Indicates that the ATM transit network selection (TNS) identifier is not a valid length.
	69A5		Indicates that ATM addresses are not valid in length or type.
	69C3		Indicates that bearer capabilities are not specified or are specified incorrectly.
	69CD		Indicates that ATM adaptation layer is not specified or is specified incorrectly.

Table 12 (Page 3 of 5). New Sense Codes

Category and Modifier (in hexadecimal)	Sense-Code Specific Information	Type	Description
086D	6991	Request reject	Indicates that ATM dial information indicating ATMSVC or the type of SVC that can be used is not specified.
	6997		Indicates that the ATM traffic description is not specified.
	69A5		Indicates that no ATM dial information is specified when a dial operation is being attempted through an ATM network accessed through native ATM.
0877	0019	Request reject	Indicates that multiple sets of dial information are specified for a native ATM call when only one set of information is allowed.
	0026		Indicates that a connection over an ATM native SVC cannot be established because the TG is not defined to support APPN and HPR.

Table 12 (Page 4 of 5). New Sense Codes

Category and Modifier (in hexadecimal)	Sense-Code Specific Information	Type	Description
1016	0031	Request error	Indicates that the link being activated by this node requires the link to support HPR, be RTP capable, and support the control flows over RTP tower and that the adjacent node has indicated that it does not support HPR for this link.
	0032		Indicates that the link being activated by this node requires the link to support HPR, be RTP capable, and support the control flows over RTP tower and that The adjacent node has indicated that this link is not RTP capable.
	0033		Indicates that the link being activated by this node requires the link to support HPR, be RTP capable, and support the control flows over RTP tower and that the adjacent node has indicated that it does not support control flows over RTP for this link.

Table 12 (Page 5 of 5). New Sense Codes

Category and Modifier (in hexadecimal)	Sense-Code Specific Information	Type	Description
1016 (continued)	0033		Indicates that the link being activated by this node requires the support of Logical Data Link Control (LDLC) during XID exchange for this link and that the adjacent node has indicated that it does not support LDLC for this link.

**ATM Network-Generated Cause and Diagnostic Codes:** New cause and diagnostic codes are now displayed in VTAM messages to indicate the cause of a failed activation request for an ATM native PVC or SVC connection. These codes indicate the cause of a failure detected by the ATM network. For descriptions of these new codes, refer to *VTAM Codes*.

## New First Failure Support Technology Probes

Table 13 shows First Failure Support Technology (FFST) probes that have been added for this function. For information about FFST probes, refer to *VTAM Diagnosis*.

Table 13 (Page 1 of 2). New First Failure Support Technology Probes

Probe	Component	Description
ISTALC01	APPN Over Logical Link Control	ISTALC01 indicates that the APPN over logical link control (ALLC) line index control block OSLIN indicates that ALNCB line entries are available, but none can be found.
ISTALC02	APPN Over Logical Link Control	ISTALC02 indicates that an unusable primitive was received by ISTALCPE.
ISTALC03	APPN Over Logical Link Control	ISTALC03 indicates that an unusable work element was queued to the ALLC port finite state machine (FSM) processor ISTALCPF.
ISTALC04	APPN Over Logical Link Control	ISTALC04 indicates that the work in progress field (ALPOR_WIP) in the ALLC port control block ALPOR has not been set and should have been set during DACTLINK processing.



Table 13 (Page 2 of 2). New First Failure Support Technology Probes

Probe	Component	Description
ISTALC05	APPN Over Logical Link Control	ISTALC05 indicates that disable confirmation was received and the filter has never gone inactive.
ISTALC06	APPN Over Logical Link Control	ISTALC06 indicates that the work element address (WEA) field in the request processing header control block RPH does not point to an ALLC parameter list (ALCPL).
ISTALC07	APPN Over Logical Link Control	ISTALC07 indicates that an unusable work element was received by ISTALCLF.
ISTALC08	APPN Over Logical Link Control	ISTALC08 indicates that an unusable work element was received by ISTALCIF.
ISTALC09	APPN Over Logical Link Control	ISTALC09 indicates that an unusable work element was received by ISTALCOF.
ISTALC10	APPN Over Logical Link Control	ISTALC10 indicates that an unusable work element was received by ISTALCCF.
ISTALC11	APPN Over Logical Link Control	ISTALC11 indicates that an unusable AAL signal was received by ISTALCOC from the AAL FSM handler ISTALCAF.
ISTALC12	APPN Over Logical Link Control	ISTALC12 indicates that an unusable AAL signal was received by ISTALCIC from the AAL FSM handler ISTALCAF.
ISTALC13	APPN Over Logical Link Control	ISTALC13 indicates that an unusable XID signal was received by ISTALCOL from the XID FSM handler ISTALCXF.
ISTALC14	APPN Over Logical Link Control	ISTALC14 indicates that an unusable XID signal was received by ISTALCIL from the XID FSM handler ISTALCXF.
ISTIUT73	Logical link control	ISTIUT73 indicates that unusable input was received by IDX GROUP CONTROL (LLCM8).
ISTIUT74	Logical link control	ISTIUT74 indicates that IDX GROUP CONTROL (LLCM8) was unable to obtain an RU processing element (RUPE) for a critical identification exchange (IDX) function.
ISTIUT75	Logical link control	ISTIUT75 indicates that IDX GROUP CONTROL (LLCM8) has received an unexpected RU processing element.

### New VTAMMAP Verb Exit Routine Option

Table 14 shows a VTAMMAP verb exit routine option that has been added for this function. For information about VTAMMAP verb exit routine options, refer to *VTAM Diagnosis*.

Table 14. New VTAMMAP Verb Exit Routine Option

Option	Description
ATMDATA	ATMDATA enables you to search a dump by line names, major node names, and port names associated with ATM native support.

### Changed VTAM Topology Attributes

Table 15 shows VTAM topology agent attributes that have changed for this function. For information about the VTAM topology agent, refer to the *VTAM CMIP Services and Topology Agent Programming Guide*.

Table 15. Changed VTAM Topology Agent Attributes

Attribute	Description
adapterAddresses	This attribute now refers to the ATM local native address associated with SVCs and PVCs.
adjacentLinkStationAddress	This attribute now refers to the remote ATM native address associated with SVCs and PVCs.
connectionID	This attribute now refers to the name of an IBM S/390 Open Systems Adapter for port objects and the virtual path connection identifier/virtual channel identifier (VPCI/VCI) for logicalLink objects. It is now included in the logicalLink object for SNALocalTopo snapshot response data.
lineType	This attribute now refers to ATM native SVCs and PVCs.

## High Performance Data Transfer for APPC

High performance data transfer (HPDT) optimizes the performance of large message transfers for VTAM LU 6.2 applications. The performance enhancements become more substantial as the size of PIUs and amount of data transferred on the APPCCMD API increase.

HPDT includes a service that reduces the number of times data is moved for an APPCCMD send or receive request. HPDT services are provided for sessions that traverse certain high bandwidth network attachments (IBM S/390 Open Systems Adapter connected to a native ATM network, APPN node-to-node connections (ANNC) that use HPR, XCF links between processors in a sysplex), or when sessions connect two intrahost applications.

HPDT services are available to all APPCCMD applications. No application change is required to receive performance benefits. However, an HPDT interface is also

provided to enable authorized applications to obtain performance benefits even greater than that provided by HPDT services.

The performance enhancement provided by HPDT services is achieved by more efficient use of critical CPU resources (CPU cycles, cache, memory bus, and the channel). Specifically, improvements include:

### **Reduction of VTAM internal data copies:**

The movement of large pieces of data results in significant processing costs on the send and receive interfaces. Additionally, data movement flushes the CPU cache and consumes the memory bus bandwidth.

### **Reduced pathlength:**

The processing of data transfers is streamlined through the use of a new buffer management technology called the *communications storage manager* (CSM), which reduces the increase in pathlength that normally occurs as API data transfer and PIU size increase.

### **Use of MPC technology:**

HPDT services use the high performance data transfer MPC provided by VTAM V4R4, which includes:

- Enhanced data packing that increases the effective data transfer rate without invoking internal data moves.
- Chain scheduling of channel programs to reduce CPU overhead related to I/O.

High performance data transfer for APPC increases total system throughput by reducing the requirements on system resources (CPU, memory bus, effective pathlength, and storage) and thereby increasing the total number of streams that can be supported by a CPU with given materials information processing system (MIPS) capacity, memory bus bandwidth, and configuration limits.

## The HPDT Interface

The HPDT interface allows system-authorized applications requiring efficient bulk data transfer to gain additional performance improvements beyond those provided by HPDT services. The HPDT interface is used by LU 6.2 applications to eliminate the data copy as data is transferred between the application and VTAM. The HPDT interface includes an IVTCSM macroinstruction for using CSM and a change to the APPCCMD macroinstruction OPTCD=XBUFLST.

### **IVTCSM Macroinstruction for CSM**

CSM provides a means for authorized host applications to share data with other CSM users without having to copy the data. (A CSM user can be any system-authorized application program or product that resides in an S/390 running MVS/ESA V4R3 or higher.) CSM is also used by VTAM on behalf of any VTAM LU 6.2 application, authorized or not, to transfer data between CSM buffers and the multipath channel with fewer data moves. Applications can create buffer pools in CSM and load data in buffers, which are represented by buffer tokens. Ownership of these buffers can be changed to allow other CSM users to access the data. This allows an application and VTAM to exchange ownership of a single piece of commonly addressable storage so that there is no need to move the data at the APPCCMD API. VTAM uses the same CSM storage area for channel I/O. CSM storage is either data space or extended common service area (ECSA) storage.

CSM provides an application program interface (IVTCSM) that enables applications to request CSM services, such as creating or deleting a pool of buffers, getting or freeing a number of buffers from a pool, or changing the ownership of a buffer. For more information about the CSM requests available to the application, see “New Communications Storage Manager Macroinstructions” on page 51.

For more complete information about CSM, see Chapter 1, “Introduction to the Communications Storage Manager” in *VTAM Programming for CSM*.

### **HPDT Requests on the APPCCMD Macroinstruction**

The application program sends or receives data in CSM buffers by issuing an APPCCMD send or receive macroinstruction with OPTCD=XBUFLST specified. The XBUFLST option indicates that the application is sending or receiving data using an *extended buffer list*. The extended buffer list points to data that resides in CSM buffers. See “New and Changed LU 6.2 Application Program Macroinstructions” on page 53 for information about macroinstructions that send or receive data using high performance data transfer for APPC.

The APPCCMD side of the HPDT interface also includes vectors that applications can use to determine whether a particular session supports HPDT services or to inform VTAM about how the application intends to receive HPDT data. See “Application Programming Vector Lists” on page 52 for more information about vector lists available to applications that use the HPDT interfaces.

Applications can mix XBUFLST and non-XBUFLST requests without negative impacts. The use of HPDT services on one end of a conversation is transparent to its conversation partner. If an application specifies XBUFLST when the HPDT service is not available, VTAM executes the request using normal APPCCMD services. “Availability of HPDT Services” on page 45 contains information about sessions and configurations that support high performance data transfer for APPC.

### **Applications that Use the HPDT Interface**

The HPDT interface is suited for applications in environments where high-speed data transfer is essential. For example, in a host file server environment, host applications may provide access to large S/390 data banks for local and remote LAN servers. These applications serve a smaller number of users concurrently storing and retrieving data than in a traditional online transaction processing environment. For each access, bulk data transfer is required. This is especially true for multimedia servers where vast amounts of bits must be transmitted for each minute of video stream.

Since performance improvements are targeted at sending and receiving large data objects, applications that typically require efficient, high-speed data transfer are most suited to use the HPDT interface. The following are the types of operations performed by applications in which HPDT operations are ideal:

- Transmitting multimedia, video, images, or data files
- Backing up large databases
- Retrieving archived data.

Overall, applications that perform frequent transfer of small messages are not highly suited for using the HPDT interface.

## Availability of HPDT Services

HPDT services are available when the session is not using VTAM cryptography or VTAM compression. Both of these functions require VTAM to move the data before the transfer. HPDT services also rely on certain high-bandwidth, network-attached facilities, which include:

- Asynchronous transfer mode (ATM) connections
- APPN node-to-node connections that use HPR
- Sysplex (XCF)
- Intrahost application-to-application.

### ATM Connections

VTAM V4R4 installations that are taking advantage of the asynchronous transfer mode support in this release can exploit HPDT services over an ATM network. HPDT data transfers are enabled when VTAM is connected to the ATM network through the IBM S/390 Open Systems Adapter (OSA). For more information about VTAM's support for ATM networks, see "Asynchronous Transfer Mode Support."

### APPN Node-to-Node Connections

High performance data transfer for APPC services are available in a node-to-node environment where large data transfers frequently occur. To realize the performance benefits of HPDT, the connection must be defined using multipath channel (MPC) and transport resource list (TRL) system definitions. The underlying MPC layer uses the high performance data transfer MPC available in this release of VTAM. For more information about the MPC enhancements, see "High Performance Data Transfer MPC."

### Sysplex

Applications can use HPDT in a sysplex environment and take advantage of XCF connectivity. In addition, VTAM V4R4 provides dynamic definition of MPC connections in a sysplex. For more information about enhancements to XCF connections, see "Dynamic Definition of VTAM-to-VTAM Connections."

### Intrahost Application-to-Application

HPDT services includes processing enhancements that make data transfers between same-host LU 6.2 applications more efficient. For example, the data path bypasses the transmission subsystem component (TSC) of VTAM, which is responsible for the transmission control, path control, and data link control layers of SNA. For same-host applications whose APPL definition statement includes APPC=YES, this enhancement is automatically provided for the APPCCMD send and receive requests.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Performance Impacts</b>	VTAM LU 6.2 applications can expect better performance for sending and receiving data.
<b>Restrictions</b>	Applications must use the APPCCMD macroinstruction to realize the performance benefits of HPDT services. Applications must be system-authorized to use the HPDT interface.  For more information about authorization, see “Authorization Criteria ” in <i>VTAM Programming</i> .
<b>Storage Requirements</b>	There are no additional storage requirements for high performance data transfer for APPC.
<b>Software Requirements</b>	This function requires MVS/ESA SP V4R3 at the minimum.
<b>Hardware Requirements</b>	The adjacent node used to route data via HPDT services must implement the high performance data transfer MPC. Among the products meeting this requirement are VTAM V4R4 and the IBM S/390 Open Systems Adapter (OSA).
<b>Migration Impacts</b>	There are no migration impacts for using high performance data transfer for APPC.

### Changes to Installation

Table 16 shows the new parmlib member that has been added for this function. For information about how to specify this parmlib member, refer to the *VTAM Installation and Migration Guide*.

Table 16. New Parmlib Member

Member Name	System Definitions	Description
IVTPRMxx	FIXED MAX ECSA MAX POOL	IVTPRMxx is a new parmlib member that allows you to define maximum storage limits for fixed and ECSA buffers and to tune CSM buffer expansion limits for each CSM buffer pool.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- “Changed Start Options”
- “Changed Definition Statement for the Transport Resource List Major Node”
- “Changed Macroinstruction for the Message-Flooding Prevention Table”
- “New and Changed VTAM Network Operator Commands”
- “New and Changed VTAM Network Operator Messages”
- “New CSM Messages”
- “New Communications Storage Manager Macroinstructions”
- “Application Programming Vector Lists”
- “New and Changed LU 6.2 Application Program Macroinstructions”
- “RCPRI and RCSEC Return Codes for LU 6.2”
- “New and Changed DSECTS”
- “Changed Installation-Wide Exit Routines”
- “New and Changed VTAM Internal Trace Options”

- “New VTAMMAP Verb Exit Routine Options.”

### Changed Start Options

Table 17 shows start options that have been changed for this function. For information about how to specify these start options, refer to the *VTAM Resource Definition Reference*.

Table 17. Changed Start Options

Start Option	Operand	Description
TRACE NOTRACE	TYPE=VTAM, OPTION=CSM	New option for the VTAM internal trace specifying tracing parameter list information that flows across the CSM interface for functions that manipulate buffer states.
TRACE NOTRACE	TYPE=VTAM, OPTION=XBUF	New option for the VTAM internal trace specifying tracing the contents of the extended buffer list.

### Changed Definition Statement for the Transport Resource List Major Node

Table 18 shows a definition statement used to define the TRL major node that has been changed for this function. For information about how to code this definition statement, refer to the *VTAM Resource Definition Reference*.

Table 18. Changed Definition Statement for the Transport Resource List Major Node

Definition Statement	Operand	Description
TRLE	STORAGE	This is a new operand that specifies whether CSM ECSA or CSM data space storage is used for the data segment of the multipath channel's inbound I/O buffer storage.

### Changed Macroinstruction for the Message-Flooding Prevention Table

Table 19 on page 48 shows a macroinstruction used to define the message-flooding prevention table that has been changed for this function. For information about how to code this macroinstruction, refer to the *VTAM Resource Definition Reference*.

Table 19. Changes to Macroinstruction for the Message-Flooding Prevention Table

Macroinstruction	Operand	Description
FLDENT	PREFIX	<p>This is a new operand that indicates the prefix for the message number that is to be suppressed. You can specify the following options:</p> <p><b>PREFIX=IST</b> suppresses VTAM network operator messages. This is the default.</p> <p><b>PREFIX=IVT</b> suppresses messages from the CSM.</p> <p><b>PREFIX=IUT</b> suppresses messages from the registration manager.</p>

## New and Changed VTAM Network Operator Commands

Table 20 shows VTAM network operator commands that have been added or changed for this function. For information about how to use these VTAM network operator commands, refer to *VTAM Operation*.

Table 20 (Page 1 of 2). New and Changed VTAM Network Operator Commands

Command	Operand	Description
DISPLAY CONVID	ID <i>name</i>	Command enhanced to display whether a session is capable of using HPDT services at the time it is established.
DISPLAY CSM	OWNERID	<p>New command that displays information about CSM buffers.</p> <ul style="list-style-type: none"> <li>If DISPLAY CSM is specified without OWNERID, the display is a summary by storage pool source of the total storage allocated to the pool.</li> <li>OWNERID=ALL produces a display by each owner of the amount of storage owned in each storage pool and the cumulative total for each owner across all pools.</li> <li>OWNERID=<i>ownerid</i> produces a display of the storage owned by the specified address space and includes the cumulative total across all of the pools.</li> </ul> <p>This command can be issued when VTAM is not running.</p>



Table 20 (Page 2 of 2). New and Changed VTAM Network Operator Commands

Command	Operand	Description
DISPLAY TRL		Command changed to indicate whether the specified MPC group is capable of performing channel I/O directly to or from CSM buffers. If so, the size of the MPC buffer segments are displayed along with an indication of whether ECSA or data space is used for incoming data.
MODIFY CSM	FIXED= ECSA=	<p>New command that allows you to dynamically change storage allocated for use by CSM as specified by the IVTPRM00 member of SYS1.PARMLIB. To change the IVTPRM00 parameters temporarily (until the next IPL), issue a MODIFY CSM and specify the parameters to be changed on the FIXED and ECSA operands. To change the IVTPRM00 parameters permanently, edit IVTPRM00 and then issue this command without specifying FIXED and ECSA.</p> <ul style="list-style-type: none"> <li>FIXED specifies the maximum megabytes of fixed storage dedicated for use by CSM.</li> <li>ECSA specifies the maximum megabytes of ECSA dedicated for use by CSM. This specification applies to buffers allocated from ECSA and the CSM control structures used to manage buffers from both ECSA and data spaces.</li> </ul>
MODIFY TRACE	TYPE=VTAM, OPTION=CSM	CSM is a new value for the option parameter specifying that tracing be performed for CSM events.
	TYPE=VTAM, OPTION=XBUF	XBUF is a new value for the option parameter specifying that tracing be performed for extended buffer list information.
MODIFY NOTRACE	TYPE=VTAM, OPTION=CSM	CSM is a new value for the option parameter specifying that tracing be stopped for CSM events.
	TYPE=VTAM, OPTION=XBUF	XBUF is a new value for the option parameter specifying that tracing be stopped for extended buffer list information.

## New and Changed VTAM Network Operator Messages

This section shows messages that have been added or changed for VTAM network operators for this function. For complete descriptions of these messages, refer to *VTAM Messages*.

**New Message:** The following message for VTAM network operators has been added:

---

**IST1577I**                    **MPC HEADER SIZE = *hpsize* MPC DATA SIZE = *dsize***  
**STORAGE = *storage***

**Changed Messages:** The following messages for VTAM network operators have changed:

---

**IST087I**                    **TYPE = *line\_type*, CONTROL = *line\_control*, HPDT = *hpdvalue***

**Explanation:** HPDT has been added to indicate whether the connection is capable of performing channel I/O directly to or from communications storage manager (CSM) buffers.

---

**IST199I**                    **OPTIONS = *options\_list***

**Explanation:** The CSM and XBUF trace options have been added as possible values for OPTIONS.

---

**IST1009I**                    **SID = *sid* HPDT = *hpdvalue***

**Explanation:** HPDT has been added to indicate whether the connection used by the session is capable of performing channel I/O directly to or from communications storage manager (CSM) buffers.

## New CSM Messages

The following messages issued by CSM have been added for this function. For complete descriptions of these messages, refer to *VTAM Messages*.

---

<b>IVT5501I</b>	<b>CSM PARMLIB MEMBER <i>membername</i> NOT FOUND - DEFAULT VALUES USED</b>
<b>IVT5502I</b>	<b>READ ERROR ON PARMLIB MEMBER <i>membername</i> - DEFAULT VALUES USED</b>
<b>IVT5503I</b>	<b>CSM PARMLIB PARAMETER NOT VALID - <i>parametername</i></b>
<b>IVT5504I</b>	<b>ABEND <i>abendcode</i> OCCURRED IN <i>modulename</i> - SDUMP HAS BEEN ISSUED</b>
<b>IVT5505I</b>	<b>CSM SDUMP FAILED WITH RETURN CODE <i>code</i> REASON X' <i>reason</i>'</b>
<b>IVT5506I</b>	<b><i>modulename</i> STORAGE ALLOCATION FAILED IN CSM</b>
<b>IVT5507I</b>	<b>CSM PARMLIB INFORMATION FOUND IN MEMBER <i>membername</i></b>
<b>IVT5508I</b>	<b>DISPLAY ACCEPTED</b>
<b>IVT5510I</b>	<b>MODIFY ACCEPTED</b>
<b>IVT5511I</b>	<b><i>command</i> CSM COMMAND SYNTAX NOT VALID</b>
<b>IVT5512I</b>	<b>FIXED PARAMETER VALUE NOT VALID</b>
<b>IVT5513I</b>	<b>ECSA PARAMETER VALUE NOT VALID</b>
<b>IVT5516I</b>	<b>ERROR OBTAINING CSM PARMLIB INFORMATION - LIMITS UNCHANGED</b>
<b>IVT5517I</b>	<b>CSM LIMITS PRIOR TO MODIFY CSM PROCESSING:</b>
<b>IVT5518I</b>	<b>CSM LIMITS AFTER MODIFY CSM PROCESSING:</b>

```

IVT5519I      ECSA MAXIMUM = maxecsa FIXED MAXIMUM = maxfix
IVT5520I      OWNERID VALUE NOT VALID
IVT5521I      NO CSM STORAGE IS CURRENTLY ALLOCATED TO
                OWNERID asid
IVT5529I      PROCESSING DISPLAY CSM COMMAND - OWNERID NOT
                SPECIFIED
IVT5530I      BUFFER BUFFER
IVT5531I      SIZE SOURCE          INUSE   FREE   TOTAL
IVT5532I      -----
IVT5533I      bufsiz bufsource          curused curfree curttotal
IVT5534I      bufsiz bufsource          POOL DOES NOT EXIST
IVT5535I      TOTAL bufsource          totused totfree totstor
IVT5536I      TOTAL ALL SOURCES totused totfree totstor
IVT5538I      FIXED MAXIMUM = maxfix FIXED CURRENT = curfix
IVT5539I      ECSA MAXIMUM = maxecsa ECSA CURRENT = curecsa
IVT5549I      PROCESSING DISPLAY CSM COMMAND - OWNERID
                SPECIFIED
IVT5551I      SIZE SOURCE          STORAGE ALLOCATED TO OWNER
IVT5553I      bufsiz bufsource          totstor
IVT5554I      TOTAL bufsource          totstor
IVT5556I      TOTAL FOR OWNERID totstor
IVT5557I      OWNERID: ASID = asid JOBNAME = jobname
IVT5558I      bufsiz bufsource  UNABLE TO DETERMINE BUFFER
                VALUES
IVT5559I      CSM DATA SPACE % NAME: %%%%%%%%%%
IVT5560I      CSM ECSA STORAGE LIMIT EXCEEDED
IVT5561I      CSM FIXED STORAGE LIMIT EXCEEDED
IVT5562I      CSM ECSA STORAGE AT CRITICAL LEVEL
IVT5563I      CSM FIXED STORAGE AT CRITICAL LEVEL
IVT5564I      CSM ECSA STORAGE SHORTAGE RELIEVED
IVT5565I      CSM FIXED STORAGE SHORTAGE RELIEVED
IVT5599I      END
    
```

### New Communications Storage Manager Macroinstructions

Table 21 on page 52 shows the CSM macroinstructions that have been added for this function. For information about how to use these macroinstructions, refer to *VTAM Programming for CSM*.

Table 21. New Communications Storage Manager Macroinstructions

Macroinstruction	Operand	Description
IVTCSM		The IVTCSM macroinstruction provides the interface to the communications storage manager (CSM). Applications use each IVTCSM REQUEST type for the following operations:
	REQUEST=ASSIGN_BUFFER	Create a logical image of a buffer.
	REQUEST=CHANGE_OWNER	Transfer ownership of buffers of a pool.
	REQUEST=COPY_DATA	Copy data between buffers of any type.
	REQUEST=CREATE_POOL	Create a storage pool of buffers residing in ECSA or in a data space.
	REQUEST=DELETE_POOL	Delete a storage pool of buffers residing in ECSA or in a data space.
	REQUEST=DUMP_INFO	Provide the address of information required to dump CSM data space.
	REQUEST=FIX_BUFFER	Set buffers into a fixed state.
	REQUEST=FREE_BUFFER	Return buffers to CSM.
	REQUEST=GET_BUFFER	Obtain buffers from CSM for application use.
	REQUEST=PAGE_BUFFER	Set buffers into a pageable or eligible to be pageable state.
	REQUEST=RESOURCE_STATS	Provide the address of CSM resource statistics information.

### Application Programming Vector Lists

Table 22 shows the vector lists that have been changed for this function. For more information about vector lists, refer to the *VTAM Guide to Programming for LU 6.2*.

Table 22. Changed Vector Lists

Vector List	Vector	Description
Application-ACB (mapped by ISTVACBV)	Application-capabilities vector (X'81')	Two new fields, VAC81FPR and VAC81FPS, allow the application to indicate support for HPDT.
VTAM-APPCCMD (mapped by ISTAPCVL)	Session- information (X'19')	A new vector that provides information about the session's ability to support HPDT.
	XBUFLST- receive (X'82')	A new vector that allows the application to inform VTAM about its preference for receiving HPDT data.

## New and Changed LU 6.2 Application Program Macroinstructions

Table 23 shows LU 6.2 application program macroinstructions that have been added or changed for this function. For information about how to code VTAM LU 6.2 application programs, refer to the *VTAM Guide to Programming for LU 6.2*.

Table 23 (Page 1 of 2). New and Changed LU 6.2 Application Program Macroinstructions

Macroinstruction	Operand	Description
APPCCMD CONTROL=DEALLOC APPCCMD CONTROL=PREPRCV APPCCMD CONTROL=SEND	OPTCD	XBUFLST is a new OPTCD value specifying that the HPDT interface is to be used. The application supplies an extended buffer list that specifies the necessary information to describe the data passed to VTAM.
	AREA	Existing operand specifying the address of the extended buffer list when OPTCD=XBUFLST on the macroinstruction.
	RECLEN	Existing operand that indicates the length of the extended buffer list.
APPCCMD CONTROL=RECEIVE	OPTCD	XBUFLST is a new OPTCD value specifying that the HPDT interface is to be used. The application supplies an area for VTAM to build an extended buffer list.
	AREA	Existing operand specifying the area where VTAM is to build an extended buffer list when OPTCD=XBUFLST is on the macroinstruction.
	AREALEN	Existing operand that indicates the length of the area supplied by the application in which VTAM is to build a buffer list.
	VTROUTA	Specifies the area that contains vectors that the application is providing to VTAM.
	VTROUTL	Specifies the length of the area that contains vectors that the application is providing to VTAM.

Table 23 (Page 2 of 2). New and Changed LU 6.2 Application Program Macroinstructions

Macroinstruction	Operand	Description
APPCCMD CONTROL=SENDRCV	OPTCD	New macroinstruction that, after sending application-supplied data, receives data from the partner. When OPTCD=XBUFLST, the send portion of this macroinstruction will use the HPDT interface.  The AREA parameter always points to a buffer list; OPTCD=NBUFLST is not available on this macroinstruction. The last entry in the buffer list points to an area for receiving data. All other buffer list entries point to an area for sending data.
ISTGAPPC	&ISTGA56	New LU 6.2 global variable that indicates support for HPDT.
APPCCMD CONTROL=ALLOC APPCCMD CONTROL=PREALLOC APPCCMD CONTROL=RCVFMH5	VTRINA, VTRINL	The new session information vector (X'19') may be returned on this macroinstruction if VTRINA and VTRINL are coded.

## RCPRI and RCSEC Return Codes for LU 6.2

Table 24 shows RCPRI and RCSEC return codes for LU 6.2 that have been added for this function. For complete descriptions of these codes, refer to *VTAM Codes* or the *VTAM Programming Reference for LU 6.2*.

Table 24. New RCPRI and RCSEC Return Codes for LU 6.2

RCPRI	RCSEC	ISTUSFBC EQU Label	Description
X'002C'	X'0030'	USF6STNV	PARAMETER_ERROR— STORAGE_TYPE_NOT_VALID
X'002C'	X'0031'	USF6VALS	PARAMETER_ERROR— SENDRCV_SPECIFIED_WITHOUT_OPTCD=BUFFLST XBUFLST
X'002C'	X'0032'	USF6UNXV	PARAMETER_ERROR— UNEXPECTED_VECTOR_PROVIDED_ON_APPCCMD
X'002C'	X'0033'	USF6VNPV	PARAMETER_ERROR— A_REQUIRED_VECTOR_WAS_NOT_PROVIDED_OR_SPECIFIED_INCORRECTLY
X'00A0'	X'0006'	USF6NAUT	PROGRAM_NOT_AUTHORIZED_FOR_REQUESTED_FUNCTION
X'00B4'	X'0001'	USF6NSPC	CSM_DETECTED_ERROR— NOT_SPECIFIED
X'00B4'	X'0002'	USF6IBTK	CSM_DETECTED_ERROR— INVALID_BUFFER_TOKEN_SPECIFIED
X'00B4'	X'0003'	USF6IIID	CSM_DETECTED_ERROR— INVALID_INSTANCE_ID_SPECIFIED

Table 25 on page 55 shows RCPRI and RCSEC return codes for LU 6.2 that have been changed for this function. For complete descriptions of these codes, refer to *VTAM Messages* or the *VTAM Programming Reference for LU 6.2*.

Table 25. Changed RCPRI and RCSEC Return Codes for LU 6.2

RCPRI	RCSEC	ISTUSFBC EQU Label	Description
X'0070'	X'0000'	USF6STOR	TEMPORARY_STORAGE_SHORTAGE_OR_RESOURCE_SHORTAGE
X'002C'	X'0008'	USF6LNIN	PARAMETER_ERROR—SUPPLIED_LENGTH_INSUFFICIENT
X'002C'	X'0010'	USF6INDL	INVALID DATA ADDRESS OR LENGTH
X'002C'	X'0012'	USF6BLIV	PARAMETER_ERROR—BUFFER_LIST_LENGTH_INVALID
X'0098'	X'0000'	USF6STGS	TEMPORARY STORAGE SHORTAGE WHILE SENDING DATA

### New and Changed DSECTs

Table 26 shows the DSECTs that have been added or changed for this function. For information about application program DSECTs, refer to *VTAM Programming* or the *VTAM Programming Reference for LU 6.2*.

Table 26. New and Changed DSECTs

DSECT	Description
IFGRPL	This DSECT has been updated to account for the new OPTCD value, XBUFLST. A new field, RPLXSRV, is returned to an application upon completion of a send request. RPLXSRV is set if VTAM accepts the entire extended buffer list.
ISTRPL6X	This DSECT has been updated to reflect the new VTROUTA and VTROUTL parameters for APPCCMD CONTROL=RECEIVE requests.
ISTAPCVL	This DSECT has been added to include the new session-information vector (ISTAPC19) and the XBUFLST-receive vector (ISTAPC82).
ISTAMSVL	This DSECT has been updated to reflect the new LU 6.2 global variable, &ISTGA56, which indicates VTAM's support for high performance data transfer for APPC.
ISTUSFBC	This DSECT has been updated to include the new RCPRI,RCSEC return codes.
ISTVACBV	This DSECT has been updated to include the changes to the application-capabilities vector.
ISTBLXEN	This is a new DSECT that maps an entry in the extended buffer list (XBUFLST).
IVTBUFL	This is a new DSECT that maps an entry in the CSM buffer list.
IVTDATSP	This is a new DSECT that maps information required to include CSM data space buffers in a dump.
IVTSTATA	This is a new DSECT that maps information required to monitor the use of CSM resources such as ECSA, data space, or fixed storage.

## Changed Installation-Wide Exit Routines

Table 27 shows installation-wide exit routines that have been changed for this function. For information about these installation-wide exit routines, refer to *VTAM Customization*.

Table 27. Changed Installation-Wide Exit Routines

Exit Routine	Description
Performance Monitor	Two new vectors have been added to this exit routine: <ul style="list-style-type: none"> <li>• CSM Buffer Pool Vector</li> <li>• CSM Storage Usage Vector</li> </ul>

## New and Changed VTAM Internal Trace Options

Two new VTAM internal trace options have been added to support high performance data transfer for APPC:

- The **XBUF** option traces the contents of the extended buffer list (XBUFLST). Records are produced to trace the contents from the application supplied extended buffer list as well as the internal buffer list VTAM uses to carry the extended buffer list information. The purpose of these records is to record relevant information contained with the extended buffer list, particularly in regard to information on CSM usage by VTAM.
- The **CSM** option traces the parameter list information that flows across the CSM interface and key internal events (such as pool expansion and contraction) for functions that manipulate buffer states. This allows you to trace and analyze the usage history of a buffer.

Table 28 shows changes to the VTAM internal trace (VIT) to support this function. For more information about the VTAM internal trace, refer to *VTAM Diagnosis*.

Table 28 (Page 1 of 3). New and Changed VIT Options

VIT Option	VIT Entry	Description
XBUF	XBA1	This record is created when a HPDT send is issued, when a HPDT send is completed and RPLXSRV is not set, and when a HPDT receive is completed.
	XBA2/XBA3	Continuation of the XBA1 entry. VTAM records as many XBA2 and XBA3 pairs as is necessary to record the entire application buffer list contents.
	XBI1	Generated when an extended buffer list AMU or TIPAC is built by VTAM.
	XBI2/XBI3	Continuation of the XBI1 entry. VTAM records as many XBI2 and XBI3 pairs as is necessary to record the entire VTAM internal extended buffer list contents.



*Table 28 (Page 2 of 3). New and Changed VIT Options*

VIT Option	VIT Entry	Description
CSM	GTBF	This record is created when a IVTCSM REQUEST=GET_BUFFER macroinstruction is issued.
	GTB2/GTB3	Continuation of the GTBF entry.
	FRBF	Created when a IVTCSM REQUEST=FREE_BUFFER macroinstruction is completed.
	FRB2	Continuation of the FRBF entry.
	ASNB	Created when a IVTCSM REQUEST=ASSIGN_BUFFER macroinstruction is issued.
	ASN2	Continuation of the ASNB entry.
	CHGO	Created when a IVTCSM REQUEST=CHANGE_OWNER macroinstruction is completed.
	CHG2	Continuation of the CHGO entry.
	FIXB	Created when a IVTCSM REQUEST=FIX_BUFFER macroinstruction is completed.
	FIX2	Continuation of the FIXB entry.
	PAGB	Created when a IVTCSM REQUEST=PAGE_BUFFER macroinstruction is completed.
	PAG2	Continuation of the PAGB entry.
	CPYB	Created when a IVTCSM REQUEST=COPY_DATA macroinstruction is completed.
	CPY2 CPY3 CPY4	Continuation of the CPYB entry.
	EXPP	Created when buffer pool expansion occurs.
	CNTP	Created when buffer pool contraction occurs.

Table 28 (Page 3 of 3). New and Changed VIT Options

VIT Option	VIT Entry	Description						
APPC	ACA1	The following fields have been changed: <ul style="list-style-type: none"> <li>RPLOPT6 contains the new RPLXBFL flag (bit 5) indicating that the application is using the HPDT interface.</li> <li>The RPL address can be used for correlation with the new XBA1 VIT entries.</li> <li>The RPL area contains the new extended buffer list area. Contents are recorded in the new XBA1/2/3 record set.</li> </ul>						
	UVI/UVI2	This is a new entry that traces vectors provided to VTAM on an APPCCMD macroinstruction.						
	ACP1/ACR1	The following fields have been changed: <table border="1"> <thead> <tr> <th>Bytes</th> <th>Contents</th> </tr> </thead> <tbody> <tr> <td>08-0B</td> <td>The RPL address can now be used for correlation with the new XBA1 VIT entries.</td> </tr> <tr> <td>0E</td> <td>RPLOPT6 contains the new RPLXBFL flag (bit 1) indicating that the application is using the HPDT interface.</td> </tr> </tbody> </table>	Bytes	Contents	08-0B	The RPL address can now be used for correlation with the new XBA1 VIT entries.	0E	RPLOPT6 contains the new RPLXBFL flag (bit 1) indicating that the application is using the HPDT interface.
Bytes	Contents							
08-0B	The RPL address can now be used for correlation with the new XBA1 VIT entries.							
0E	RPLOPT6 contains the new RPLXBFL flag (bit 1) indicating that the application is using the HPDT interface.							
	ACP2/ACR2	The RPL area now contains the new extended buffer list area. Contents are recorded in the new XBA1/2/3 record set. The new RPLEXTDS field contains the new RPLXSRV flag (bit 7).						
	MU1	The following field has been added: <table border="1"> <thead> <tr> <th>Bytes</th> <th>Contents</th> </tr> </thead> <tbody> <tr> <td>17</td> <td>Flag byte which indicates in bit 7 whether the AMU contains an extended buffer list.</td> </tr> </tbody> </table>	Bytes	Contents	17	Flag byte which indicates in bit 7 whether the AMU contains an extended buffer list.		
Bytes	Contents							
17	Flag byte which indicates in bit 7 whether the AMU contains an extended buffer list.							
	MU2	If an AMU contains an extended buffer list, the following fields provide information relevant to HPDT: <ul style="list-style-type: none"> <li>The data address field (AMUDATAA) points to the first extended buffer list entry that contains RU data.</li> <li>The data length field (AMUDATLN) shows the data length for all RU data represented in the extended buffer list contained in the AMU.</li> </ul>						
CIO	MPDU/MPD2	These are new entries that provide information about outbound and inbound MPC PDU processing.						

## New VTAMMAP Verb Exit Routine Options

Table 29 shows VTAMMAP verb exit routine options that have been added for this function. For information about VTAMMAP verb exit routine options, refer to *VTAM Diagnosis*.

Table 29 (Page 1 of 2). New VTAMMAP Verb Exit Routine Options

Option	Description
CSMALL	This new dump procedure displays information about all storage pools in CSM.
CSMBUF	This new dump procedure displays information about a CSM buffer with a specific buffer token.

Table 29 (Page 2 of 2). New VTAMMAP Verb Exit Routine Options

Option	Description
CSMOWNER	This new dump procedure displays the addresses of all CSM buffers owned by a specific user.
CSMPOOL	This new dump procedure displays information about a specific type and size CSM storage pool.

### New and Changed First Failure Support Technology Probes

Table 30 shows First Failure Support Technology (FFST) probes that have been added or changed for this function. For information about First Failure Support Technology probes, refer to *VTAM Diagnosis*.

Table 30 (Page 1 of 3). New and Changed First Failure Support Technology Probes

Probe	Component	Description
ISTTSC31	Transmission Subsystem	This is a new probe that indicates a problem occurred trying to free a CSM buffer.
ISTHSC01	Half-Session Services	This is a new probe that indicates a problem occurred trying to free a CSM buffer.
IVTSMC03	Communications storage manager	This is a new probe that indicates the buffer size (BUFSIZE) or buffer source (BUFSOURCE) specification on a CREATE_POOL request was not valid.
IVTSMC04	Communications storage manager	This is a new probe that indicates an SRB schedule of IVTSMCEX failed for a pool expansion.
IVTSMC05	Communications storage manager	This is a new probe that indicates a STORAGE OBTAIN error occurred.
IVTSMC06	Communications storage manager	This is a new probe that indicates an SRB schedule of IVTSMCEX failed for pool contraction.
IVTSMC07	Communications storage manager	This is a new probe that indicates a cross-memory post failed.
IVTSMC08	Communications storage manager	This is a new probe that indicates an SRB schedule of IVTSMCEX failed for pool contraction or expansion.
IVTSMC09	Communications storage manager	This is a new probe that indicates an SRB schedule of IVTSMCSD failed in IVTSMCFX.
IVTSMC0A	Communications storage manager	This is a new probe that indicates an SRB schedule of IVTSMCSD failed in IVTSMCBF.
IVTSMC0B	Communications storage manager	This is a new probe that indicates an SRB schedule of IVTSMCSD failed in IVTSMCFR.

Table 30 (Page 2 of 3). New and Changed First Failure Support Technology Probes

Probe	Component	Description
IVTSMC0C	Communications storage manager	This is a new probe that indicates an SRB schedule of IVTSMCSD failed in IVTSMCWL.
IVTSMC0D	Communications storage manager	This is a new probe that indicates a post failed in IVTSMCFX.
IVTSMC0E	Communications storage manager	This is a new probe that indicates a post failed in IVTSMCFR.
IVTSMC0F	Communications storage manager	This is a new probe that indicates an SRB schedule of IVTSMCSD failed in IVTSMCFC.
IVTSMC10	Communications storage manager	This is a new probe that indicates the field containing the number of available buffers is incorrect.
ISTPSC01	Presentation Services	This is a new probe that indicates a CSM pool control block corrupted.
ISTPSC02	Presentation Services	This is a new probe that indicates a pool token was specified that is not valid.
ISTPSC03	Presentation Services	This is a new probe that indicates CSM detected an MVS system error.
ISTPSC04	Presentation Services	This is a new probe that indicates an unexpected CSM reason code was encountered.
ISTPSC05	Presentation Services	This is a new probe that indicates a buffer pool cannot be expanded.
ISTPSC06	Presentation Services	This is a new probe that indicates a buffer token was specified that is not valid.
ISTPSC07	Presentation Services	This is a new probe that indicates CSM detected an MVS system error.
ISTPSC08	Presentation Services	This is a new probe that indicates an unexpected CSM reason code was encountered.
ISTPSC09	Presentation Services	This is a new probe that indicates a buffer token was specified that is not valid.
ISTPSC10	Presentation Services	This is a new probe that indicates CSM detected an MVS system error.
ISTPSC11	Presentation Services	This is a new probe that indicates an unexpected CSM reason code was encountered.
ISTPSC12	Presentation Services	This is a new probe that indicates data resides in a fixed I/O buffer instead of a CSM buffer.

Table 30 (Page 3 of 3). New and Changed First Failure Support Technology Probes

Probe	Component	Description
ISTPSC13	Presentation Services	Unexpected CSM reason code.
ISTPSC14	Presentation Services	Unexpected CSM reason code.

## High Performance Data Transfer MPC

Since VTAM V4R1, VTAM has provided the multipath channel (MPC) function, which uses ESCON technology over high speed, fiber-optic based connections. MPC allows you to define more than one subchannel for a transmission group (TG), enabling multiple subchannels on a single TG to be used simultaneously. Furthermore, a single TG definition can include more than one physical channel medium, enabling the TG to be available even if one of the physical connections becomes inoperative.

VTAM V4R2 introduced MPC connections between nodes in an APPN network. In V4R3, this support was expanded to include high performance routing (HPR) and improved availability.

In VTAM V4R4, connectivity over MPC connections in an APPN network has been enhanced to provide more efficient transfer of data by:

- **Data packing without data movement:** This process decreases consumption of CPU cycles by reducing the internal movement of data, thus increasing the availability of MIPS for user processing.
- **Chain scheduling of channel programs:** This process reduces operating system I/O invocations and CPU overhead.

The enhanced MPC is called high performance data transfer (HPDT) MPC. HPDT services are available over connections to other nodes that implement HPDT MPC. Applications that use HPDT services rely on HPDT MPC connections for pathlength reductions and performance enhancements when sending and receiving data. For more information about this function, see “High Performance Data Transfer for APPC” on page 42.

HPDT MPC uses the services of the communications storage manager (CSM). CSM is a new storage facility that allows authorized host applications to set up data in buffers that can be addressed and accessed by other authorized host applications, eliminating the need to copy data as it is being prepared to be sent. CSM is installed with VTAM. Maximum CSM storage limits are defined in the CSM parmlib member IVTPRMxx. For more information about using CSM, refer to *VTAM Programming for CSM*.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	Use the estimating storage worksheets in Appendix A, “Estimating Storage” in the <i>VTAM Installation and Migration Guide</i> to determine the total amount of storage you need for VTAM V4R4.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	<p>On a VARY ACT command for a transport resource list (TRL) major node, the default for the UPDATE operand has changed to UPDATE=ADD. Be aware that issuing this command for a TRL major node without specifying the UPDATE operand will not replace current TRLEs in the active TRL major node (ISTTRL). For more information about the VARY ACT command, see <i>VTAM Operation</i>.</p> <p>If you have an APPN host-to-host channel (AHHC) connection between two pre-V4R4 VTAM nodes that are not HPR RTP nodes, and you upgrade both nodes to VTAM V4R4, you must code MPCLEVEL=NOHPDT on the TRLE definition statement in the TRL major node that defines the connection in at least one of the VTAM nodes. If one of the VTAM nodes is an HPR RTP node and the other is not, you must code MPCLEVEL=NOHPDT in the VTAM that is not. Otherwise, the connection will fail.</p>
<b>Configuration Requirements</b>	<p>HPDT MPC connections are available only to other nodes that implement HPDT MPC. To use an HPDT MPC connection, VTAM must provide RTP-level HPR support. Examples of HPDT MPC connections are:</p> <ul style="list-style-type: none"> <li>• A connection between two VTAM V4R4 APPN host nodes that support HPDT MPC</li> <li>• A connection between a VTAM V4R4 APPN host node that supports HPDT MPC and an APPN non-host node that supports HPDT MPC</li> <li>• A connection between a VTAM V4R4 APPN host node and a port on an IBM S/390 Open Systems Adapter through which native access to an ATM network is achieved.</li> </ul> <p>HPDT MPC connections do not support:</p> <ul style="list-style-type: none"> <li>• Subarea links</li> <li>• Non-HPR APPN (FID2) links.</li> </ul> <p>MPC connections to products that do not implement HPDT MPC continue to operate as in pre-V4R4 releases. Examples of MPC connections that operate at the pre-V4R4 level are:</p> <ul style="list-style-type: none"> <li>• A connection between two VTAM subarea host nodes</li> <li>• A connection between two VTAM V4R4 APPN host nodes, where at least one of the VTAMs does not support HPDT MPC</li> <li>• A connection between a VTAM V4R4 APPN host node and a pre-V4R4 VTAM APPN host node.</li> </ul>
<b>Performance Impacts</b>	You can expect better overall system performance using a HPDT MPC connection. Send and receive operations for LU 6.2 applications should demonstrate better performance when using an HPDT MPC connection.

## Implementation Overview

HPDT MPC connections are defined in the TRL major node. VTAM uses HPDT MPC connections to connect to:

- An adjacent APPN node (host or non-host)  
You define an adjacent APPN node in the local SNA major node.
- A port on an IBM S/390 Open Systems Adapter through which native access to an ATM network is achieved.  
You define a port on an IBM S/390 Open Systems Adapter in the external communications adapter (XCA) major node.

For complete information about defining HPDT MPC connections and VTAM's use of those connections, refer to the *VTAM Network Implementation Guide*.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Start options
- Definition statements
  - Definition statements for major nodes
    - Local SNA major node
    - Transport resource list (TRL) major node
- VTAM network operator commands
- VTAM network operator messages
- New data link control (DLC) status codes
- New DISPLAY STORUSE pool
- New VTAM buffer pool
- VTAM internal trace (VIT) entries
- First Failure Support Technology (FFST) probes.

### New and Changed Start Options

Table 31 shows start options that have been added or changed for this function. For information about how to specify these start options, refer to the *VTAM Resource Definition Reference*.

Table 31 (Page 1 of 2). New and Changed Start Options

Start Option	Operand	Description
INOPDUMP		The INOPDUMP start option now specifies whether VTAM dumps should be generated whenever VTAM detects certain errors for HPDT connections.

Table 31 (Page 2 of 2). New and Changed Start Options

Start Option	Operand	Description
TIBUF	<i>baseno</i> <i>bufsize</i> <i>slowpt</i> F <i>xpnano</i> <i>xpanpt</i> <i>xpanlim</i>	TIBUF is a new start option used to specify values for a new buffer pool, TIBUF. The TIBUF buffer pool contains control information to support HPDT services.

## Changed Definition Statements for Major Nodes

The definition statements used to define the following major nodes have changed for this function:

- Local SNA
- Transport resource list (TRL).

For information about how to code these definition statements, refer to the *VTAM Resource Definition Reference*.

**Local SNA Major Node:** Table 32 shows definition statements used to define the local SNA major node that have been added or changed for this function.

Table 32. Changed Definition Statements for the Local SNA Major Node

Definition Statement	Operand	Description
PU	TRLE	The TRLE operand has been changed to allow you to specify the same TRLE name on more than one PU definition statement.

**Transport Resource List Major Node:** Table 33 shows definition statements used to define the TRL major node that have been changed for this function.

Table 33. Changed Definition Statements for the Transport Resource List Major Node

Definition Statement	Operand	Description
TRLE	MAXBFRU	The default value for the MAXBFRU operand has changed from 1 to 5.
	MAXREADS	This is a new operand that specifies how many read buffers are available to read data over an HPDT MPC connection.
	MPCLEVEL	This is a new operand that specifies which level of MPC should be used for the connection.
	STORAGE	This is a new operand that specifies whether CSM ECSA or CSM data space storage is used for the data segment of the multipath channel's inbound I/O buffer storage.



## Changed VTAM Network Operator Commands

Table 34 shows VTAM network operator commands that have been added or changed for this function. For information about how to use these VTAM network operator commands, refer to *VTAM Operation*.

Table 34. Changed VTAM Network Operator Commands

Command	Operand	Description
DISPLAY BFRUSE	BUFFER	The DISPLAY BFRUSE command now displays buffer usage information for the new TIBUF buffer pool.
VARY ACT	UPDATE	The default for the UPDATE operand has been changed to ADD when the ID operand specifies a TRL major node.

## New and Changed VTAM Network Operator Messages

This section shows messages for VTAM network operators that have been added and changed for this function. For complete descriptions of these messages, refer to *VTAM Messages*.

**New Messages:** The following messages for VTAM network operators have been added:

IST1578I	<i>inoptype</i> INOP DETECTED FOR <i>trlename</i> BY <i>modname</i> CODE= <i>code</i>
IST1621I	DUPLICATE CP NAME: <i>cpname</i> FOR ID = <i>puname</i>
IST1630I	<i>puname</i> ACTIVATION FAILED - HPR=RTP REQUIRED WITH HPDT MPC
IST1631I	<i>trlename</i> SUBCHANNEL <i>cua</i> status
IUT5000I	<i>trlename</i> STILL ACTIVE: VTAM TERMINATION WAITING FOR <i>ulpid</i>
IUT5001I	VTAM MPC CONNECTION MANAGER PROCESSING TERMINATED
IUT5002I	TASK FOR ULPID <i>ulpid</i> USING TRLE <i>trlename</i> TERMINATING

**Changed Message:** The following message for VTAM network operators has been changed:

IST1235I	SIO = <i>sio</i> SLOWDOWN = <i>slowdown</i>
----------	---------------------------------------------

**Explanation:** The explanation of this message has changed to indicate that the count of start I/O operations shown in *sio* is reset each time VTAM reports tuning statistics.

## New DLC Status Codes

DLC status codes provide information about errors encountered during the use of HPDT services. They are displayed in message IST1556I and in the IUTx VIT entry. Descriptions of the DLC status codes are contained in *VTAM Codes*.

### New DISPLAY STORUSE Pool

A new DISPLAY STORUSE pool, TIPACX, has been added for this function. TIPACX elements contain control information to support HPDT services. For information about DISPLAY STORUSE pools, refer to the *VTAM Network Implementation Guide*.

### New VTAM Buffer Pool

A new VTAM buffer pool, TIBUF, has been added for this function. TIBUF contains control information to support HPDT services. protocols. For information about VTAM buffer pools, refer to the *VTAM Network Implementation Guide* and the *VTAM Resource Definition Reference*.

### New and Changed VTAM Internal Trace Entries

Table 35 shows VTAM internal trace (VIT) entries that have been added or changed for this function. For information about the VTAM internal trace, refer to *VTAM Diagnosis*.

Table 35. New and Changed VTAM Internal Trace Entries

Option	Entry	Description
PIU	DSCO	This new VIT entry is created when transport interface parameter access containers (TIPACs) are discarded because of an error condition.
CIO	GCEL	This new VIT entry shows the status of each (Get Cell) request for a CSM cell.
	INTx	This VIT entry is now created when an interrupt occurs between two channel-to-channel-attached hosts.
	IUTx	This new VIT entry records an IUT processing event.
	MPDU	This new VIT entry provides information about outbound and inbound MPC PDU processing of the extended buffer list (XBUFLST).
	PCIx	This new VIT entry indicates a program-controlled interrupt.
	RIO	This new VIT entry is created when the MVS Resume I/O service is invoked and for HPDT only.
	TOKx	This new VIT entry is created when a token is added to or deleted from a token collection.
None (generated by VTAM)	INOP	This new VIT entry captures various inoperative condition (INOP) information related to a specific device.

## New and Changed First Failure Support Technology Probes

Table 36 shows First Failure Support Technology (FFST) probes that have been added or changed for this function. For information about FFST probes, refer to *VTAM Diagnosis*.

Table 36 (Page 1 of 2). New and Changed First Failure Support Technology Probes

Probe	Component	Description
ISTIUT02	Logical Link Control	Unrecognized primitive received.
ISTIUT03	Logical Link Control	Unrecognized primitive received.
ISTIUT04	Logical Link Control	ISTIUT04 is a new probe that indicates unrecognized response type received as input.
ISTIUT05	Logical Link Control	ISTIUT05 is a new probe that indicates input is not a response type.
ISTIUT14	Logical Link Control	ISTIUT14 is a new probe that indicates unrecognized response type received as input.
ISTIUT15	Logical Link Control	ISTIUT15 is a new probe that indicates input is not a response type.
ISTIUT38	Logical Link Control	ISTIUT38 is a new probe that indicates Connection Manager input received is not valid for this state.
ISTIUT42	Logical Link Control	ISTIUT42 is a new probe that indicates Connection Manager input received is not valid for this state.
ISTIUT44	Logical Link Control	ISTIUT44 is a new probe that indicates Connection Manager input received is not valid for this state.
ISTIUT49	Logical Link Control	ISTIUT49 is a new probe that indicates Connection Manager input received is not valid for this state.
ISTIUT50	Logical Link Control	ISTIUT50 is a new probe that indicates Connection Manager input received is not valid for this state.
ISTIUT51	Logical Link Control	ISTIUT51 is a new probe that indicates Connection Manager input received is not valid for this state.
ISTIUT65	Logical Link Control	ISTIUT65 is a new probe that indicates internal token address is zero.
ISTIUT66	Logical Link Control	ISTIUT66 is a new probe that indicates token that was not valid when token reuse attempted.

*Table 36 (Page 2 of 2). New and Changed First Failure Support Technology Probes*

<b>Probe</b>	<b>Component</b>	<b>Description</b>
ISTIUT67	Logical Link Control	ISTIUT67 is a new probe that indicates internal address is zero.
ISTIUT72	Logical Link Control	ISTIUT72 is a new probe that indicates unrecognized FM Initialization FSM state.

## Chapter 4. High Performance Routing (HPR) Enhancements

The following function enhances VTAM's HPR support:

- "HPR Extensions for Border Node and CNN."

### HPR Extensions for Border Node and CNN

In VTAM V4R3, a composite network node (CNN) can provide only automatic network routing (ANR)-level HPR support through an NCP of the CNN, and can thus be only an intermediate node on an HPR route. A CNN cannot provide rapid transport protocol (RTP)-level HPR support as the endpoint of an HPR route. HPR support is not available for connections to or from VTAM in a CNN.

In VTAM V4R4, HPR support is available through VTAM in a CNN. A CNN now provides ANR-level support, through NCP or VTAM, as an intermediate node on an HPR route. VTAM in a CNN can also provide RTP-level HPR support as the endpoint of an HPR route.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	To use HPR over an NCP you must have, at a minimum, NCP Version 7 Release 3 (and 37xx controllers supported by NCP Version 7 Release 3). To use HPR over a subnetwork boundary you must have, at a minimum, NCP Version 7 Release 5.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	The default value of the HPR start option at a CNN has changed to HPR=RTP.  The HPRPST start option now includes a value for network transmission priority limit. Default values have also changed.
<b>Performance Impacts</b>	None.

### Implementation Overview

There are three levels of HPR support for a VTAM node:

#### Rapid transport protocol (RTP)

An RTP connection can exist between two VTAM nodes with APPN capability (NODETYPE is coded); these two VTAMs can be endpoints of an HPR route.

#### Automatic network routing (ANR)

A VTAM network node (NODETYPE=NN) can also provide ANR-level support as an intermediate node on a HPR route.

## High Performance Routing (HPR) Enhancements

### No HPR support

HPR support can be disabled for a particular VTAM network node or end node using the HPR=NONE start option. If HPR support is disabled, that VTAM cannot be an endpoint or intermediate node for an HPR route. A VTAM subarea node (NODETYPE not coded) also cannot provide HPR support.

HPR support provided by a VTAM APPN node can be limited using the HPR=ANR, HPR=(RTP,ANR), HPR=(RTP,NONE), or HPR=(ANR,NONE) start option.

### HPR=ANR

You can use the HPR=ANR start option to limit HPR support provided by a network node. Ordinarily, network nodes can provide both RTP-level and ANR-level support, but use of HPR=ANR precludes a network node from providing RTP-level support. If you use HPR=ANR, coding HPR=YES on a CDRM or PU definition statement (or allowing it to default to YES) results in ANR-level HPR support over that connection.

### HPR=(RTP,ANR)

Using HPR=(RTP,ANR) indicates this VTAM provides RTP-level HPR support only if HPR=YES is coded for a particular CDRM or PU definition statement. If you let the HPR operand default on a CDRM or PU definition statement, you only get ANR-level HPR support over that connection. This way you can easily select exactly which links serve as RTP endpoints, while allowing others to provide ANR-level HPR support by default.

### HPR=(RTP,NONE)

Specifying HPR=(RTP,NONE) indicates this VTAM provides RTP-level HPR support only if HPR=YES is coded on the CDRM or PU definition statement. If you let the HPR operand default on a CDRM or PU definition statement, you get no HPR support over that connection.

### HPR=(ANR,NONE)

Specifying HPR=(ANR,NONE) indicates this VTAM provides ANR-level HPR support only if HPR=YES is coded on the CDRM or PU definition statement. If you let the HPR operand default on a CDRM or PU definition statement, you get no HPR support over that connection. This way you can get ANR support on selected links without automatically getting it on all links.

HPR support is available over NCP connections, and to or from VTAM over APPN host-to-host channel connections, local SNA connections, and VR-based TGs. HPR support can also be disabled by coding HPR=NO on a particular GROUP, LINE, or PU definition statement, or on the CDRM definition statement for VR-based TGs.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Start options
- Definition statements

- Definition statements for major nodes
  - Cross-domain resource manager (CDRM) major node
  - Local SNA major node
  - Network Control Program (NCP) major node
  - Switched major node
- VTAM network operator commands
- VTAM network operator messages
- Codes
  - Abend codes
  - Command and request/response unit (RU) types in VTAM messages
  - Session initiation states
  - Sense codes for the Performance Monitor communication network management (CNM) RUs
- DISPLAY STORUSE pools
- Performance Monitor Interface
- Installation-wide exit routines
  - Performance Monitor exit routine
  - Session management (SME)
- VTAM internal trace (VIT) entries.

### New and Changed Start Options

Table 37 shows the start options that have been added or changed for this function. For information about how to specify these start options, refer to the *VTAM Resource Definition Reference*.

*Table 37. New and Changed Start Options*

Start Option	Operand	Description
HPR		The default value of the HPR start option at a CNN has changed to HPR=RTP. New values are HPR=(RTP,ANR), HPR=(RTP,NONE), and HPR=(ANR,NONE).
HPRPST		The HPRPST start option now includes a value for network transmission priority limit. Default values have also changed.
PSRETRY		Specifies the interval between attempts to switch a rapid transport protocol (RTP) session to a better path. You can specify different time limits for low, medium, and high network transmission priority connections.

### Changed Definition Statements for Major Nodes

The definition statements used to define the following major nodes have changed for this function:

- Cross-domain resource manager (CDRM)
- Local SNA
- NCP
- Switched.

For information about how to code these definition statements, refer to the *VTAM Resource Definition Reference*.

**Cross-Domain Resource Manager Major Node:** Table 38 shows the definition statements used in defining a cross-domain resource manager major node that have been changed for this function.

*Table 38. New and Changed Definition Statements for the Cross-Domain Resource Manager Major Node*

Definition Statement	Operand	Description
CDRM	HPR	A new operand on the CDRM definition statement, used to specify HPR capability (YES or NO) to a CDRM.

**Local SNA Major Node:** Table 39 shows definition statements used to define the local SNA major node that have been changed for this function.

*Table 39. Definition Statements for the Local SNA Major Node*

Definition Statement	Operand	Description
PU	HPR	The default value has changed.

**Network Control Program Major Node:** Table 40 shows definition statements used to define the NCP major node that have been changed for this function.

*Table 40. Changed Definition Statements for the NCP Major Node*

Definition Statement	Operand	Description
GROUP LINE PU	HPR	The default for this operand has changed.

**Switched Major Node:** Table 41 shows definition statements used to define the switched major node that have been changed for this function.

*Table 41. Changed Definition Statements for the Switched Major Node*

Definition Statement	Operand	Description
PU	HPR	The default for this operand has changed.



### Changed VTAM Network Operator Commands

Table 42 shows VTAM network operator commands that have been changed for this function. For information about how to use these VTAM network operator commands, refer to *VTAM Operation*.

Table 42. Changed VTAM Network Operator Commands

Command	Operand	Description
DISPLAY VTAMOPTS	FUNCTION = APPNCHAR FUNCTION = PERFTUNE	These operands display the value of the new PSRETRY start option.
MODIFY VTAMOPTS	PSRETRY	This operand changes the value of the PSRETRY start option.
START	PSRETRY	This start option is new to specify the interval between attempts to switch a rapid transport protocol (RTP) session to a better path. You can specify different time limits for low, medium, and high network transmission priority connections.
VARY ACT	HPR	The VARY ACT command has been changed so that the HPR operand can now be specified on activation of a CDRM.

### New and Changed VTAM Network Operator Messages

This section shows messages that have been added or changed for VTAM network operators. For complete descriptions of these messages, refer to *VTAM Messages*.

**New Messages:** The following messages for VTAM network operators have been added:

IST1568I	INLP = <i>inlp</i> ONLP = <i>onlp</i> BFNLP = <i>bfnlp</i>
IST1569I	INLP = <i>inlp</i> ONLP = <i>onlp</i>
IST1570I	NBYTECTO = <i>nbyTECTO</i> NBYTECT = <i>nbyTECT</i>

**Changed Messages:** The following messages for VTAM network operators have been changed:

IST440I	TIME = <i>time</i> DATE = <i>date</i> ID = <i>id</i>
---------	------------------------------------------------------

**Explanation:** PIUs and NLPs are now counted separately; NLPs no longer treated as PIUs for tuning statistics.

IST1230I	TIME = <i>time</i> DATE = <i>date</i> ID = <i>id</i>
----------	------------------------------------------------------

**Explanation:** PIUs and NLPs are now counted separately; NLPs no longer treated as PIUs for tuning statistics.



## New DISPLAY STORUSE Pool

HPRINFO is a new storage pool that can be displayed using the DISPLAY STORUSE command.

## New and Changed Installation-Wide Exit Routines

Table 46 shows installation-wide exit routines that have been added or changed for this function. For information about these installation-wide exit routines, refer to *VTAM Customization*.

Table 46. New and Changed Installation-Wide Exit Routines

Exit Routine	Description
Session Management	The HPR virtual route selection function (function code X'0C') has been added to the session management exit routine, which also required expansion of the exit options field to 4 bytes. A VTAM release vector was added to the environment vector list.
Performance Monitor	The global environment vector has been changed to include a local network ID, a local CP name, and HPR capability. The RTP data vector has been added.

## New and Changed VTAM Internal Trace Entries

Table 47 shows VTAM internal trace (VIT) entries that have been added or changed for this function. For information about the VTAM internal trace, refer to *VTAM Diagnosis*.

Table 47. New and Changed VTAM Internal Trace Entries

Entry	Option	Description
HPR, HPR2, HPR3	HPR	This VIT entry has been changed.
RSCx, RSC2	HPR	This VIT entry has been added.

## High Performance Routing (HPR) Enhancements

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## Chapter 5. LU 6.2 Application Program Interface (API) Enhancements

The following functions enhance LU 6.2 application program interface processing:

- “APPCCMD Macroinstruction Enhancements”
- “APPC Enhancements for the Distributed Computing Environment” on page 81
- “Conversations between Programs Located on the Same LU” on page 86
- “Deleting Unusable Entries from the LU-Mode Table” on page 88
- “Extended Security Sense Codes” on page 89
- “Password Substitution” on page 93
- “STOKEN for Workload Balancing” on page 97.

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### APPCCMD Macroinstruction Enhancements

The APPCCMD macroinstruction enhancements provide new APPCCMD semantics that LU 6.2 applications can use to improve performance by bypassing processing steps for sending and receiving data and allocating conversations.

### Performance Enhancements for Sending and Receiving Data

The new APPCCMD CONTROL=SENDRCV, QUALIFY=DATAFLU macroinstruction is suited for applications that perform frequent send and receive operations within a single conversation. This macroinstruction essentially combines the CONTROL=SEND and CONTROL=RECEIVE options into one APPCCMD request, reducing the number of APPCCMD macroinstructions that have to be processed during the conversation. When an application issues APPCCMD CONTROL=SENDRCV, QUALIFY=DATAFLU, VTAM sends data to the partner LU and automatically turns the flow of the conversation around to receive the next request.

Large packet applications can realize additional performance improvements by using the APPCCMD CONTROL=SENDRCV, QUALIFY=DATAFLU macroinstruction with OPTCD=XBUFLST. Specifying OPTCD=XBUFLST indicates that, for the sending portion of the macroinstruction, VTAM should use HPDT services that send the data directly from the application's buffers in the communications storage manager (CSM) without invoking any intervening data moves. For more information about high performance data transfer for APPC, see “High Performance Data Transfer for APPC” on page 42.

For more information about the APPCCMD CONTROL=SENDRCV, QUALIFY=DATAFLU macroinstruction, see “APPCCMD CONTROL=SENDRCV, QUALIFY=DATAFLU” in the *VTAM Programming Reference for LU 6.2*.

### Performance Enhancements for Receiving the FMH-5

The new QUALIFY=QUEUE|DATAQUE values for the APPCCMD CONTROL=RCVFMH5 macroinstruction targets LU 6.2 applications that frequently receive conversation allocation requests (FMH-5). When an FMH-5 is received by VTAM, these new values allow the application to bypass ATTN(FMH-5) exit processing and, when application data accompanies the FMH-5, avoid the movement of the incoming data to a data space.

## LU 6.2 Application Program Interface (API) Enhancements

### Overview of RCVFMH5 Processing

With pre-V4R4 VTAM, when a conversation allocation request is received for an LU 6.2 application, VTAM automatically schedules the ATTN(FMH-5) exit to notify the application of the pending FMH-5. VTAM queues the FMH-5 and, if application data accompanies the FMH-5, VTAM moves the data to a data space to clear I/O buffers. After the application's ATTN exit executes, the application issues an APPCCMD CONTROL=RCVFMH5. VTAM then returns the FMH-5 and the conversation identifier (CONVID) to the application. Next, the application issues an APPCCMD CONTROL=RECEIVE with the CONVID to get the data that has already been moved into the data space by VTAM.

LU 6.2 applications using VTAM V4R4 can issue an APPCCMD CONTROL=RCVFMH5, QUALIFY=QUEUE|DATAQUE before VTAM receives the partner's allocation request. VTAM queues the request until an FMH-5 is received. Then VTAM processes the RCVFMH5 request as follows:

- If **QUEUE** is specified, VTAM moves the FMH-5 immediately to the application's buffer and bypasses ATTN(FMH-5) exit processing. Any data that accompanies the FMH-5 is moved to a data space to clear I/O buffers.
- If **DATAQUE** is specified, VTAM processes the request similar to the QUEUE option except that any data that accompanies the FMH-5 is transferred to the application. VTAM examines the setting of the application's FILL parameter to determine how to handle the data. The remainder of the macroinstruction is processed similar to a receive request.

For more information about the APPCCMD CONTROL=RCVFMH5, QUALIFY=QUEUE|DATAQUE macroinstruction, see Chapter 7, "Allocating a Conversation" in the *VTAM Guide to Programming for LU 6.2*.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	<p>Using the new APPCCMD semantics has no impact on existing applications. However, any attempt by an application to use the new APPCCMD semantics with a pre-V4R4 VTAM will fail. Applications should be designed to verify VTAM's support for LU 6.2 global variables &amp;ISTGA55 and &amp;ISTGA57 either at the completion of OPEN processing (by examining the LU-6.2-support vector) or during application assembly (by using the ISTGAPPC macroinstruction).</p> <p>See "Vector Lists" in the <i>VTAM Guide to Programming for LU 6.2</i> for more information.</p>
<b>Performance Impacts</b>	<p>Performance for sending and receiving data can be enhanced by using the APPCCMD CONTROL=SENDRCV, QUALIFY=DATAFLU macroinstruction. Performance for conversation allocation can be enhanced by using the APPCCMD CONTROL=RCVFMH5, QUALIFY=QUEUE DATAQUE macroinstruction.</p>

### New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- LU 6.2 application programming macroinstructions
- VIT entries
- RCPRI and RCSEC return codes for LU 6.2
- DSECTs.

### New and Changed LU 6.2 Application Program Macroinstructions

Table 48 shows LU 6.2 application program macroinstructions that have been added or changed for this function. For information about how to code VTAM LU 6.2 application programs, refer to the *VTAM Guide to Programming for LU 6.2*.

*Table 48 (Page 1 of 2). New and Changed LU 6.2 Application Program Macroinstructions*

Macroinstruction	Operand	Description
APPCCMD CONTROL= RCVFMH5	QUALIFY= QUEUE  DATAQUE	QUEUE and DATAQUE are new QUALIFY values that queue the RCVFMH5 request pending the receipt of an FMH-5.

## LU 6.2 Application Program Interface (API) Enhancements

Table 48 (Page 2 of 2). New and Changed LU 6.2 Application Program Macroinstructions

Macroinstruction	Operand	Description
APPCCMD CONTROL= SENDRCV	QUALIFY= DATAFLU	This new macroinstruction sends data to the partner application and then places the conversation in receive state to wait for data from the partner. This macroinstruction combines the functions of two macroinstructions: APPCCMD CONTROL=SEND, QUALIFY=DATAFLU followed by APPCCMD CONTROL=RECEIVE, QUALIFY=SPEC.
ISTGAPPC	&ISTGA55 &ISTGA57	These two new LU 6.2 global variables indicate VTAM's support for this function.
ISTRPL6	QUALIFY= QUEUE DATAQUE	This macroinstruction has been updated to reflect the new QUALIFY values.

### Changed VTAM Internal Trace Entries

Table 49 shows VTAM internal trace (VIT) entries that have been changed for this function. For information about the VTAM internal trace, refer to *VTAM Diagnosis*.

Table 49. Changed VTAM Internal Trace Entries

Entry	Option	Description
ACA1 ACP1 ACP2	APPC	Updated entries reflect the new CONTROL and QUALIFY values for the APPCCMD macroinstruction.

### New RCPRI and RCSEC Return Code for LU 6.2

Table 50 shows an RCPRI and RCSEC return code that has been added for this function. Descriptions of the RCPRI and RCSEC return codes for LU 6.2 are contained in *VTAM Codes* and the *VTAM Programming Reference for LU 6.2*.

Table 50. New RCPRI and RCSEC Return Code for LU 6.2

RCPRI	RCSEC	ISTUSFBC EQU Label	Description
X'002C'	X'0031'	USF6VALS	PARAMETER_ERROR— SENDRCV_SPECIFIED_WITHOUT_ OPTCD=BUFFLST XBUFLST

### New and Changed DSECTs

ISTUSFBC has been changed to reflect the new RCPRI,RCSEC combination listed in Table 50.

ISTRPL6X has been changed to reflect the new CONTROL and QUALIFY values as a result of this new function.



## APPC Enhancements for the Distributed Computing Environment

This function enables application programs that use VTAM's API for APPC to exploit third party authentication. Third party authentication is a security function of the Distributed Computing Environment (DCE) that allows authorized end users access to a heterogeneous network with a single logon. Application programs implementing third party authentication write to the Generic Security Services application programming interface (GSS-API), which became available as part of Release 1.1 of DCE by the Open Software Foundation (OSF). The GSS-API allows application programs that do not implement remote procedure calls to have security services provided by a server in a distributed computing environment.

The APPC implementation of the GSS-API is described in option sets #230 and #231 in the *SNA Transaction Programmer's Reference for LU 6.2*.

For an overview of DCE, see one of the following resources:

- *Distributed Computing Environment: Understanding the Concepts* (GC09-1478-01)
- The Open Software Foundation home page, available at the following URL:  
<http://www.osf.org/>

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Restrictions</b>	<p>The application program implementing VTAM's APPC enhancements for the Distributed Computing Environment must use VTAM's API for APPC.</p> <p>For any given conversation, the following security options cannot be used simultaneously with third party authentication (DCE security):</p> <ul style="list-style-type: none"> <li>• Already-verified indications</li> <li>• LU already in signed-on list</li> <li>• LU to be added to signed-on list</li> <li>• Password substitution.</li> </ul> <p>These options can be used simultaneously for a given session.</p>
<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	Application programs must account for the new SNA sense codes.
<b>Performance Impacts</b>	None.

### Implementation Overview

VTAM offers pass-through support for third party authentication (DCE security). It is the responsibility of the application program to implement this option. VTAM's responsibility is to assist in determining DCE security support for a particular session and to allow DCE tokens to be sent in the FMH-5. It is the application's responsibility to do the following:

#### **Verify VTAM's support for DCE security**

An application can verify VTAM's support for DCE security at assembly time with the ISTGAPPC macroinstruction, or at OPEN ACB time by examining the LU-6.2-function-list vector in the access-method-support vector list.

For more information about verifying VTAM's support for LU 6.2 functions, see "LU 6.2 Global Variables" in the *VTAM Guide to Programming for LU 6.2*.

#### **Indicate the application's support for DCE security**

An application must inform VTAM that it supports DCE security in the local application's DCE capability vector if it intends to use the function for any session. This vector is located in the application-ACB vector list, which is indicated by the PARMS=APPLVCTR=*address* parameter on the ACB macroinstruction. VTAM uses this vector to negotiate support for DCE security during session setup. New unit fields in the BIND and BIND response are used by VTAM to indicate support for DCE security. The nonce user data subfield is sent to the partner in the BIND and BIND response for use in generating the authentication token. The security mechanisms user data subfield is sent to the partner in the BIND and BIND response to communicate the type and policy of security mechanisms to be used.

For more information about using the application-capabilities vector, see "Vector Lists" in the *VTAM Guide to Programming for LU 6.2*.

#### **Verify session support for DCE security**

Support for DCE security must be negotiated during BIND processing by both the PLU and the SLU of a session. If one partner does not support DCE security, then neither partner can use it for the session. A VTAM application determines if DCE security is supported for a session with its partner by examining the partner's-DCE-capabilities vector, which is returned in the VTAM-APPCCMD vector list (see "Vector Lists Used During APPCCMD Processing" in the *VTAM Guide to Programming for LU 6.2* for more information).

#### **Build an FMH-5 containing the authentication token (X'12F6') GDS variable**

The application sets byte 4, bit 5 to B'1' to indicate that the authentication token precedes user data. The authentication token is built according to APPC architecture.

For more information about building the FMH-5, see Chapter 7, "Allocating a Conversation" in the *VTAM Guide to Programming for LU 6.2*.

For more information about VTAM's support for DCE security, see Chapter 13, "VTAM's LU 6.2 Security Options" in the *VTAM Guide to Programming for LU 6.2*.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Sense codes
- Application programming vector lists
- LU 6.2 application programming macroinstructions and exit routines
- DSECTs
- IBM-supplied logon mode table.

### Sense Codes

Table 51 shows sense codes that have been added for this function.

Table 51 (Page 1 of 3). New Sense Codes

Category and Modifier (in hexadecimal)	Sense-Code Specific Information	Type	Description
080F	8000	Request Reject	Access Failure: GSS-API unexpected status value — A GSS-API request returned an unrecognized status value.
080F	8001	Request Reject	Access Failure: GSS-API GSS_BAD_MECH — unsupported mechanism requested.
080F	8002	Request Reject	Access Failure: FSS-API GSS_BAD_NAMETYPE — name of unsupported type provided.
080F	8003	Request Reject	Access Failure: GSS_API GSS_BAD_BINDINGS — channel binding mismatch.
080F	8004	Request Reject	Access Failure: GSS_API GSS_BAD_NAME — invalid name provided.
080F	8005	Request Reject	Access Failure: GSS_API GSS_BAD_STATUS — invalid input status selector.
080F	8006	Request Reject	Access Failure: GSS_API GSS_BAD_SIG — token had invalid signature.
080F	8007	Request Reject	Access Failure: GSS_API GSS_DEFECTIVE_CREDENTIAL — defective credential detected.
080F	8008	Request Reject	Access Failure: GSS_API GSS_DEFECTIVE_TOKEN — defective token detected.
080F	8009	Request Reject	Access Failure: GSS_API GSS_FAILURE — failure, unspecified at GSS_API level.

## LU 6.2 Application Program Interface (API) Enhancements

Table 51 (Page 2 of 3). New Sense Codes

Category and Modifier (in hexadecimal)	Sense-Code Specific Information	Type	Description
080F	800A	Request Reject	Access Failure: GSS_API GSS_NO_CONTEXT — no valid security context specified.
080F	800B	Request Reject	Access Failure: GSS_API GSS_NO_CRED — no valid credentials provided.
080F	8101	Request Reject	Retryable Access Failure: GSS_API GSS_CONTEXT_EXPIRED — specified security context expired.
080F	8102	Request Reject	Retryable Access Failure: GSS_API GSS_CREDENTIALS_EXPIRED — expired credentials detected.
080F	8103	Request Reject	Retryable Access Failure: Deferred Authentication processing was requested, but communications failures occurred while attempting to communicate with the Distributed Authentication Service TP.
080F	8104	Request Reject	Retryable Access Failure: Deferred Authentication processing was requested, but the origin could not locate the conversation's security context.
1008	6050	Request Error	Missing or unexpected X'12F6' GDS.
1008	6051	Request Error	The length of the Attach Sequence Number field in the FMH-5 is not 0 or 8.
1008	6053	Request Error	Incorrect length of X'12F6', X'12F7', or X'12F8' GDS variable.
1008	6054	Request Error	Byte 4, bit 5 of the Attach is 1, indicating the use of GSS-API based authentication, but either other security bits in the Attach are on also or the Attach access security information fields are present.
1008	6056	Request Error	The partner LU responded to an Attach with any data other than an FMH7 or an Authentication Token GDS (ID X'12F6').

Table 51 (Page 3 of 3). New Sense Codes

Category and Modifier (in hexadecimal)	Sense-Code Specific Information	Type	Description
1008	6057	Request Error	Deferred authentication processing was requested but the Attach did not contain a valid conversation correlator.

### Application Programming Vector Lists

Table 52 shows the vector lists that have been changed for this function. For more information about vector lists, refer to the *VTAM Guide to Programming for LU 6.2*.

Table 52. New Vector Lists

Vector List	Vector	Description
Application-ACB (mapped by ISTVACBV)	Local-application's-DCE-capability vector (X'82')	A new vector that the application can specify on the OPEN macroinstruction that indicates support for DCE security.
VTAM-APPCCMD (mapped by ISTAPCVL)	Partner's-DCE-capability vector (X'12')	A new vector that provides information about functions supported by the partner LU. Support for APPC enhancements for the Distributed Computing Environment for a particular session is indicated in this vector.

### Changes to LU 6.2 Application Program Macroinstructions and Exit Routines

Table 53 shows LU 6.2 application program macroinstructions and exit routines that have been changed for this function. For information about how to code VTAM LU 6.2 application programs, refer to the *VTAM Guide to Programming for LU 6.2*.

Table 53. Changed LU 6.2 Macroinstructions and Exit Routines

Macroinstruction	Operand	Description
APPCCMD, CONTROL=ALLOC APPCCMD CONTROL=OPRCNTRL APPCCMD CONTROL=PREALLOC APPCCMD CONTROL=RCVFMH5	VTRINA, VTRINL	The new partner's-DCE-capability vector (X'12') can be returned on these macroinstructions when VTRINA and VTRINL is specified.
ATTN exit	CNOS function	The new partner-application-capabilities vector can be returned on the ATTN(CNOS) exit.
ISTGAPPC	&ISTGA61	This is a new global variable to indicate support for APPC enhancements for the Distributed Computing Environment. VTAM provides pass-through support.

### DSECTS

Table 54 shows the DSECTS that have been changed for this function. For information about application program DSECTS, refer to *VTAM Programming* or the *VTAM Programming Reference for LU 6.2*.

Table 54. Changes to DSECTS

DSECT	Description
ISTDBIND	ISTDBIND reflects the changes to the BIND image.
ISTAMSVL	The LU 6.2-support-function-list vector (ISTAMS06) reflects the new LU 6.2 global variable that has been added for this function.
ISTFM5	Byte 4 indicates whether a DCE security GDS is present.

### IBM-Supplied Logon Mode Table (ISTINCLM)

The new architected SNDAUTH mode has been added to the IBM-supplied logon mode table. For the complete layout of the default logon mode table, see Appendix A, "IBM-Supplied Tables" in the *VTAM Resource Definition Reference*.

## Conversations between Programs Located on the Same LU

This function introduces VTAM's support for LU=OWN conversations, which are conversations between two transaction programs that reside on the same LU or application.

In pre-V4R4 releases, when a VTAM LU 6.2 application issued a session initiation request and specified its own application name on the LUNAME parameter, VTAM rejected the request with a sense code of X'10030020'. For V4R4, this function allows a VTAM LU 6.2 application to request a session with itself and for transaction programs on that application to allocate LU=OWN conversations.

LU=OWN conversations are implemented by the application program. VTAM provides pass-through support for this function. LU=OWN conversations are documented in the *SNA Transaction Programmer's Reference Manual for LU 6.2* under SNA Option Set #204.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Restrictions</b>	<ul style="list-style-type: none"> <li>• Applications using conversations between programs located on the same LU must have APPC=YES defined on their APPL definition statement and use the APPCCMD macroinstruction.</li> <li>• Data is not encrypted or compressed when it is transferred between same host LU 6.2 applications, even if requested by the application. This applies to data sent between two transaction programs that reside on the same LU.</li> <li>• LU=OWN conversations are not permitted when the application indicates that the partner (itself) is a single-session capable LU in the CNOS control block.</li> </ul>
<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

### New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- LU 6.2 global variable (ISTGAPPC)
- Vector lists
- Sense codes.

#### New LU 6.2 Global Variable

A new LU 6.2 global variable, &ISTGA58, has been added to indicate VTAM's support for LU=OWN conversations. The ISTGAPPC macroinstruction has been changed to include &ISTGA58.

#### Application Programming Vector Lists

&ISTGA58 has been added to the LU 6.2-support-function-list vector. VTAM informs an application about its level of support for conversations between programs located on the same LU on the LU-6.2-support-function-list vector, which is located in the access-method-support vector list. The application must examine this vector list to determine if the VTAM with which it has opened its ACB supports conversations between transaction programs on the same LU (LU 6.2 option set #204). For more information about using vectors and vector lists, see "Vector Lists" in the *VTAM Guide to Programming for LU 6.2*.

The DSECT that maps the access-method-support vector list, ISTAMSVL, includes the new LU 6.2 global variable, &ISTGA58.

### Sense Codes

Table 55 shows the sense code that has been changed for this function.

Table 55. Changed Sense Codes

Category and Modifier (in hexadecimal)	Sense-Code Specific Information	Type	Description
1003	0020	Request Error (10XX)	For VTAM LU 6.2 applications, this sense code will no longer be issued for a session initiation request when the OLU and DLU are the same.

### Deleting Unusable Entries from the LU-Mode Table

In VTAM V4R3, VTAM adds an entry to the LU-mode table when a session is established with an application program. In certain situations (for example, an LU logs on to the application program using an existing LU name), entries with the same LU name might be marked as UNUSABLE. UNUSABLE entries remain in the LU-mode table until the application program is terminated and restarted.

In VTAM V4R4, LU-mode table entries marked as UNUSABLE can be removed from the table by specifying the DELETE=UNUSE operand when issuing a MODIFY DEFINE command for the application program name and the LU name.

**Note:** This function was introduced in VTAM V4R3 through the program temporary fix (PTF) associated with APAR OW15631.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	Network operators might receive new RCPRI and RCSEC values when issuing a MODIFY DEFINE,DELETE=UNUSE command.
<b>Performance Impacts</b>	None.



## Implementation Overview

Unusable entries in the LU-mode table can be deleted by issuing a MODIFY DEFINE command using the new DELETE=UNUSE operand.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- VTAM network operator commands
- RCPRI and RCSEC return codes for LU 6.2.

### Changed VTAM Network Operator Command

Table 56 shows a VTAM network operator command that has been changed for this function. For information about how to use VTAM network operator commands, refer to *VTAM Operation*.

Table 56. Changed VTAM Network Operator Command

Command	Operand	Description
MODIFY DEFINE	DELETE	A new value, UNUSE, allows the operator to delete unusable entries from the LU-mode table.

### New RCPRI and RCSEC Return Code for LU 6.2

Table 57 shows an RCPRI and RCSEC return code for LU 6.2 that has been added for this function. Descriptions of the RCPRI and RCSEC return codes for LU 6.2 are contained in *VTAM Codes* and the *VTAM Programming Reference for LU 6.2*.

Table 57. New RCPRI and RCSEC Return Code for LU 6.2

RCPRI	RCSEC	ISTUSFBC EQU Label	Description
00A0	0008	USF6ENEL	A MODIFY DEFINE command with DELETE=UNUSE was issued for an entry in the LU-mode table, but the entry type is not UNUSABLE.

## Extended Security Sense Codes

This function enables application programs that use VTAM's application program interface (API) for APPC to exploit extended security sense codes. Extended security sense codes is an option set (225) in the APPC architecture that provides a means for application programs to provide helpful diagnostic information about security access failures to authorized users.

## LU 6.2 Application Program Interface (API) Enhancements

SNA architecture defines a single sense code, X'080F6051' - Access Security Information Invalid, for security access failures on sessions that do not support extended security sense codes. This generic sense code prevents unauthorized users from determining the exact cause of an access error. For example, a conversation allocation request may be sent without a userid or with a password that is not valid. Returning a sense code that specifies the exact cause of the error enables users to correct the problem and facilitates access to the resource. This is not desirable when the identity of the end user is unknown and, therefore, the single generic sense code has been used. Authorized users, however, are also affected when they cannot determine the cause of an access failure. Using extended security sense codes provides more helpful information without compromising the security of system resources.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Restrictions</b>	The application implementing extended security sense codes must use VTAM's API for APPC.
<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

### Implementation Overview

VTAM offers pass-through support for extended security sense codes. It is the responsibility of the application program to implement this service. VTAM's responsibility is to inform the session partner about the application's support for extended security sense codes. It is the application's responsibility to do the following:

#### Verify VTAM's support for extended security sense codes

An application can verify VTAM's support for extended security sense codes at assembly time with the ISTGAPPC macroinstruction, or at OPEN ACB time by examining the LU-6.2-function-list vector in the access-method-support vector list.

For more information about verifying VTAM's support for LU 6.2 functions, see Chapter 2, "LU 6.2 and the VTAM API" in the *VTAM Guide to Programming for LU 6.2*.

#### Indicate the application's support for extended security sense codes

An application must inform VTAM that it supports extended security sense codes in the application-capabilities vector if it intends to use the function for any session. This vector is located in the application-ACB vector list, which is indicated by the PARMs=APPLVCTR=*address* parameter on the ACB macroinstruction. VTAM uses this vector during session setup to inform the session partner about the application's support for extended security sense codes. New unit fields in the BIND

and BIND response are used by VTAM to indicate support for extended security sense codes.

For more information about using the application-capabilities vector, see “Vector Lists” in the *VTAM Guide to Programming for LU 6.2*.

### Verify session support for extended security sense codes

A VTAM application determines if extended security sense codes is supported for a session with its partner by examining the partner-application-capabilities vector, which is returned in the VTAM-APPCCMD vector list (see “Vector Lists Used During APPCCMD Processing” in the *VTAM Guide to Programming for LU 6.2* for more information).

### Build an FMH-7, when necessary, for allocation requests containing security access errors

For a complete list of extended security sense codes that can flow on the FMH-7, see Chapter 1, “Sense Codes” in the *VTAM Messages*.

For more information about VTAM's support for extended security sense codes, see Chapter 13, “VTAM's LU 6.2 Security Options” in the *VTAM Guide to Programming for LU 6.2*.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Sense codes
- Application programming vector lists
- LU 6.2 application programming macroinstructions and exit routines
- DSECTs.

### New Sense Code

Table 58 shows a sense code that has been added for this function. Descriptions of sense codes are contained in *VTAM Codes*.

Table 58. New Sense Codes

Category and Modifier (in hexadecimal)	Sense-Code Specific Information	Type	Description
080F	6058 FF00 — FF0D	Request Reject	These can only be issued by an application that indicates support for extended security sense codes through the application-capabilities vector during OPEN ACB.

### Application Programming Vector Lists

Table 59 on page 92 shows the vector lists that have been changed for this function. For more information about vector lists, refer to the *VTAM Programming Reference for LU 6.2*.

## LU 6.2 Application Program Interface (API) Enhancements

Table 59. New and Changed Vector Lists

Vector List	Vector	Description
Application-ACB (mapped by ISTVACBV)	Application-capabilities vector (X'81')	The following new field has been added: VAC81ESS (X'10') Application is capable of handling extended security sense codes.
VTAM-APPCCMD (mapped by ISTAPCVL)	Partner- application-capabilities (X'20')	This is a new vector that provides information about functions supported by the partner LU. Support for extended security sense codes for a particular session is indicated in this vector.

### Changes to LU 6.2 Application Program Macroinstructions and Exit Routines

Table 60 shows LU 6.2 application program macroinstructions and exit routines that have been changed for this function. For information about how to code VTAM LU 6.2 application programs, refer to the *VTAM Guide to Programming for LU 6.2*.

Table 60. Changed LU 6.2 Application Program Macroinstructions

Macroinstruction	Operand	Description
APPCCMD, CONTROL=ALLOC CONTROL=OPRCNTRL QUALIFY=CNOS DISPLAY CONTROL=PREALLOC CONTROL=RCVFMH5	VTRINA VTRINL	The new partner-application-capabilities vector (X'20') can be returned on these macroinstructions when VTRINA and VTRINL is specified.
ATTN exit	CNOS function	The new partner-application-capabilities vector can be returned on the ATTN(CNOS) exit.
ISTGAPPC	&ISTGA60	This is a new global variable to indicate support for extended security sense codes. VTAM provides pass-through support.

### DSECTS

Table 61 shows the DSECTS that have been changed for this function. For information about application program DSECTS, refer to *VTAM Programming* or refer to the *VTAM Programming Reference for LU 6.2*.

Table 61. Changes to DSECTS

DSECT	Description
ISTDBIND	ISTDBIND reflects the changes to the BIND image.
ISTAMSVL	The LU 6.2-support-function-list vector (ISTAMS06) reflects the new LU 6.2 global variables that have been added for this function.

## Password Substitution

This function enables application programs that use VTAM's API for APPC to exploit the password substitution. Password substitution is an option set (223) of APPC architecture that provides a mechanism for masking an end user's password sent in a conversation request (FMH-5). LU 6.2 products that do not implement password substitution send end user passwords in clear text in the FMH-5. These passwords are not masked and are available to anyone who can inspect the FMH-5.

Many other LU types and OEM networks that support security verification also send passwords in clear text. Sending clear passwords over the network is sometimes necessary because some end user verification mechanisms cause additional network flows and processor cycles. However, unmasked passwords expose a user's presumably secret password in a network transport facility that may be susceptible to monitoring by unauthorized parties (for example, token ring). Using substituted passwords on the FMH-5 reduces the exposure of end user passwords in the network at no additional cost in network flows.

This function allows an application program to create a token (encrypted form of the password) that effectively substitutes for a user's password on remote requests. Like a password, the token verifies the user's identifier, but unlike a password, the token is valid only under controlled circumstances that are not known to other users.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Restrictions</b>	The application program implementing password substitution must use VTAM's API for APPC.  For a given conversation, password substitution cannot be used simultaneously with APPC enhancements for the Distributed Computing Environment. Both options can be used for a given session.
<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

VTAM offers pass-through support for password substitution. It is the responsibility of the application program to implement this service. VTAM's responsibility is to assist in determining password substitution support for a particular session and to allow substituted passwords to be sent in the FMH-5. It is the application's responsibility to do the following:

## LU 6.2 Application Program Interface (API) Enhancements

### Verify VTAM's support for password substitution

An application can verify VTAM's support for password substitution at assembly time with the ISTGAPPC macroinstruction, or at OPEN ACB time by examining the LU-6.2-function-list vector in the access-method-support vector list.

For more information about verifying VTAM's support for LU 6.2 functions, see Chapter 2, "LU 6.2 and the VTAM API" in the *VTAM Guide to Programming for LU 6.2*.

### Indicate the application's support for password substitution

Before password substitution can be used on a session, an application must inform VTAM that it supports this option in the application-capabilities vector. This vector is located in the application-ACB vector list, which is indicated by the PARM=APPLVCTR=*address* parameter on the ACB macroinstruction. VTAM uses this vector to negotiate support for LU 6.2 functions during session setup. New unit fields in the BIND and BIND response are used by VTAM to indicate support for password substitution. The nonce data user subfield is sent to the partner in the BIND and BIND response for use in generating the encrypted password.

For more information about using the application-capabilities vector, see "Vector Lists" in the *VTAM Guide to Programming for LU 6.2*.

### Verify session support for password substitution

Support for password substitution must be negotiated during BIND processing by both the PLU and the SLU of a session. If one partner does not support password substitution, then neither partner can use it for the session. A VTAM application program determines if password substitution is supported for a session with its partner by examining the partner-application-capabilities vector, which is returned in the VTAM-APPCCMD vector list (see "Vector Lists Used During APPCCMD Processing" in the *VTAM Guide to Programming for LU 6.2* for more information).

### Build an FMH-5 with the encrypted password

Once a session has been established using password substitution support, every FMH-5 on that session must use encrypted passwords. Byte 4 of the FMH-5 indicates whether a token is used to protect a password. The password is encrypted using the DES algorithm specified in the APPC architecture, which is available at the following URL:

<ftp://networking.raleigh.ibm.com/pub/standards/ciw/sig/sec/pwsubciw.ps>

The application must examine the VTAM-APPCCMD vector list for vectors used to encrypt the password.

For more information about building the FMH-5, see see Chapter 7, "Allocating a Conversation" in the *VTAM Guide to Programming for LU 6.2*.

For more information about VTAM's support for password substitution, see Chapter 13, "VTAM's LU 6.2 Security Options" in the *VTAM Guide to Programming for LU 6.2*.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Application programming vector lists
- LU 6.2 application programming macroinstructions and exit routines
- RCPRI and RCSEC return codes for LU 6.2
- Record mode application programming macroinstructions
- DSECTS.

### Application Programming Vector Lists

Table 62 shows the vector lists that have been changed for this function. For more information about vector lists, refer to the *VTAM Guide to Programming for LU 6.2*.

Table 62. Changed Vector Lists

Vector List	Vector	Description
Application-ACB (mapped by ISTVACBV)	Application-capabilities vector (X'81')	A new field (VAC81PWS, X'20') is used by the application program to indicate support for password substitution.
VTAM-APPCCMD (mapped by ISTAPCVL)	Partner-application-capabilities vector(X'20')	A new vector that provides information about functions supported by the partner LU.

### Changes to LU 6.2 Application Program Macroinstructions and Exit Routines

Table 63 shows LU 6.2 application program macroinstructions and exit routines that have been changed for this function. For information about how to code VTAM LU 6.2 application programs, refer to the *VTAM Guide to Programming for LU 6.2*.

Table 63. Changed LU 6.2 Application Program Macroinstructions

Macroinstruction	Operand	Description
APPCCMD CONTROL=ALLOC APPCCMD CONTROL=OPRCNTRL APPCCMD CONTROL=PREALLOC APPCCMD CONTROL=RCVFMH5	VTRINA VTRINL	The new partner-application-capabilities vector (X'20') can be returned on these macroinstructions when VTRINA and VTRINL are specified.
ATTN exit	CNOS function	The new partner-application-capabilities vector can be returned on the ATTN(CNOS) exit.
ISTGAPPC	&ISTGA59	This is a new global variable to indicate support for password substitution. VTAM provides pass-through support.

### New RCPRI and RCSEC Return Code for LU 6.2

Table 64 shows an RCPRI and RCSEC return code for LU 6.2 that has been added for this function. Descriptions of the RCPRI and RCSEC return codes for LU 6.2 are contained in *VTAM Codes* and the *VTAM Programming Reference for LU 6.2*.

Table 64. New RCPRI and RCSEC Return Code for LU 6.2

RCPRI	RCSEC	ISTUSFBC EQU Label	Description
X'002C'	X'0034'	USF6LNSP	Returned when password substitution support is sent on an FMH5 for a session that does not support password substitution.

### Changed Record Mode Application Program Macroinstructions

Table 65 shows record mode application program macroinstructions that have been changed for this function. For information about how to code VTAM record mode application programs, refer to *VTAM Programming*.

Table 65. Changed Record Mode Application Program Macroinstructions

Macroinstruction	Operand	Description
OPEN	(acb address)	A new value, 120 (X'78'), has been added to the error field of the ACB (ACBERFLG) indicating that an attempt to open an ACB for persistent sessions failed because the password substitution value did not match that of the original ACB.

### DSECTS

Table 66 on page 97 shows the DSECTS that have been changed for this function. For information about application program DSECTS, refer to *VTAM Programming* or refer to the *VTAM Programming Reference for LU 6.2*.



Table 66. Changes to DSECTs

DSECT	Description
ISTAPCVL	The new partner-application- capabilities vector (X'20') provides information to the application about the session's use of password substitution.
ISTVACVB	Fields have been added to the application-capabilities vector (ISTVAC81) to allow the application to indicate support for password substitution when the application opens an ACB.
ISTDBIND	ISTDBIND has been updated to reflect the changes to the BIND image.
ISTAMSVL	The LU 6.2-support-function-list vector (ISTAMS06) includes the new LU 6.2 global variable (&ISTGA59) that has been added for this function.
ISTFM5	Byte 4 indicates whether a token is used in place of the password in the security access subfield of the FMH-5.
ISTUSFBC	ISTUSFBC includes the new RCSEC code for X'002C'.

### STOKEN for Workload Balancing

In pre-V4R4 releases, when an application program issues the SETLOGON OPTCD=GNAMEADD macroinstruction, the program's space token (STOKEN) is passed to the MVS WorkLoad Manager for workload balancing. For V4R4, an application program can indicate an alternate value to be passed to the WorkLoad Manager as the STOKEN. The alternate value is stored in the new NIBSTKN field of the node initialization block (NIB) and is used by VTAM when the application program specifies PROC=STOKEN on the NIB macroinstruction.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

### New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Record mode application program macroinstructions
- RTNCD and FDB2 return code combinations
- User DSECTs.

### Changed Record Mode Application Program Macroinstructions

Table 67 shows record mode application program macroinstructions that have been changed for this function. For information about how to code VTAM record mode application programs, refer to *VTAM Programming*.

Table 67. Changed Record Mode Application Program Macroinstructions

Macroinstruction	Parameter	Description
NIB	PROC=STOKEN	A new value, STOKEN, has been added to indicate that VTAM should use the STOKEN value in ISTDNIB (NIBSTKN field) in place of the STOKEN of the issuing application program's address space.

### New RTNCD and FDB2 Return Code Combination

Table 68 shows an RTNCD and FDB2 return code combination that has been added for this function. Descriptions of RTNCD and FDB2 return code combinations for LU 6.2 are contained in *VTAM Codes* and the *VTAM Programming Reference for LU 6.2*.

Table 68. New RTNCD and FDB2 Return Code Combination

RTNCD	FDB2	Description
20(X'14')	143(X'93')	STOKEN NOT VALID. This is a new RTNCD, FDB2 code combination which is returned when PROC=STOKEN is specified and the NIBSTKN field contains zeros or blanks.

### DSECTS

Table 69 shows the DSECTS that have been changed for this function. For information about application program DSECTS, refer to *VTAM Programming* or refer to the *VTAM Programming Reference for LU 6.2*.

Table 69. Changes to DSECTS

DSECT	Description
ISTUSFBC	ISTUSFBC has been changed to include the new RPL return and feedback code value, X'14', X'93'.
ISTDNIB	A new field, NIBSTKN, contains an STOKEN value to be passed on the SETLOGON OPTCD=GNAMEADD macroinstruction in place of the STOKEN of the issuing application's address space. This field is used in place of NIBSYM when PROC=STOKEN is specified on the NIB macroinstruction. ISTDPROC includes the new PROCSTKN field, which indicates whether or not PROC=STOKEN has been specified.

---

## Chapter 6. Network Dynamics

The following functions enable dynamic access to the network:

- “Dynamic LU Alias for CDRSCs”
- “Enhancements to Dynamic Definition of VTAM Application Programs” on page 100
- “Multiple Dynamic Switched Major Nodes” on page 102.

---

### Dynamic LU Alias for CDRSCs

In pre-V4R4 releases, an LUALIAS can only be defined on a predefined CDRSC.

In V4R4, VTAM can dynamically generate an LUALIAS (with NQNMODE=NQNAME) for a cross-network dynamic CDRSC.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

### Implementation Overview

By using LUAPFX, the need to predefine a CDRSC with LUALIAS for each cross-network resource that wants to establish a session with an application that does not support network qualified names, is eliminated. LUAPFX specifies the first two characters of the LUALIAS assigned when a dynamically generated cross-network CDRSC is created for a session with the application.

### New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include the definition statement for the application program major node.

Table 70 on page 100 shows the definition statement used to define the application program major node that has been changed for this function. For information about how to code this definition statement, refer to the *VTAM Resource Definition Reference*.

Table 70. Changed Definition Statement for the Application Program Major Node

Definition Statement	Operand	Description
APPL	LUAPFX=string	<p>New operand. Indicates the two characters to be used as the prefix for all dynamically generated LUALIAS names for dynamic cross-network CDRSCs in session with this application. You must take into account the VTAM naming convention when choosing this prefix.</p> <p>By using this prefix, you can eliminate the need to predefine a CDRSC with LUALIAS for each cross-network resource which may want to establish a session with an application that does not support network qualified names. See "LUALIAS" on page 97 for a description and how it is used.</p>

## Enhancements to Dynamic Definition of VTAM Application Programs

In pre-V4R4 releases,

- For the TSO application definition, the names you specify on the ACBNAME operand must start with 'TSO.'
- Wildcard use is not supported in the application program major node if you code the ACBNAME operand.
- The INQUIRE APPSTAT API does not report information about a model definition that has not been opened.

In VTAM V4R4,

- A new keyword, BASENAME, is introduced for the TSOKEYxx parmlib member. You can specify one to four characters which are used as the ACBNAME prefix for the TSO application definition.
- Wildcard characters ('?' and '\*') can be used on the ACBNAME definition of the application program major node.
- The INQUIRE APPSTAT API now has the capability to return information about a model definition. A new operand on the application major node, MODSRCH, specifies when the mode definitions are searched.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

---

**Storage Requirements**      None.

---

<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Configuration Requirements</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

The BASENAME keyword for the TSOKEYxx parmlib number has been added to support a one- to four-character ACBNAME prefix for the TSO application definition.

Wildcard characters are supported when you code an ACBNAME on the application program major node.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Parmlib member
- VTAM network operator command
- VTAM network operator message.

### Changed Parmlib Member

Table 71 shows a parmlib member that has been changed for this function. For information about how to specify this parmlib member, refer to the *OS/390 MVS Initialization and Tuning Reference*.

Table 71. Changed Parmlib Member

Parmlib Member	Operand	Description
TSOKEYxx	BASENAME	Used to specify a 1 to 4 character prefix for the ACBNAME coded for a TSO application.

### Changed VTAM Network Operator Command

Table 72 shows a VTAM network operator command that has been changed for this function. For information about how to use this VTAM network operator command, refer to *VTAM Operation*.

Table 72. Changed VTAM Network Operator Command

Command	Operand	Description
MODIFY RESOURCE	MODSRCH	This operand has been added allow the operator to change the value of MODSRCH for both model and dynamically created applications. Valid values are NEVER, FIRST, or LAST.

### New VTAM Network Operator Message

The following message for VTAM network operators has been added. For a complete description of this message, refer to *VTAM Messages*.

---

IST1629I

MODSRCH = *modsrch\_value*

---

### Multiple Dynamic Switched Major Nodes

In pre-V4R4 releases, the ISTDSWMN dynamic switched major node is automatically created during VTAM initialization to manage any dynamically created switched devices (PUs and LUs). As a result, a single major node might have a very large number of switched devices under it, making it difficult to manage these devices. For example, a DISPLAY command to determine the number of dynamic LUs with active sessions can take an unacceptable amount of time.

In VTAM V4R4, the multiple dynamic switched major nodes function solves the problem of too many switched devices under one dynamic major node. Instead of having all of the dynamic switched PU and LU devices under one major node, you can:

- Dynamically create as many switched major nodes as needed
- Assign a name to each dynamic switched major node
- Assign dynamic switched devices to specific dynamic switched major nodes.

VTAM no longer automatically creates (and maintains) a single dynamic switched major node during initialization.

When all of the dynamic switched devices under a dynamic switched major node are deleted, VTAM deletes the major node.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	For each switched major node that is dynamically created, 204 additional bytes of storage are required.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	<p>The switched major node ISTDSWMN is no longer created automatically during VTAM initialization. ISTDSWMN is dynamically created when:</p> <ul style="list-style-type: none"> <li>• VTAM receives the first request to create a dynamic PU</li> <li>• A Configuration Services XID Exit routine is not active, or the exit did not supply a switched major node name when the exit received control to create the dynamic PU.</li> </ul> <p>When the last dynamic PU under the switched major node is deleted, ISTDSWMN (and any dynamic switched major node) is deleted and message IST1133I is issued.</p>
<b>Performance Impacts</b>	None.

## Implementation Overview

To use the multiple dynamic switched major nodes function:

- Code the necessary model major definitions. For more information on model major definitions see *VTAM Resource Definition Reference*.
- Ensure that a Configuration Services XID Exit routine is appropriately modified to include a major node name in the information the exit routine returns to VTAM. You can use the sample exit ISTECCS ASSEMBLE or create your own exit routine.

For information on coding this exit routine, see “Configuration Services XID Exit Routine” in *VTAM Customization*.

- Install and activate the exit routine.

When an unknown device dials in to VTAM, the VTAM Configuration Services XID Exit routine is invoked. The exit routine returns to VTAM the model statement, the switched major node name, and the names of the associated PU and LUs. VTAM then builds the dynamic switched major node as well as the dynamic switched devices currently being created. VTAM deletes a dynamic switched major node when its associated dynamic devices are deleted.

When an unknown device dials in to VTAM and Configuration Services XID Exit routine is either not active or not appropriately modified, the multiple dynamic switched major nodes function dynamically creates the switched major node ISTDSWMN, if it does not already exist. All dynamic devices are added to the ISTDSWMN major node. The major node is deleted when all of the devices under the node are deleted.





## Chapter 7. Operator Interface Enhancements

The following functions enhance the VTAM operator interface:

- “Displaying Active Resources with Sessions”
- “Limiting Output from the DISPLAY STORUSE Command” on page 106
- “MODIFY EXIT Command Enhancement” on page 107.

### Displaying Active Resources with Sessions

In pre-V4R4 releases, you can use the SCOPE operand to limit the output of some VTAM DISPLAY commands, according to the state of resources. You can shorten the display of active resources by specifying that only active (SCOPE=ACTONLY), pending (SCOPE=PENDING), or connectable (SCOPE=CONCT) resources be displayed.

In VTAM V4R4, you can further limit the active display of resources to those that have sessions by specifying SCOPE=ACTSESS on the DISPLAY command.

**Note:** This function was introduced only for the DISPLAY RSCLIST command in VTAM V4R2 and VTAM V4R3 through the program temporary fixes (PTFs) associated with APARs OW18503 and OW18844.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

### Implementation Overview

There are no implementation considerations for this function.

### Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the changed user interfaces that enable you to use this function. These changed user interfaces include:

- VTAM network operator commands
- VTAM network operator messages.

### Changed VTAM Network Operator Commands

Table 74 shows VTAM network operator commands that have been changed for this function. For information about how to use these VTAM network operator commands, refer to *VTAM Operation*.

Table 74. Changed VTAM Network Operator Commands

Command	Operand	Description
DISPLAY APPLS DISPLAY CDRMS DISPLAY CDRSCS DISPLAY CLSTRS DISPLAY GROUPS DISPLAY ID DISPLAY LINES DISPLAY STATIONS DISPLAY TERMS	SCOPE	SCOPE=ACTSESS is a new value to display resources that are active with sessions.
DISPLAY RSCLIST	SCOPE	SCOPE=ACTSESS is a new value to display resources that are active with sessions.
	MAJNODE	Is a new operand that limits the display to resources defined in the specified major node.

### Changed Message for VTAM Network Operators

The following message for VTAM network operators has been changed. For a complete description of this message, refer to *VTAM Messages*.

**IST172I**                      **NO** text

**Explanation:** ACTSESS has been added as a value in the text field when no active resources with sessions are found for the command issued.

### Limiting Output from the DISPLAY STORUSE Command

In pre-V4R4 releases, the POOL operand was used on the DISPLAY STORUSE command to specify the VTAM storage pools about which usage information is to be displayed.

In VTAM V4R4, you can limit output from the DISPLAY STORUSE command by using the POOLTYPE and LIST operands.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

There are no definition requirements needed to use the POOLTYPE and LIST operands; they are issued from the DISPLAY STORUSE command.

## Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These user interfaces include changes to VTAM network operator commands.

Table 75 shows the VTAM network operator command that has been changed for this function. For information about how to use this VTAM network operator command, refer to *VTAM Operation*.

*Table 75. Changed VTAM Network Operator Command*

<b>Command</b>	<b>Operand</b>	<b>Description</b>
DISPLAY STORUSE	LIST	The LIST operand allows you to limit information displayed about storage pools.
	POOLTYPE	The POOLTYPE operand allows you to limit information displayed about storage pools located in CSA, private, or both.

## MODIFY EXIT Command Enhancement

In VTAM V4R4, as the MODIFY EXIT command loads exit routines, initial values are passed (PARMS option) to the following installation-wide exits: session management, configuration services, and selection of definition for dependent LUs (SDDLUs).

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

## Operator Interface Enhancements

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

### Implementation Overview

To pass parameter data to the user exits, initiate the PARMS option of the MODIFY EXIT command.

### New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- VTAM network operator command
- Installation-wide exit routines
  - Configuration services XID
  - Session management (SME)
  - Selection of definition for dependent LUs (SDDLUs).

#### Changed VTAM Network Operator Command

Table 76 shows the VTAM network operator command that has been added or changed for this function. For more information about how to use the VTAM network operator command, refer to *VTAM Operation*.

Table 76. Changed VTAM Network Operator Command

Command	Operand	Description
MODIFY EXIT	PARMS	This operand can now be specified with the ISTECCA, ISTECCS, and ISTECCSD installation-wide exit routines.

#### Changed Installation-Wide Exit Routines

Table 77 shows installation-wide exit routines that have been changed for this function. For information about these installation-wide exit routines, refer to *VTAM Customization*.

Table 77. Changed Installation-Wide Exit Routines

Exit Routine	Description
Session Management	Field added to parameter list of all three exit routines to point to the character string provided on the MODIFY EXIT command (PARMS operand)
Configuration Services SDDLUs	

---

## Chapter 8. Performance Enhancements

The following functions provide enhancements to VTAM performance:

- “DELAY Operand Default Change”
- “Enhanced Adaptive Pacing Support”
- “New Component Recovery Area (CRA) Buffer Pools” on page 111
- “Multiple Statements in Start and Configuration Decks” on page 111
- “Verifying Communication or Cluster Controller Channel Connections” on page 112
- “Verifying External Communication Adapter Connection Reliability” on page 113.

---

### DELAY Operand Default Change

In pre-V4R4 releases, VTAM had a default DELAY parameter for CTC and NCP connections of .1 and .2 seconds, respectively.

With VTAM V4R4's processor and channel speeds, the default delay has been changed to zero (0). If a delay is desired, it can still be coded in the major node definition.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

### Implementation Overview

There is no implementation needed for the DELAY operand default change.

---

### Enhanced Adaptive Pacing Support

In pre-V4R4 releases, VTAM supports adaptive session pacing by accepting a new pacing window size from another node along the session path. However, VTAM does not dynamically vary a session partner's send window size when receiving data from that partner. VTAM uses the same receive window size for adaptive session pacing that it uses for fixed session pacing.

In VTAM V4R4, VTAM dynamically varies the pacing window size for adaptive session pacing when appropriate. Whenever possible, the receive pacing window

## Performance Enhancements

size is incremented when a larger pacing window is requested. In addition, VTAM reduces the pacing window size when resources become critical and incoming data flow needs to be throttled.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	Use of the enhanced adaptive pacing support function will increase VTAM's performance by allowing VTAM to deliver and receive data faster than in previous versions of VTAM.

### Implementation Overview

The use of the enhanced adaptive pacing support function is automatic when using adaptive session pacing. There are no coding requirements associated with using enhanced adaptive pacing support.

### Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the changed user interfaces that enable you to use this function. These changed user interfaces include:

- Definition statements for the application program major node
- VTAM network operator commands.

#### Changed Definition Statement for the Application Program Major Node

Table 78 shows the definition statement used to define the application program major node that has changed for this function. For information about how to code this definition statement, refer to the *VTAM Resource Definition Reference*.

Table 78. Changed Definition Statement for the Application Program Major Node

Definition Statement	Operand	Description
APPL	ASRCVLM	The value of this new operand is used by VTAM to calculate the threshold values for the application program data space. Threshold values allow VTAM to take appropriate actions when data space storage reaches constraint and critical usage levels.

## Changed VTAM Network Operator Command

Table 79 shows a VTAM network operator command that has been changed for this function. For information about how to use this VTAM network operator command, refer to *VTAM Operation*.

Table 79. Changed VTAM Network Operator Command

Command	Operand	Description
MODIFY RESOURCE	ASRCVLM	The MODIFY command includes the ASRCVLM operand, allowing you to change the current value of the ASRCVLM operand on the APPL definition statement.

## New Component Recovery Area (CRA) Buffer Pools

In VTAM V4R4, there are two new buffer pools available for VTAM private use only. These new pools, CRA4 and CRA8, cannot be defined or changed. VTAM regulates the size and expansion of these pools. The DISPLAY BFRUSE command provides the same information about the CRA4 and CRA8 as it does about other buffer pools.

The CRA4 and CRA8 buffer pools are used for scheduling and error recovery.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

There are no implementation considerations for this function.

## Multiple Statements in Start and Configuration Decks

In pre-V4R4 releases, if to continue a line in the start option and configuration lists a comma was needed at the end of a line along with a continuation character in column 72.

In V4R4 VTAM, in order to allow multiple lines, the requirement for a continuation character for start option and configuration lists has been dropped. In addition, the comma is not required at the end of each line.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

---

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

---

### Implementation Overview

No implementation is required to take advantage of multiple statements in start and configuration decks.

---

### Verifying Communication or Cluster Controller Channel Connections

In pre-V4R4 releases, a channel or device failure across the communication controller or SNA cluster controller channel connections is not detected until I/O traffic is sent across the channel. The channel might sit idle and a failure might go undetected until I/O traffic is sent across it.

In VTAM V4R4, a small amount of I/O traffic is automatically sent across the channel at 1-minute intervals to verify the availability of the channel. If a failure is detected, VTAM responds like it does to any channel failure detected on the NCP or SNA cluster controller channel connection session when I/O traffic is sent.

This function monitors idle communication controller or SNA cluster controller channel connections for errors.

**Note:** This function was introduced in VTAM V4R3 and VTAM V4R2 through the program temporary fixes (PTFs) associated with APAR OW18006.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

---

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

---



## Implementation Overview

The NCP or SNA cluster controller channel verification is automatic. If the channel is idle for one minute, VTAM will send a small amount of I/O traffic to verify availability of the channel. If a failure is detected, VTAM responds like it does to any channel failures detected on a NCP or cluster controller session when I/O traffic is sent.

---

## Verifying External Communication Adapter Connection Reliability

In pre-V4R4 releases, a channel or device failure across an IBM 3172 Nways Interconnect Controller connection, or across other devices using an external communication adapter, is not detected until I/O traffic is sent across the channel. The channel might sit idle and a failure might go undetected until I/O traffic is sent across it.

In VTAM V4R4, a small amount of I/O traffic is automatically sent across the channel at 1-minute intervals to verify the availability of the channel. If a failure is detected, VTAM responds like it does to any channel failure detected on an IBM 3172 Nways Interconnect Controller connection session when I/O traffic is sent.

This function monitors idle IBM 3172 Nways Interconnect Controller channel connections for errors.

**Note:** This function was introduced in VTAM V3R4.2 and VTAM V4R3 through the program temporary fixes (PTFs) associated with APAR OW13424.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

The IBM 3172 Nway Interconnect Controller channel verification is automatic. When the channel has been idle for one minute, VTAM will send a small amount of I/O traffic to verify availability of the channel. If a failure is detected, VTAM responds like it does to any channel failures detected on a IBM 3172 Nway Interconnect Controller session when I/O traffic is sent.

## Performance Enhancements

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## Chapter 9. Problem Diagnosis

The following functions enhance the VTAM program's problem determination and isolation capabilities:

- “BUFF Entry for 8K External Buffer”
- “Buffer Tracing Enhancements for LU 6.2 Conversations” on page 117
- “Elimination of Duplicate VTAM Dumps” on page 117
- “IST605I Message Group Enhancement” on page 117
- “Tracing Resource States with Start List” on page 119
- “Unformatted System Services (USS) Message Text Enhancements” on page 120.

---

### BUFF Entry for 8K External Buffer

In pre-V4R4 releases, the VTAM external VIT records are individually GTRACEd, incurring significant overhead.

In VTAM V4R4, VTAM is allowed to buffer approximately 8K of VIT records prior to starting the GTRACE macro.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Configuration Requirements</b>	None.
<b>Performance Impacts</b>	None.

### Implementation Overview

There are no implementation considerations for BUFF entry for 8K external buffer.

### New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Start options
- VTAM network operator commands
- VTAM internal trace (VIT) entries.

### New and Changed Start Options

Table 80 shows start options that have been added or changed for this function. For information about how to specify these start options, refer to the *VTAM Resource Definition Reference*.

Table 80. New and Changed Start Options

Start Option	Operand	Description
TRACE,TYPE=VTAM	BFRNUM	This new operand specifies the number of 8K external trace buffers the VTAM internal trace is to allocate and use for generalized trace facility (GTF) processing. Integers 0 or 2–50 can be specified. The default is 2.

### Changed VTAM Network Operator Commands

Table 81 shows VTAM network operator commands that have been added or changed for this function. For information about how to use these VTAM network operator commands, refer to *VTAM Operation*.

Table 81. Changed VTAM Network Operator Commands

Command	Operand	Description
MODIFY TRACE	BFRNUM	This operand is new to allow the operator to change the number of 8K external trace buffers to be used for generalized trace facility (GTF) processing when TYPE = VTAM,MODE = EXT is specified.
START	BFRNUM	This operand is new for the TRACE,TYPE = VTAM start option to specify the number of 8K external trace buffers to be used for generalized trace facility (GTF) processing when MODE = EXT is specified.

### New VTAM Internal Trace Entries

Table 82 shows VTAM internal trace (VIT) entries that have been added for this function. For information about the VTAM internal trace, refer to *VTAM Diagnosis*.

Table 82. New VTAM Internal Trace Entries

Option	Entry	Description
None	BUFF	This new VIT entry is created when VIT is running externally using 8K buffers.
CIO	MPDU/MPD2	These are new entries that provide information about outbound and inbound MPC PDU processing.

---

## Buffer Tracing Enhancements for LU 6.2 Conversations

In pre-V4R4 releases, when a MODIFY TRACE|NOTTRACE,TYPE=BUF command is issued against an LU 6.2 session, VTAM does not recognize the change in buffer trace status until the current conversation ends and another conversation is started. For conversations of short duration, this is not a problem. However, to start a buffer trace for long duration conversations, the system operator must first terminate the APPC conversation, issue a MODIFY TRACE command, and then restart the conversation.

This function eliminates the requirement to terminate and restart a long duration LU 6.2 conversation in order to collect a buffer trace.

---

## Elimination of Duplicate VTAM Dumps

In VTAM V4R4, the elimination of duplicate VTAM dumps allows VTAM to provide information to the MVS dump analysis and elimination (DAE) facility to eliminate duplicate dumps. With this function, multiple dumps produced by the same error can be eliminated.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

Elimination of duplicate VTAM dumps is automatic; there are no user actions required to use this function. VTAM provides the necessary symptom strings to the MVS dump analysis and elimination (DAE) facility that suppress the dump if one has already been produced for the same reason. Refer to *MVS Planning: Problem Determination and Recovery* for information on how to use the DAE facility.

---

## IST605I Message Group Enhancement

In pre-V4R4 releases of VTAM, the information issued with message IST605I was insufficient to indicate the cause of the error.

In VTAM V4R4, new messages have been grouped with message IST605I to provide more specific information to diagnose the error.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

There is no implementation required for the IST605I message group enhancement.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include messages for VTAM network operators. For complete descriptions of these messages, refer to *VTAM Messages*.

### New Messages

The following messages for VTAM network operators have been added:

IST1590I	PU NETID DIFFERENT THAN HOST AND CONTACTED REQUEST
IST1591I	NCP NOT LOADED
IST1592I	NETID IN XID DID NOT MATCH NETID OF PU
IST1593I	RESOURCE TYPE NOT VALID
IST1594I	CP NAME IN CONTACTED REQUEST SAME AS SSCP
IST1595I	LINK STATION NOT ASSOCIATED WITH AN NCP
IST1596I	LINK STATION SWITCHED AND NCP NODE STATUS PCTD2
IST1597I	SWITCHED CALL=IN NCP NOT VALID
IST1598I	INVAIID STATE FOR NCP LOAD REQUEST
IST1599I	NODE STATUS PCTD1 BUT NCP LOAD=NO
IST1600I	LOAD MODUAL MISMATCH, LOAD=NO
IST1601I	SUBAREA MISMATCH, LOAD=NO
IST1602I	RU ERROR: EXTRA CV X'xx'
IST1603I	RU ERROR: INVALID POSITIVE RESPONSE
IST1604I	RU ERROR: LENGTH, FORMAT, OR TYPE NOT VALID
IST1605I	RU ERROR: MISSING CV X'0B'
IST1606I	RU ERROR: POSITIVE RESPONSE WITHOUT DATA
IST1607I	RU ERROR: RESPONSE TOO LONG
IST1608I	RU ERROR: RESPONSE TOO SHORT
IST1609I	CV X'0B' INDICATES ADJ LINK STATION NOT SUPPORTED
IST1610I	CORRELATOR MISMATCH, LOAD=NO
IST1611I	CORRELATOR MISMATCH, NCP ACQUIRED BEFORE ACTIVATION

IST1612I

LOAD MODULE MISMATCH - EXPECTED loadmod1 FOUND  
loadmod2**Changed Message**

The following message for VTAM network operators has been changed:

IST605I

ERROR FOR ID = *nodename—text1:text2,*

**Explanation:** This message is now the first message in a group of messages that provides more specific information to diagnose errors.

**Tracing Resource States with Start List**

In VTAM V4R3, you can trace the current and desired states of the resources in your network. Initiation of resource state tracing is available only through the MODIFY TRACE command.

In VTAM V4R4, you can also initiate resource state tracing during VTAM start processing with the TRACE,TYPE=STATE start option. The SAVE operand added for TRACE,TYPE=STATE also applies to the TRACE start option for TYPE=BUF and TYPE=IO.

**Planning to Use This Function**

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	If you used resource state tracing in V4R3, you might consider initiating the trace in your start list.
<b>Performance Impacts</b>	None.

**Implementation Overview**

To initiate resource state tracing with a start list, code the TRACE,TYPE=STATE start option in your start list.

**Changed User Interface That Enables You to Use This Function**

This section provides an overview of the changed user interfaces that enables you to use this function. These changed user interfaces include:

- Start options
- VTAM network operator messages.

### Changed Start Option

Table 83 shows the start option that has been changed for this function. For information about how to specify this start option, refer to the *VTAM Resource Definition Reference*.

Table 83. Changed Start Option

Start Option	Operand	Description
TRACE	TYPE	STATE is a new value on the TYPE operand. It is used to initiate resource state tracing.
	SAVE	SAVE is a new operand for the TYPE=BUF, TYPE=IO, and TYPE=STATE traces. It specifies whether the trace request is saved for the resource named on the ID operand.

### Changed VTAM Network Operator Messages

The following messages for VTAM network operators have changed. For complete descriptions of these messages, refer to *VTAM Messages*.

---

**IST199I**                      **OPTIONS = optionlist**

**Explanation:** This message is now issued with IST1515I when a resource state trace is initiated by the TRACE start option.

---

**IST1515I**                      *tracetype* **TRACE ACTIVE**

**Explanation:** This message is now issued when a buffer or I/O trace is initiated. Previously, this message was issued only for resource state tracing.

---

## Unformatted System Services (USS) Message Text Enhancements

With VTAM V4R4, you can now specify a character string for sense data when defining USSMSG07 using the unformatted system services (USS) table.

**Note:** This function was introduced in VTAM V4R2 through the program temporary fixes (PTFs) associated with APAR OW24164.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

---

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.

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<b>Performance Impacts</b>	None.
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## Implementation Overview

Additional character strings allow you to include sense data in the message text when defining USSMSG07 using the USSMSG buffer format. To use this function, specify two new character strings in the message text:

**@@@SENSE** Character string to be replaced with 8-character sense code. The sense code indicates the reason for the logon failure.

**@@@@RUNAME** Character string to be replaced with up to a 10-character RU name. The RU name is the name of the RU associated with the session setup failure.

## Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the changed user interfaces that enable you to use this function. These changed user interfaces include macroinstructions for the unformatted system services (USS) table for terminal operator messages.

Table 84 shows a macroinstruction used to define the USS table for terminal operator messages that has been changed for this function. For information about how to code this macroinstruction, refer to the *VTAM Resource Definition Reference*.

---

*Table 84. Changes to Macroinstruction for the USS Table for Terminal Operator Messages*

Start Option	Operand	Description
USSMSG	BUFFER	<p>New character string values have been added for defining a message. Use the SCAN or LUNAME operand values to indicate that VTAM is to search and replace the following character strings with its appropriate value.</p> <p><b>@@@SENSE</b>Sense code</p> <p><b>@@@@RUNAME</b> Request/response unit name</p>

---



## Chapter 10. Security Enhancements

The following functions enhance VTAM's security:

- “Enhanced Cryptographic Authentication”
- “Message Authentication Support and Cryptographic Enhancements” on page 126.

### Enhanced Cryptographic Authentication

In pre-V4R4 releases, VTAM provides encrypted data (security) through cryptography. A secondary logical unit (SLU) can verify a primary logical unit's (PLU's) key to decryption, but a PLU cannot verify an SLU's key. When the keys differ and the session is allowed to continue, data can be lost.

VTAM V4R4 provides authentication so the SLU and PLU can verify that the partner shares the same cryptographic key.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	<p>Depending on the cryptographic product chosen, the appropriate software (for example, IBM Programmed Cryptographic Facility) or hardware (for example, IBM Cryptographic Unit Support Program) must be installed prior to enabling the cryptographic function.</p> <p>Before enabling the CERTIFY= function, ensure that the device or software providing the partner's LU support also supports the CERTIFY= function. VTAM supports the function on behalf of the PLU or SLU.</p>
<b>Hardware Requirements</b>	<p>Depending on the cryptographic product chosen, the appropriate software (for example, PCF) or hardware (for example, CUSP) must be installed prior to enabling the cryptographic function.</p> <p>Before enabling the CERTIFY= function, ensure that the device or software providing the partner's LU support also supports the CERTIFY= function. VTAM supports the function as either PLU or SLU.</p>
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

### Implementation Overview

When CERTIFY=YES is specified, SLU authentication causes VTAM (as the PLU) to verify that the SLU is using the same cryptographic key as the PLU application. If verification is positive, the PLU sends the cryptographic request verification (CRV), and the SLU sends a positive response. If verification is not positive, the

PLU UNBINDs the session or the SLU sends negative response or UNBINDs the session.

### New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Definition statements
  - Definition statements for major nodes
    - Application program major node
    - Local SNA major node
    - Logical unit (LU) group major node
    - Model major node
    - Network Control Program major node
    - Switched major node.
- VTAM network operator messages.

#### Changed Definition Statements for Major Nodes

The definition statements used to define the following major nodes have changed for this function:

- Application program
- Local SNA
- Logical unit (LU) group
- Model
- Network Control Program
- Switched.

For information about how to code these definition statements, refer to the *VTAM Resource Definition Reference*.

**Application Program Major Node:** Table 85 shows a definition statement used to define the application program major node that has been changed for this function.

*Table 85. Changed Definition Statements for the Application Program Major Node*

Definition Statement	Operand	Description
APPL	CERTIFY	New operand. Specifying CERTIFY=YES causes SLU authentication (verifying the SLU and the PLU are using the same cryptographic key).

**Local SNA Major Node:** Table 86 on page 125 shows a definition statement used to define the local SNA major node that has been changed for this function.

Table 86. Changed Definition Statements for the Local SNA Major Node

Definition Statement	Operand	Description
LU	CERTIFY	New operand. Specifying CERTIFY=YES causes SLU authentication (verifying that the SLU and the PLU are using the same cryptographic key).

**LU Group Major Node:** Table 87 shows a definition statement used to define the LU group major node that has been changed for this function.

Table 87. Changed Definition Statements for the LU Group Major Node

Definition Statement	Operand	Description
LU	CERTIFY	New operand. Specifying CERTIFY=YES causes SLU authentication (verifying that the SLU and the PLU are using the same cryptographic key).

**Model Major Node:** Table 88 shows a definition statement used to define the model major node that has been changed for this function.

Table 88. Changed Definition Statement for the Model Major Node

Definition Statement	Operand	Description
LU	CERTIFY	New operand. Specifying CERTIFY=YES causes SLU authentication (verifying that the SLU and the PLU are using the same cryptographic key).

**Network Control Program Major Node:** Table 89 shows a definition statement used to define the Network Control Program (NCP) major node that has been changed for this function.

Table 89. Changed Definition Statement for the Network Control Program Major Node

Definition Statement	Operand	Description
LU	CERTIFY	New operand. Specifying CERTIFY=YES causes SLU authentication (verifying that the SLU and the PLU are using the same cryptographic key).

**Switched Major Node:** Table 90 on page 126 shows a definition statement used to define the switched major node that has been changed for this function.

Table 90. Changed Definition Statement for the Switched Major Node

Definition Statement	Operand	Description
LU	CERTIFY	New operand. Specifying CERTIFY=YES causes SLU authentication (verifying that the SLU and the PLU are using the same cryptographic key).

### Changed VTAM Network Operator Message

The following message for VTAM network operators has changed. For a complete description of this message, refer to *VTAM Messages*.

**IST225I** *command FOR ID = nodename FAILED — reason*

**Explanation:** CALL SECURITY ERROR is caused by not having the correct password coded for both the caller and the receiver. Having a different message can also cause this.

## Message Authentication Support and Cryptographic Enhancements

In VTAM V4R4, data security has expanded to provide message authentication support and enhanced support of cryptographic services. A new start option, ENCRPREF, has also been added.

### Message Authentication

This security feature provides data integrity protection for selected LU-LU sessions, similar to the data secrecy protection provided by the encryption function. A message authentication code is attached to session data to prevent intentional or accidental appropriation. Operands and commands are provided to control the enhancement.

### Cryptographic enhancements

The encryption enhancements broaden cryptography services by:

- Supporting more common cryptographic architecture interfaces; you can define unique LU and CP/SSCP key-encrypting key (KEK) names.
- Giving you the ability to switch between common cryptographic architecture products while VTAM is running.
- Allowing you to change LU and CP/SSCP KEK names dynamically.
- Conditionally establishing clear sessions when services are temporarily unavailable.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use these functions. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	Additional storage is required per LU to store the LUs key-encrypting key name. No significant amount of additional storage is required to use the message authentication function.
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<b>Software Requirements</b>	To use the message authentication function, you must have, at a minimum, an MVS/ESA 5.1 operating system.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	<p>Any interchange nodes along a session route using message authentication support must be at the VTAM V4R4 level or have applied the program temporary fix (PTF) associated with APAR OW21113.</p> <p>Consider the new default value of YES for ENCRPREF.</p> <p>ENCR=COND now supports clear sessions if encryption products are not available.</p> <p>There are no migration impacts for using cryptographic enhancements.</p>
<b>Performance Impacts</b>	You should not experience any significant performance impacts if you use the message authentication code support function. However, when defining an import/export CP/SSCP key-encrypting key name for a CP or SSCP using the pre-V4R4 syntax, an additional cryptographic request can be incurred during session establishment.

## Implementation Overview

To use message authentication support and the enhancements to the encryption facility, code the appropriate operands and issue the appropriate commands as detailed in the user interface sections listed on page 127.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Start options
- Definition statements for major nodes
  - Application program major node
  - Local SNA major node
  - Logical unit group major node
  - Model major node
  - NCP major node
  - Switched major node
- Logon mode table
- VTAM network operator commands
- VTAM network operator messages
- Sense codes
- Installation-wide exit routines.

### New and Changed Start Option

Table 91 shows a start option that has been changed for this function. For information about how to specify this start option, refer to the *VTAM Resource Definition Reference*.

Table 91. Changed Start Option

Start Option	Description
ENCRPREF	The following values have been added: <ul style="list-style-type: none"> <li>• Default value of yes</li> <li>• CCA</li> <li>• CUSP</li> </ul>

### Changed Definition Statements for Major Nodes

The definition statements used to define the following major nodes have changed for this function:

- Application program
- Local SNA
- Logical unit (LU) group
- Model
- Network Control Program
- Switched.

For information about how to code these definition statements, refer to the *VTAM Resource Definition Reference*.

**Application Program Major Node:** Table 92 shows the definition statement used to define the application program major node that has been changed for this function.

Table 92. Changed Definition Statement for the Application Program Major Node

Definition Statement	Operand	Description
APPL	ENCR	The COND option for the ENCR operand is changed to allow a clear (without cryptography) session when cryptographic support is not available during the start of the session.
	MAC	This new operand specifies the MAC capabilities and requirements for the application program.
	MACLNTH	This new operand specifies the minimum length, in bytes, of the message authentication code that is to be generated.
	MACTYPE	This new operand specifies the type of method to use when the message authentication code is created and checked.



**Local SNA, LU Group, Model, NCP, and Switched Major Nodes:** Table 93 on page 129 shows a definition statement used to define the local SNA, LU group, model, NCP, and switched major nodes that has been changed for this function.

Table 93. Changed Definition Statement for Local SNA, LU Group, Model, NCP, and Switched Major Nodes

Definition Statement	Operand	Description
LU in the following major nodes: <ul style="list-style-type: none"> <li>• Local SNA</li> <li>• LU group</li> <li>• Model</li> <li>• NCP</li> <li>• Switched</li> </ul>	CKEYNAME	<p>CKEYNAME is a new operand that specifies the cryptographic key name of a key-encrypting key (KEK) in the cryptographic key data set (CKDS) for this LU. If not coded, the cryptographic key name defaults to the name on the LU definition statement.</p> <p><b>Local SNA Major Node Only:</b> You can code CKEYNAME on the PU definition statement to take advantage of the sift-down effect.</p>

### Changed Macroinstruction for the Logon Mode Table

Table 94 shows a macroinstruction that has been changed in the logon mode table. For information about how to code the logon mode table, refer to the *VTAM Resource Definition Reference*.

Table 94. Changed Logon Mode Table Macroinstruction

Macroinstruction	Operand	Description
MODEENT	CKEY	CKEY is a new operand that specifies which cryptographic key name (alternate or primary) should be used for an LU.
	MAC	MAC is a new operand that specifies the message authentication requirements for the LU.
	MACLNTH	MACLNTH is a new operand that specifies the minimum length, in bytes, of the message authentication code that is to be generated.
	MACTYPE	MACTYPE is a new operand that specifies the message authentication code checking capability of the LU.

### New and Changed VTAM Network Operator Commands

Table 95 lists VTAM network operator commands that have been added or changed for this function. For information about how to use these VTAM network operator commands, refer to *VTAM Operation*.

Table 95. New and Changed VTAM Network Operator Commands

Command	Operand	Description
DISPLAY ID	ID	For an application program, logical unit, or cross-domain resource, the DISPLAY ID command now displays security data (encryption and message authentication) using message IST228I and two new messages IST1552I and IST1563I.
DISPLAY VTAMOPTS	OPTION	For the DISPLAY VTAMOPTS command, there are new values values that might display for when OPTION=ENCRPREF.
MODIFY SECURITY	CKEY	CKEY is a new operand that specifies the cryptographic key level indicator. The cryptographic key level indicator is used to determine which cryptographic key name should be used for an LU.
	ENCR	ENCR is a new operand that specifies the cryptographic requirements for the LU.
	ID	ID is a new operand that specifies the name of the LU whose security specification you want to change.
	MAC	MAC is a new operand that specifies the message authentication requirements of a logical unit or application program.
	MACLNTH	MACLNTH is a new operand that specifies the minimum length, in bytes, of the message authentication code that is to be generated.
	MACTYPE	MACTYPE is a new operand that specifies the method VTAM will use to create and to check message authentication codes are created and checked.
MODIFY VTAMOPTS	ENCRPREF	ENCRPREF is a new operand that specifies the cryptographic requirements for the LU.

## New and Changed VTAM Network Operator Messages

This section shows messages for VTAM network operators that have been added or changed for this function. For complete descriptions of these messages, refer to *VTAM Messages*.

**New Messages:** The following messages for VTAM network operators have been added:

---

<b>IST1552I</b>	<b>MAC</b> = <i>mac_level</i> <b>MACTYPE</b> = <i>mac_type</i>
<b>IST1563I</b>	<b>CKEYNAME</b> = <i>ckey_name</i> <b>CKEY</b> = <i>ckey_value</i> <b>CERTIFY</b> = <i>certify_value</i>

**Changed Messages:** The following messages for VTAM network operators have been changed:

---

<b>IST221I</b>	<i>majornode</i> : <i>minornode</i> <b>IS INVALID, n, UNSUPPORTED OPTION</b> — <i>option</i>
----------------	-------------------------------------------------------------------------------------------------

**Explanation:** This message is also generated when incompatible message authentication options are specified.

---

<b>IST228I</b>	<b>ENCRYPTION</b> = <i>encr_level</i>
----------------	---------------------------------------

**Explanation:** New values are displayed. The two new messages in the group are IST1552I and IST1563I.

---

<b>IST1137I</b>	<i>command</i> <b>FAILED</b> , <i>nodename</i> – <i>reason</i>
-----------------	----------------------------------------------------------------

**Explanation:** In response to the MODIFY SECURITY command, this might be issued with new failure codes, or for new reasons, as follows:

- **MACLNTH NOT VALID FOR MACTYPE** is issued if the MACLNTH value specified is not a valid value.
- **RESOURCE NOT VALID** is issued if the resource specified by ID= operand is not an application or a device type LU. If the resource is not found, message IST607I is issued as is done for other MODIFY commands. For the CKEY operand, the resource must be a device type LU. For the MAC, MACTYPE, and MACLNTH operands, the resource must be an application.
- **MUST BE MORE SECURE** is issued if the command you issued does not increase the security level of message authentication; you cannot lower the level of security with the command. For example, the current message authentication security level is greater than COND, and COND is specified by the command.

## Changed Sense Codes

Table 96 on page 132 shows sense codes that have been changed for this function. Descriptions of sense codes are contained in *VTAM Codes*.

## Security Enhancements

Table 96. Changed Sense Codes

Category and Modifier (in hexadecimal)	Sense-Code Specific Information	Type	Description
088F	0014	Request reject	Extended recovery facility error. The message authentication level of the extended recovery facility (XRF) backup session does not match that of the XRF primary session.
0821	000B	Request reject	Incompatible session parameters. The PLU requires message authentication, but it cannot be supported.
	000C		Incompatible session parameters. The SLU requires message authentication, but it cannot be supported.
1001	0036	Request error	RU data error. Data in the request RU is not acceptable to the receiving component. For 0036, the verification of the data against the message authentication failed.  For example, the message authentication code received in the RU did not match the code generated from the RU received.

## Changed Installation-Wide Exit Routines

Table 97 shows installation-wide exit routines that have been changed for this function. For information about these installation-wide exit routines, refer to *VTAM Customization*.

*Table 97. Changed Installation-Wide Exit Routines*

Exit Routine	Description
Selection of definitions for dependent LUs (SDDLUs)	<p>A new field is added to the SDDLUs resource entry block for the name of the LU encryption key. You can specify a unique LU encryption key name in the SDDLUs or let the key name default to the LU name.</p> <p>The REBLK length is increased to allow for the LU encryption key field. When the BEGIN vector is processed, it indicates that this larger length is being used for the field to be addressable.</p>

## Security Enhancements

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## Chapter 11. Sysplex Functions

The following are functions of VTAM in a sysplex environment:

- “Central Directory Server Enhancement for Generic Resources”
- “Dynamic Definition of VTAM-to-VTAM Connections” on page 137
- “Enhancements to Dynamic Definition of VTAM Application Programs” on page 100
- “Generic Resource Name for Security Management Profile” on page 144
- “Generic Resources Enhancements” on page 144
- “Multinode Persistent Sessions” on page 146
- “TSO-Generic Resources” on page 156.

---

### Central Directory Server Enhancement for Generic Resources

This function removes VTAM's enforcement of central directory server (CDS) nodes in a generic resource configuration.

In pre-V4R4 releases, a VTAM network node (NN) in a generic resource configuration automatically became a CDS when started. The CDSERVER start option was forced to YES to guarantee that CDS search logic is available to reduce the overhead of broadcast searches for generic resources. The CDSERVER=YES requirement is an adequate solution in APPN networks with relatively few NNs. However, larger networks that use generic resources may require more flexibility in assigning node types in the network. As the size of the network grows, each CDS must provide enough storage to accommodate the growing directory services (DS) database. Each CDS must also be capable of processing more search requests from NNs outside of the sysplex. In a large generic resource configuration, it may be more desirable to designate the VTAM nodes that are suited for network processing as CDS nodes and allow other NNs to perform base functions.

In VTAM V4R4, VTAM preserves the value specified by the CDSERVER start option. By using the CDSERVER start option to designate NNs and CDS nodes in the network, you can improve system and network performance in the following ways:

- Reduce the number of directed searches to alternate CDS nodes in the network. A NN in the sysplex can perform directed searches to other nodes in the generic resource configuration.
- Increase the storage capability and performance of NNs in the generic resource configuration.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

---

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.

---

<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	<p>If you are migrating a VTAM node in a generic resource configuration to V4R4, the CDSERVR value may change. VTAM will not start as a CDS if one of the following are true:</p> <ul style="list-style-type: none"> <li>• You do not have CDSERVR defined in your start list.</li> <li>• You have CDSERVR=NO in your start list.</li> </ul> <p>If you have CDSERVR=YES in your start list, then you will experience no change as a result of this function.</p> <p>If you are migrating to V4R4, we recommend that you upgrade all NNs in the generic resource configuration to avoid inefficiencies for generic resource searches.</p>
<b>Performance Impacts</b>	You can expect improved performance for nodes in a large APPN network that are using generic resources.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Start options
- VTAM network operator messages
- VTAM internal trace (VIT) entries.

### Changes to Start Options

VTAM no longer sets the CDSERVR start option to YES when VTAM is connected to a generic resource structure (such as ISTGENERIC) in the coupling facility.

### Deleted VTAM Network Operator Messages

The following message for VTAM network operators has been deleted:

---

**IST1362I** CDSERVR FORCED TO YES BECAUSE *structure\_name* DEFINED

### New and Changed VTAM Internal Trace Entries

Table 98 shows VTAM internal trace (VIT) entries that have been added or changed for this function. For information about the VTAM internal trace, refer to *VTAM Diagnosis*.

*Table 98. New and Changed VTAM Internal Trace Entries*

Entry	Option	Description
DLT/DL2	SSCP	The new search logic used by NNs in a generic resource configuration is traced by the task vector and task vector results fields in these VIT records.



## Dynamic Definition of VTAM-to-VTAM Connections

In pre-V4R4 releases, to communicate with other VTAMs, you had to define a subarea channel-attachment major node with LINE and PU definition statements for subarea MPC connections, or you had to define PU and TRLE operands for APPN host-to-host channel connections.

In VTAM V4R4, you no longer need to define channel-to-channel connections if you use the services provided by the cross-system coupling facility (XCF) of MVS within a sysplex. The definitions needed for VTAM-to-VTAM communication are created dynamically.

When a VTAM is started within a sysplex, the communication path is already in place. As each new VTAM is started, the other VTAMs in the sysplex are made aware of the new VTAM, and the necessary control structures for establishing communication are created.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	To use dynamic definition of VTAM-to-VTAM connections, you must have the level of MVS provided with OS/390 Release 3.
<b>Hardware Requirements</b>	None.
<b>Configuration Requirements</b>	VTAM nodes communicating through XCF connections must be HPR nodes that are rapid transport protocol (RTP) capable.
<b>Migration Impacts</b>	Dynamic definition of VTAM-to-VTAM connections dynamically creates the definitions needed for VTAM-to-VTAM communication. Definitions for VTAMs in the sysplex and the paths to them can co-exist with XCF, but the first connection activated will set up the CP-CP session. To ensure that XCF sets up the CP-CP sessions, it is recommended that the definitions be removed or at least taken out of the configuration list.
<b>Performance Impacts</b>	None.

## Implementation Overview

Dynamic definition of VTAM-to-VTAM connections depends on the functions of XCF in a sysplex. The MVS system programmer must establish the environment. VTAM requires that a value for the MVS symbol &SYSCZONE be provided during MVS initialization and that it is unique within the sysplex. VTAM joins the XCF group named ISTXCF. No action is required to specify this group.

VTAM only uses the XCF facilities if they exist. If XCF facilities are not available, VTAM-to-VTAM communication within a sysplex requires explicit definition.

Whether VTAM uses the XCF facilities is determined by the value specified for the start option XCFINIT. By default, VTAM uses XCF facilities.

A model for dynamic XCF local SNA PUs can be defined in a model major node to override the XCF default values for the operands of the PU definition statement. Coding a TRLE operand signifies that the model is for XCF connections. Only one PU model definition is in effect at a time. The first model activated is the one used for the dynamic PUs.

### New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Start options
- Definition statements for the model major node
- VTAM network operator commands
- VTAM network operator messages
- VTAM internal trace (VIT) entries.

#### New Start Option

Table 99 shows a new start option that has been added for this function. For information about how to specify this start option, refer to the *VTAM Resource Definition Reference*.

Table 99. New Start Option

Start Option	Operand	Description
XCFINIT		Specifies whether XCF connections to other VTAMs are to be established at VTAM initialization.

### Changed Definition Statement for the Model Major Node

Table 100 on page 139 shows a definition statement used to define the model major node that has been changed for this function. For information about how to code this definition statement, refer to the *VTAM Resource Definition Reference*.

Table 100. Changed Definition Statement for the Model Major Node

Definition Statement	Operand	Description
PU	name	HPR is a new operand on the PU definition statement that specifies whether high performance routing (HPR) support is enabled for dynamic XCF local SNA PUs.
	TRLE	TRLE is a new operand on the PU definition statement for XCF connections that defines the first 1–4 characters of the dynamic TRLEs in the TRL major node, followed by an asterisk (*).
	CONNTYPE DYNADJCP DYNLU PDELAY SECURITY	If the TRLE operand is coded for XCF connections, the XCF default for these operands is different than the default for other model PUs.
	LIMRES PUTYPE SECNET VERALSID	If the TRLE operand is coded for XCF connections, these operands must be allowed to default or be coded with the default value.
	ADDR ANS DATMODE IRETRY LUGROUP LUSEED MAXDATA MAXOUT MAXSESS NATIVE NETID NN PASSLIM	If the TRLE operand is coded for XCF connections, these operands are ignored.

### Changed VTAM Network Operator Commands

Table 101 on page 140 shows VTAM network operator commands that have been changed for this function. For information about how to use these VTAM network operator commands, refer to *VTAM Operation*.

Table 101 (Page 1 of 2). Changed VTAM Network Operator Commands

Command	Operand	Description
DISPLAY ID	ID	ID=VTAM displays the XCF token of this VTAM, along with other information about the host. To display information about a dynamic XCF local SNA PU, the operator can specify either the name of the dynamic XCF local SNA PU or the CP name of the adjacent VTAM with IDTYPE=XCFCP.
	IDTYPE	IDTYPE has a new value, XCFCP, to display information about the dynamic XCF local SNA PU representing the connection to the VTAM with the CP name specified on the ID operand.
DISPLAY TRACES	ID	To display the status of a trace for a dynamic XCF local SNA PU, the operator can specify either the name of the dynamic XCF local SNA PU or the CP name of the adjacent VTAM with IDTYPE=XCFCP.
	IDTYPE	IDTYPE has a new value, XCFCP, to display the status of a trace for a dynamic XCF local SNA PU representing the connection to the VTAM with the CP name specified on the ID operand.
DISPLAY TRL	CONTROL	CONTROL is a new operand that allows the operator to display either the entire list of TRLEs (defined and dynamic), or to display a subset of only defined or dynamic TRLEs.
	XCFCP= <i>cpname</i>	XCFCP is a new operand that allows the operator to display the TRLE representing the connection to the VTAM with the CP name specified.
DISPLAY VTAMOPTS	FUNCTION	XCFINIT appears in the display when FUNCTION=APPNCHAR or FUNCTION=CONNECT is specified on this command.

Table 101 (Page 2 of 2). Changed VTAM Network Operator Commands

Command	Operand	Description
MODIFY TRACE and MODIFY NOTRACE	ID	To start or stop tracing for the dynamic XCF local SNA PU the operator can specify either the name of the PU or the CP name of the adjacent VTAM with IDTYPE=XCFCP.
	IDTYPE	IDTYPE has a new value, XCFCP, that is used to start or stop tracing for the dynamic XCF local SNA PU representing the connection to the VTAM with the CP name specified on the ID operand.
	OPTION	OPTION has a new value, XCF, for TYPE=VTAM to start or stop the VTAM internal trace (VIT) for XCF connections.
START	OPTION	OPTION has a new value for TRACE TYPE=VTAM, XCF, to start the VTAM internal trace (VIT) for XCF connections.
VARY ACT and VARY INACT	ID	ID has a new value, ISTLSXCF, that is used to activate or deactivate the dynamic XCF local SNA major node. To reactivate or deactivate a dynamic XCF local SNA PU, the operator can specify either the name of the PU or the CP name of the adjacent VTAM with IDTYPE=XCFCP.
	IDTYPE	IDTYPE has a new value, XCFCP, that is used to reactivate or deactivate a dynamic XCF local SNA PU representing the connection to the VTAM with the CP name specified on the ID operand.

### New and Changed VTAM Network Operator Messages

This section shows VTAM network operator messages that have been added or changed for this function. For complete descriptions of these messages, refer to *VTAM Messages*.

**New Messages:** The following messages for VTAM network operators have been added:

---

IST1501I	XCF TOKEN = <i>token</i>
IST1502I	ADJACENT CP = <i>CP_Name_of_other_side</i>
IST1503I	XCF TOKEN = <i>token</i> STATUS = <i>status</i>
IST1504I	XCF CONNECTION WITH <i>cp_name</i> IS INOPERATIVE
IST1505I	TYPE = <i>type</i> TOKEN = <i>token</i>
IST1506I	<i>command</i> FAILED FOR <i>nodename</i> - MEMBER LEAVING GROUP

**Changed Messages:** The following messages for VTAM network operators have been changed:

---

IST1137I	<i>command</i> FAILED, <i>nodename</i> – <i>reason</i>
----------	--------------------------------------------------------

**Explanation:** New reason codes have been added for XCF support.

---

IST1230I	TIME = <i>time</i> DATE = <i>date</i> ID = <i>id</i>
----------	------------------------------------------------------

**Explanation:** This is the first message in a message group that contains message IST1236I. It contains a pointer to IST1505I for a description of the message group for XCF connections.

---

IST1236I	BYTECNTO = <i>bytecnto</i> BYTECNT = <i>bytecnt</i> [DIR = <i>direction</i> ]
----------	-------------------------------------------------------------------------------

**Explanation:** Adds the direction of the data flow over the device.

---

IST1314I	TRLE = <i>trl_element</i> STATUS = <i>trle_status</i> CONTROL = <i>Inctl</i>
----------	------------------------------------------------------------------------------

**Explanation:** XCF can be displayed in the *Inctl* field.

## New VTAM Internal Trace Entries

Table 102 shows VTAM internal trace (VIT) entries that have been added for this function. For information about the VTAM internal trace, refer to *VTAM Diagnosis*.

Table 102. New VTAM Internal Trace Entries for XCF

Entry	Option	Description
XCFC XCC2	XCF	Contain information about a saved message from another XCF member.
XCFJ XCJ2	XCF	Contain information associating an XCF member with an XCF group.
XCFL XCL2	XCF	Contain information disassociating an XCF member from an XCF group and placing the member in an undefined state.
XCFM XCM2	XCF	Contain information about an XCF member when the member joins or leaves an XCF group.
XCFR XGR2	XCF	Contain information about the receipt of a message from another active member of the same XCF group.
XCFS XCS2	XCF	Contain information about a message being sent to another active member of the same XCF group.
XCFX	XCF	Contains information about the invocation of the VTAM XCF message exit or notify exit.

## Changed VTAM Topology Attributes

Table 103 shows VTAM topology agent attributes that have changed for this function. For information about the VTAM topology agent, refer to the *VTAM CMIP Services and Topology Agent Programming Guide*.

Table 103. Changed VTAM Topology Agent Attributes

Attribute	Description
adapterAddresses	This attribute now refers to the XCF token of the agent VTAM.
adjacentLinkStationAddress	This attribute now refers to the XCF token of the adjacent VTAM.
dlcName	This attribute now refers to XCF.

## Generic Resource Name for Security Management Profile

In pre-V4R4 releases, an application's security profile is loaded using only the application network name, even if the application is also known by a generic resource name. Security profile loading is performed as part of OPEN ACB processing when VTAM finds a profile that matches the application's network name.

In VTAM V4R4, an application's security profile can be loaded using the generic resource name of the application. Security profile loading can be performed as part of SETLOGON, OPTCD=GNAMEADD processing.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

---

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

---

### Implementation Overview

Only one security profile can be used by an application. If a security profile using the application's network name exists, it is loaded when the application opens its ACB. In this case, the generic resource name of the application is **not** used by the security management product.

If a security profile using the application's network name does not exist, no profile is loaded during OPEN ACB processing. In this case, if a security profile is defined with the application's generic resource name, it is loaded when the application issues SETLOGON, OPTCD=GNAMEADD.

For more information about how to define LU-LU session pair profiles, see the *OS/390 Security Server (RACF) Security Administrator's Guide*.

---

### Generic Resources Enhancements

The following enhancements have been made to the generic resource function:

- The CHANGE macroinstruction now allows affinities associated with a single application program to be purged with a single issuance of the macroinstruction.
- The search criteria used by VTAM to locate resources or purge affinities for application programs that do not support network qualified names have been increased.
- Application programs can now determine if the application program or VTAM is to own all session affinities.

**Note:** These enhancements were introduced in VTAM V4R3 and VTAM V4R2 through the program temporary fixes (PTFs) associated with APAR OW16245.



## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

To specify affinity ownership and end all affinities at the same time, the application program must be updated. However, no changes are necessary to use VTAM's extended search of non-network-qualified partner LUs.

### Specifying Affinity Ownership

Coding a new parameter, AFFIN, on the NIB macroinstruction enables you to indicate whether the application program or VTAM is to own all session affinities associated with the application program.

### Ending Associations with Affinities

To disassociate all affinities associated with an application program at one time, code NAME=\* on the NIB macroinstruction for the NIB that is used by the CHANGE OPTCD=ENDAFFIN macroinstruction. When the CHANGE macroinstruction is executed, all affinities with the application program are terminated.

### Locating Partner LUs

For generic resource application programs that are not network-qualified, VTAM now extends its search for a non-network qualified partner LU to the sysplex. If a partner LU name is not found locally, VTAM searches the coupling facility for the partner LU.

If a non-network qualified application program uses either the CHANGE or INQUIRE macroinstruction, VTAM uses the first occurrence of the partner name.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include record mode application programming macroinstructions.

Table 104 on page 146 shows a record mode application program macroinstruction that has been changed for this function. For information about how to code VTAM record mode application programs, refer to *VTAM Programming*.

Table 104. Changed Record Mode Application Program Macroinstruction

Macroinstruction	Parameter	Description
NIB	AFFIN	New parameter indicating that VTAM is to own all session affinities.
	NAME	Changed so that when the NIB is to be used by a CHANGE OPTCD=ENDAFFIN macroinstruction, a value of "*" can be specified for the NAME operand. By specifying NAME=* all affinities associated with an application will be ended with a single issuance of the CHANGE OPTCD=ENDAFFIN macroinstruction.

## Multinode Persistent Sessions

In pre-V4R4 releases, if an application program fails or is brought down, VTAM can retain active sessions, allowing the same or another application program to reconnect to the sessions, and avoiding the need to re-establish the sessions. If an application program fails, it can reconnect to the retained sessions when it recovers. Also, another application program can take over the sessions.

In VTAM V4R4, multinode persistent session (MNPS) support is extended to VTAM, the operating system, and hardware failures. Since VTAM maintains session and network information in the MVS coupling facility, MPSs enable you to re-establish an application's sessions after any of the following failures:

- Application
- VTAM
- Operating system.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	There will be some additional storage used to maintain the application's status information before it is written to the coupling facility. Also, when a persistent session is restarted, there will be a large (instantaneous) demand for storage as the necessary data areas are re-built.
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<b>Software Requirements</b>	<p>Use of the multinode persistent session function, you must have at a minimum, the following requirements:</p> <ul style="list-style-type: none"> <li>• A sysplex and all VTAMs in the sysplex use MVS V5R2 or a subsequent release of MVS that supports coupling facility services.</li> <li>• All VTAMs that are part of the sysplex must be at least V4R3. However, if a interchange node is the network node server it must be V4R4. The end nodes (ENs) where the MNPS APPL resides must be V4R4. Also, this is the only place where the MNPS APPL must reside on an EN.</li> <li>• The sysplex environment must include an active Coupling Facility Resource Management (CFRM) policy.</li> <li>• The coupling facility code must be at least CFCC Level 1.</li> <li>• The default multinode persistent session (MNPS) structure name (ISTMNPS) or name defined by the STRMNPS start option must be defined in the active CFRM policy for the sysplex in which VTAM resides.</li> </ul>
<b>Hardware Requirements</b>	<p>To use multinode persistent sessions, an MVS coupling facility is required to provide the hardware and software that supports high-speed shared storage across multiple MVS systems.</p>
<b>Migration Impacts</b>	<p>Any application program currently supporting single-node persistent LU-LU sessions will be able to take advantage of multinode persistent LU-LU sessions with no changes to the application program.</p>
<b>Performance Impacts</b>	<p>There may be some performance degradation for sessions with multinode persistent session applications, because VTAM preserves session and link information in the coupling facility so that the information can be retrieved in the event the application is restarted after a failure.</p>

## Implementation Overview

To provide multinode persistent session support, VTAM must reside in a sysplex with a coupling facility. The VTAM on which the persistent-capable application program resides must be an end node or a migration data host and support the rapid transport protocol (RTP) tower of high performance routing (HPR).

The application program must open its ACB with PERSIST=YES indicated in the ACB (this identifies the application program as persistent-capable). The application program must issue SETLOGON OPTCD=(PERSIST) which indicates that the application program is persistent-enabled. These are the same requirements for an application program using single-node persistent sessions; therefore, no changes are required for applications which currently support persistent sessions.

You must specify PERSIST=MULTI on the APPL definition statement for the application program.

**Note:** As with persistent session support available in previous releases, the HALT CANCEL command will not override persistence. HALT and HALT QUICK will override persistence.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Start options
- Definition statement for the application program major node
- VTAM network operator commands
- VTAM network operator messages
- Codes
  - ABEND codes
  - RTNCD and FDB2 return code combinations
  - Sense codes
- VTAM internal trace (VIT) entries
- First Failure Support Technology (FFST) probes
- Installation-wide exit routines.

### New Start Option

Table 105 shows a start option that has been added for this function. For information about how to specify this start option, refer to the *VTAM Resource Definition Reference*.

Table 105. New Start Option

Start Option	Operand	Description
STRMNPS		This start option allows you to provide a name to the coupling facility structure used for multinode persistent sessions.

### Changed Definition Statement for Application Program Major Node

Table 106 shows the definition statement used to define the application program major node that has changed for this function. For information about how to code this definition statement, refer to the *VTAM Resource Definition Reference*.

Table 106. Changed Definition Statement for the Application Program Major Node

Definition Statement	Operand	Description
APPL	PERSIST	PERSIST is a new operand that indicates if multinode persistence sessions is enabled for the application being defined by the APPL definition statement.

## Changed VTAM Network Operator Command

Table 107 shows the VTAM network operator command that has changed for this function. For information about how to use this VTAM network operator command, refer to *VTAM Operation*.

Table 107. Changed VTAM Network Operator Command

Command	Operand	Description
DISPLAY STATS	STRNAME	The STRNAME operand allows you to specify the name of the coupling facility structure to be displayed when TYPE=CFS is specified.

## New and Changed VTAM Network Operator Messages

This section shows messages for VTAM network operators that have been added and changed for this function. For complete descriptions of these messages, refer to *VTAM Messages*.

**New Messages:** The following messages for VTAM network operators have been added:

IST1517I	LIST HEADERS = <i>list_hdrs</i> – LOCK HEADERS = <i>lock_ents</i>
IST1518I	BASE STRUCTURE IS <i>strname</i>
IST1519I	ALTERNATE STRUCTURES ARE:
IST1549I	OWNER = <i>owning_VTAM</i> MNPS STATE = <i>state</i>
IST1550I	MNPS STATE = <i>state</i>
IST1567I	<i>alt_structure alt_structure alt_structure</i>
IST1587I	ORIGIN NCE X' <i>nccid</i> '
IST1588I	RTP END TO END ROUTE - COMPUTED SESSION PATH
IST1626I	ALL DATA IN <i>structure_name</i> FOR <i>appl_name</i> REMOVED
IST1627I	MULTI-NODE PERSISTENT SESSION TIMER EXPIRED
IST1628I	DATA WAS IN AN UNRECOVERABLE STATE - <i>state</i>

**Changed Messages:** The following messages for VTAM network operators have been changed:

IST323I	LABEL = <i>labelname</i> — MACRO TYPE = <i>macrotype</i> — KEYWORD = <i>keyword</i>
---------	----------------------------------------------------------------------------------------

**Explanation:** Value for *keyword* can now include the PERSIST operand.

IST448I	<i>option</i> OPTION IGNORED – <i>reason</i>
---------	----------------------------------------------

**Explanation:** Description for reason code **Coupling Facility Not Supported** has been changed.

IST1070I	<i>value</i> FOR <i>option</i>
----------	--------------------------------

**Explanation:** The length of the *value* field has been increased to 16 characters.

---

**IST1350I**                      **DEFINITION ERROR:** *reason*

**Explanation:** Message text has been updated to add new reason value.

---

**IST1479I**                      **RTP CONNECTION STATE = state - MNPS = mnps**

**Explanation:** Message text has been updated to indicate that the RTP connection is being used for multinode persistent session.

---

**IST1480I**                      **RTP END TO END ROUTE - PHYSICAL PATH**

**Explanation:** Message text has been updated to indicate whether the path displayed is the physical path used by the session.

---

**IST1486I**                      **RTP NAME    STATE                      DESTINATION CP    MNPS**

**Explanation:** Message text changed to add a header for the multinode persistent session indicator.

---

**IST1487I**                      **puname    state                      nodename    mnps**

**Explanation:** Message text has been updated to indicate that the RTP connection is being used for multinode persistent session.

## New and Changed Codes

This section shows the following types of codes that have been added or changed for this function:

- ABEND codes
- RTNCD and FDB2 return code combinations
- Sense codes.

**Abend Codes:** Table 108 shows the abend code that has changed for this function.

---

*Table 108. New Abend Codes*

Code	Description
0A9	New value, X'707A' in register 15 when abend code X'0A9' is received. This value indicates that a FREESTOR macro was issued for previously freed storage.

**RTNCD and FDB2 Return Code Combinations:** Table 109 on page 151 shows RTNCD and FDB2 return code combinations that have changed for this function.

Table 109. Changed RTNCD and FDB2 Return Code Combinations

RTNCD	FDB2	Description
0	13(X'0D')	Can now be received if VTAM did not have all the session control blocks built for a multinode persistent session while processing an INQUIRE PERSESS macro.

**Sense Codes:** Table 110 shows sense codes that have changed for this function.

Table 110. Changed Sense Codes

Category and Modifier (in hexadecimal)	Sense-Code Specific Information	Type	Description
0840	0017	Request reject	An HPR connection is not available during a session initiation request for a multinode persistent enabled application program.
8020	000D	Path error	A multinode persistent application program attempted to recover on a VTAM where the application program is defined as a cross-domain resource (CDRSC).

### New and Changed VTAM Internal Trace Entries

Table 111 shows VTAM internal trace (VIT) entries that have been added or changed for this function. For information about the VTAM internal trace, refer to *VTAM Diagnosis*.

Table 111 (Page 1 of 3). New and Changed VTAM Internal Trace Entries

Entry	Option	Description
AP	SSCP	Entry has been changed to add new values for the process anchor block identification type.
CFAL, CFA2	CFS	A new entry that is written when the IXLALTER macro is used to change the coupling facility storage attributes.

Table 111 (Page 2 of 3). New and Changed VTAM Internal Trace Entries

Entry	Option	Description
CFEE	CFS	Entry has been changed to add additional values to the following fields: <ul style="list-style-type: none"> <li>• offset 05</li> <li>• offset 06</li> <li>• offset 13</li> <li>• offset 14-17</li> <li>• offset 18-1b</li> </ul>
CFLS	CFS	Entry has been changed to add additional values to the following fields: <ul style="list-style-type: none"> <li>• offset 06</li> <li>• offset 0D</li> </ul>
CFL2	CFS	Entry has been changed to add additional values to offset 04 field.
CFPG, CFP2	CFS	A new entry that is written when a request to purge outstanding accesses to the coupling facility structure using the IXLPURGE macro is issued.
CFVC	CFS	A new entry that is written when an IXVECTR macro is used to modify or test the list notification vector.
FBLK	SMS	Entry has been updated to add new storage pools.
FRES	SMS	A new trace record showing the status of each FREESTOR request issued by VTAM components.
GBLK	SMS	Entry has been updated to add new storage pools.
GETS	SMS	A new trace record showing the status of each FREESTOR request issued by VTAM components.
HPR, HRP2, HPR3	HPR	Entry has been updated to add additional values to the following fields: <ul style="list-style-type: none"> <li>• offset 06</li> <li>• offset 07</li> <li>• offset 08</li> <li>• offset 09-0D</li> <li>• offset 10-13</li> <li>• offset 14-1B</li> </ul>
MNPS	CFS	A new trace record showing the status of each multinode persistent session (MNPS) request issued to manipulate data in the MNPS coupling facility structure.



Table 111 (Page 3 of 3). New and Changed VTAM Internal Trace Entries

Entry	Option	Description
SPT	SSCP	Entry has been changed to include the MPS indicator field.

### New First Failure Support Technology Probes

Table 112 shows First Failure Support Technology (FFST) probes that have been added for this function. For information about First Failure Support Technology probes, refer to *VTAM Diagnosis*.

Table 112 (Page 1 of 3). New First Failure Support Technology Probes

Probe	Component	Description
ISTFSC12	Coupling Facility Services	An unexpected return code and reason code were returned from IXCJOIN when VTAM attempted to join an XCF group.
ISTFSC13	Coupling Facility Services	An unexpected return code and reason code were returned from IXLALTER when VTAM attempted to alter coupling facility structure attributes.
ISTFSC14	Coupling Facility Services	An unexpected return code and reason code were returned from IXLLIST when VTAM attempted to establish list monitoring.
ISTFSC15	Coupling Facility Services	An unexpected return code and reason code were returned from IXPURGE when VTAM attempted to purge outstanding structure access request.
ISTFSC16	Coupling Facility Services	An unexpected return code and reason code were returned from IXLLIST when VTAM attempted to read multiple entries from a list.
ISTFSC17	Coupling Facility Services	An unexpected return code and reason code were returned from IXLLIST when VTAM attempted to delete multiple entries.
ISTFSC18	Coupling Facility Services	An unexpected return code and reason code were returned from IXLLIST when VTAM attempted to update the list control area.
ISTFSC19	Coupling Facility Services	An unexpected return code was returned from IXLVECTR when VTAM attempted to modify or test the list notification vector.
ISTFSC27	Coupling Facility Services	An unexpected return code and reason code were returned from IXLLIST when VTAM attempted to delete a list of entries.

Table 112 (Page 2 of 3). New First Failure Support Technology Probes

Probe	Component	Description
ISTFSC28	Coupling Facility Services	An unexpected return code and reason code were returned from IXCQUERY when VTAM attempted to obtain sysplex related information.
ISTFSC29	Coupling Facility Services	A pointer to a buffer containing NLP entry IDs for a IXLLIST DELETE_ENTRYLIST request that was being retried was zero. NLP entries may not be deleted from a MNPS coupling facility structure.
ISTFSC2A	Coupling Facility Services	A coupling facility user deregistered but did not provide an area to pass back a work element when one existed. The storage for the work element is not freed.
ISTFSC2B	Coupling Facility Services	A coupling facility user attempted to deregister, but provided a user token that was not valid.
ISTFSC2C	Coupling Facility Services	A coupling facility user attempting signal a process was completed, but provided a user token that was not valid.
ISTFSC2D	Coupling Facility Services	When attempting to alter the entry-to-element ratio for the generic resource structure, the new ratio was not valid. Either the entry portion was zero, the element portion was zero, or the entry portion divided by the element portion was greater than the maximum number of data elements.
ISTFSC2E	Coupling Facility Services	When attempting to alter the entry-to-element ratio for a VTAM list structure, the new ratio was not valid. Either the entry portion was zero, the element portion was zero, or the entry portion divided by the element portion was greater than the maximum number of data elements.
ISTFSC30	Coupling Facility Services	An unexpected return code of X'0008' and reason code of X'0082B' was received for IXLLIST while attempting to delete NLP entries in the multinode persistent coupling facility structure. A start or stop index that was not valid was given.

Table 112 (Page 3 of 3). New First Failure Support Technology Probes

Probe	Component	Description
ISTFSC31	Coupling Facility Services	An unexpected return code of X'0008' and reason code of X'0082B' was received for IXLLIST while attempting to delete NLP entries in the MPS coupling facility structure. NLP entries may not be deleted.
ISTFSC32	Coupling Facility Services	A work element that was not recognized was received by a MNPS structure object PAB.
ISTFSC33	Coupling Facility Services	A work element was recognized by a MNPS structure object PAB, but it contained incorrect data.
ISTFSC34	Coupling Facility Services	An unexpected return code and reason code was returned from IXLLIST while attempting to read in a MNPS application program's data during a MNPS recovery. Sessions will not be recovered.
ISTFSC35	Coupling Facility Services	An unexpected return code and reason code was returned from IXLLIST when attempting to read multiple entries form a list.
ISTFSC36	Coupling Facility Services	An unexpected return code and reason code was returned from IXLLIST when attempting to delete data associated with a MNPS application program. The state of the application program will remain in CLEANUP_PENDING and may be cleaned up by another VTAM.
ISTSSC07	Session Services	No session control block could be located for the FQPCID supplied by the recovery PAB on the MNPS Started signal flow is started.
ISTSSC08	Session Services	Session services could not locate the correct recovery PAB when attempting to send a response to the recovery PAB's request to recover an multinode persistent session.

### Changed Installation-Wide Exit Routines

Table 113 on page 156 shows installation-wide exit routines that have been changed for this function. For information about these installation-wide exit routines, refer to *VTAM Customization*.

Table 113. New and Changed Installation-Wide Exit Routines

Exit Routine	Description
Performance monitor exit routine	New performance data vectors have been added.
Session management exit routine	Can be scheduled due to a MNPS recovery process.  New fields have been added to the SME function code, session information parameter, and exit option field.

## TSO-Generic Resources

In pre-V4R4 releases, TSO/VTAM is identified by a unique application program network name. You obtain a session with TSO/VTAM by specifying this unique name. If a failure occurs for a particular TSO/VTAM, you cannot obtain a session with it until the problem is corrected. In addition, there is no mechanism to evenly distribute sessions across a group of TSO/VTAMs.

In VTAM V4R4, TSO/VTAM can be identified by a unique application program network name or by a generic name. A TSO/VTAM on one MVS system can be known by the same generic name as a TSO/VTAM on any other MVS system, and all of the TSO/VTAMs sharing a particular generic name can be concurrently active. This provides both increased TSO/VTAM availability and workload balancing.

TSO/VTAM availability increases because all TSO/VTAMs can now be accessed by the same generic name. If a particular TSO/VTAM fails, a session request using the generic name can still be successful, as another TSO/VTAM with the same generic name can be selected as the session partner.

MVS workload manager makes efficient use of system resources by selecting a session partner based on balanced load distribution from among TSO/VTAM application programs with the same generic name.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	To use TSO-generic resources you must have, at a minimum, the following software products: <ul style="list-style-type: none"> <li>• TSO/E</li> <li>• JES2 or JES3</li> <li>• MVS/ESA V5R1 or a subsequent release of MVS that supports coupling facility services</li> <li>• OS/390 R3, or later, for workload manager support and for the ability to reconnect a userid across a sysplex.</li> </ul>
<b>Hardware Requirements</b>	An MVS coupling facility is required for the hardware and software that supports high-speed shared storage across multiple MVS systems, and for multiple copies or images of the MVS operating system to process work concurrently.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

The parmlib member, TSOKEYxx, contains TSO/VTAM time-sharing parameters. A new operand, GNAME, has been added to allow you to specify a generic name. A generic name can also be specified on the START command to activate TSO/VTAM. If a generic name is not specified in TSOKEYxx or on the START command, then no generic name is used. If a generic name is used, a TSO/VTAM registers its generic name by issuing the SETLOGON GNAMEADD macroinstruction.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- TSO/VTAM network operator messages
- RTNCD and FDB2 return code combinations
- Record mode application programming macroinstructions
- VTAM internal trace (VIT) entries.

### New and Changed TSO/VTAM Network Operator Messages

This section shows messages for TSO/VTAM network operators that have been added for this function. For complete descriptions of these messages, refer to *VTAM Messages*.

**New Messages:** The following messages for TSO/VTAM network operators have been added:

<b>IKT032I</b>	<i>macroinstruction</i> <b>FAILED FOR</b> <i>gname</i> <b>RPLRTNCD=aa</b> <b>RPLFDB2=bb</b>
<b>IKT033I</b>	<b>TCAS USERMAX VALUE SET TO</b> <i>count</i>

**Changed Message:** The following message for TSO/VTAM network operators has changed:

---

**IKT111I                      APPLNAME=applname FAILED DUE TO: reason**

**Explanation:** A new reason added; SETLOGON GNAME SUB failure, RPLRTNCD=aa, RPLFDB2=bb. The TSO user logon is rejected.

### New RTNCD and FDB2 Return Code Combinations

Table 114 shows RTNCD and FDB2 return code combinations that have been added for this function. Descriptions of RTNCD and FDB2 return code combinations are contained in *VTAM Codes* and *VTAM Programming*.

---

*Table 114. New RTNCD and FDB2 Return Code Combinations*

RTNCD	FDB2	Description
X'14'	X'91'	SETLOGON OPTCD=GNAMEADD failed. Either a non-TSO application is attempting to use the generic name already being used by TSO, or TSO is attempting to use the generic name already being used by a non-TSO application.
X'14'	X'92'	SETLOGON OPTCD=GNAME SUB failed for one of the following reasons: <ul style="list-style-type: none"> <li>• SETLOGON OPTCD=GNAMEADD was previously issued for this ACB.</li> <li>• SETLOGON OPTCD=GNAME SUB was previously issued for this ACB.</li> <li>• The application program network name specified in the VTAM node identification block (NIB) either was not found or was not an instance of the generic name specified in the NIB.</li> </ul>

### Changed Record Mode Application Program Macroinstruction

Table 115 on page 159 shows a record mode application program macroinstruction that has been changed for this function. For information about how to code VTAM record mode application programs, refer to *VTAM Programming*.

Table 115. Changed Record Mode Application Program Macroinstruction

Macroinstruction	Operand	Description
SETLOGON	OPTCD = GNAMESUB	New OPTCODE value. An application can be a subordinate of another application that uses a generic name. In this case, the subordinate application uses GNAME SUB to have its sessions included in the other application's session count for workload balancing. The GNAME SUB option code should not be used for LU 6.2.

### New and Changed VTAM Internal Trace Entries

Table 116 shows VTAM internal trace (VIT) entries that have been added or changed for this function. For information about the VTAM internal trace, refer to *VTAM Diagnosis*.

Table 116. New and Changed VTAM Internal Trace Entries

Entry	Option	Description
GNAM	SSCP	Additional event flags added to byte 7 and reason codes added to byte 14 for reason macros (byte 6) X'01' and X'05'.





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## Chapter 12. System and Configuration Management

The following functions enhance your ability to set up, manage, and control resources in your network using the VTAM program:

- “Applying VTAM Maintenance without Re-IPLing MVS”
- “Choice of Communication Network Management (CNM) Routing Tables” on page 166
- “Delayed Disconnection When No LU-LU Session Is Established” on page 168
- “Dynamic Reconfiguration of Switched Resources” on page 169
- “Filtering Initiation Failures From Session Awareness (SAW) Data” on page 171
- “Interpret Table Enhancement” on page 173
- “Reset LU Enhancement” on page 175
- “Search Retry After Dial-Out Failure” on page 176
- “Support for OS/390 Data Set Concatenation” on page 177
- “TCP/IP DLC Provision” on page 178
- “31-Bit UCB Support” on page 182.

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### Applying VTAM Maintenance without Re-IPLing MVS

In pre-V4R4 releases, some VTAM modules reside in the MVS data set SYS1.LPALIB (LPALIB). During MVS initialization, MVS loads the modules in LPALIB into pageable link pack area (PLPA) and extended pageable link pack area (EPLPA) storage. Additional VTAM modules reside in the MVS data set SYS1.NUCLEUS (NUCLEUS). Prior to MVS initialization, modules in NUCLEUS are linked with MVS modules. During MVS initialization, MVS loads the modules in NUCLEUS into nucleus and extended nucleus storage.

To apply maintenance to any of the modules in LPALIB or NUCLEUS, you must:

1. Apply the appropriate program temporary fixes (PTFs)
2. Re-IPL MVS with the CLPA option
3. Restart VTAM.

In VTAM V4R4, most of the modules that reside in LPALIB and NUCLEUS in pre-V4R4 releases now reside in a new MVS data set called SYS1.SISTCLIB (SISTCLIB). During VTAM initialization, MVS now loads these modules into common service area (CSA) and extended common service area (ECSA) storage. Small pieces of some modules remain in LPALIB and NUCLEUS. MVS loads these pieces into PLPA/EPLPA and nucleus/extended nucleus storage. These pieces give control to the main parts of the modules that MVS now loads from SISTCLIB into CSA/ECSA storage.

As a result, you no longer have to re-IPL MVS to apply maintenance to the modules that now reside in SISTCLIB. However, you must still restart VTAM after applying maintenance.

**Note:** Some modules associated with TSO/VTAM and VTAM Common Management Information Protocol (CMIP) services remain in LPALIB and continue to be loaded by MVS into PLPA/EPLPA storage. Some new modules introduced in VTAM V4R4—those associated with Common Storage Manager (CSM)—reside in LPALIB and are loaded by MVS into PLPA/EPLPA storage. You must re-IPL MVS and restart VTAM to apply maintenance to the modules that still reside in LPALIB. When it is necessary to re-IPL MVS and restart VTAM to apply maintenance, the

## System and Configuration Management

HOLDDATA instructions (++HOLD data) that accompany PTFs instruct you to do so.

VTAM formatted dump routines now reside in the MVS data set SYS1.MIGLIB, which is a migration data set used by the Interactive Problem Control System (IPCS).

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

---

<b>Storage Requirements</b>	Define a sufficient amount of common service area and extended common service area (CSA/ECSA) storage. Use the estimating storage worksheets in Appendix A, "Estimating Storage" in the <i>VTAM Installation and Migration Guide</i> to determine the total amount of CSA/ECSA storage you need for VTAM V4R4.  In general, the amount of CSA storage required to load the modules from SISTCLIB is 32K. The amount of ECSA storage required is 1404K.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.

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### Migration Impacts

Although you will require less pageable and extended pageable link pack area (PLPA/EPLPA) storage, you will require additional common service area and extended common service area (CSA/ECSA) storage. The additional CSA/ECSA storage is required for VTAM modules that used to be loaded from LPALIB and NUCLEUS into PLPA/EPLPA storage and nucleus and extended nucleus storage and are now loaded into CSA/ECSA storage.

Use the estimating storage worksheets in Appendix A, “Estimating Storage” in the *VTAM Installation and Migration Guide* to determine the amount of CSA/ECSA storage you need.

After you have defined a sufficient amount of CSA/ECSA storage, you must re-IPL MVS before starting VTAM V4R4.

You also need to allocate space for the new SYS1.SISTCLIB data set when installing VTAM V4R4. In addition, you need to ensure that enough space is allocated for the MVS data set SYS1.MIGLIB. For the storage requirements for these data sets, and changes to the storage requirements for SYS1.LPALIB, SYS1.NUCLEUS, and SYS1.AOS26, refer to the *VTAM Program Directory* for VTAM V4R4.

You might need to change your automated operation procedures because of new messages that now appear in the output of the DISPLAY BFRUSE and DISPLAY STORUSE commands. For information about these new messages and how they might affect your automated operation procedures, refer to one of the following sections in the *VTAM Installation and Migration Guide*:

- If you are upgrading VTAM V4R3 to VTAM V4R4, refer to “Changes to Command Output” in Chapter 2, “Upgrading VTAM V4R3 to VTAM V4R4.”
- If you are upgrading VTAM V4R2 to VTAM V4R4, refer to “Changes to Command Output” in Chapter 3, “Upgrading VTAM V4R2 to VTAM V4R4.”
- If you are upgrading VTAM V4R1 to VTAM V4R4, refer to “Changes to Command Output” in Chapter 4, “Upgrading VTAM V4R1 to VTAM V4R4.”
- If you are upgrading VTAM V3R4.2 to VTAM V4R4, refer to “Changes to Command Output” in Chapter 5, “Upgrading VTAM V3R4.2 to VTAM V4R4.”

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### Performance Impacts

You should not experience any significant performance impacts as a result of applying VTAM maintenance without re-IPLing MVS. You might notice some delay during VTAM initialization while MVS loads VTAM modules into CSA/ECSA storage.

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## Implementation Overview

The VTAM modules that used to be loaded into PLPA/EPLPA storage and are now loaded into CSA/ECSA storage are automatically loaded during VTAM initialization.

Because MVS loads VTAM modules from SISTCLIB into CSA/ECSA storage, you need to define a sufficient amount of CSA/ECSA storage. Use the estimating storage worksheets in Appendix A, “Estimating Storage” in the *VTAM Installation and Migration Guide* to determine the amount of CSA/ECSA storage you need.

Define the amount of CSA/ECSA storage you need on the CSA parameter in the IEASYS00 or IEASYSxx member of the MVS data set SYS1.PARMLIB.

If you are upgrading to VTAM V4R4 from a previous version or release, after you have defined a sufficient amount of CSA/ECSA storage you must re-IPL MVS before starting VTAM V4R4.

Allocate space for the new SYS1.SISTCLIB data set and ensure that enough space is allocated for the SYS1.MIGLIB data set when installing VTAM V4R4. For the storage requirements for these data sets, and changes to the storage requirements for SYS1.LPALIB, SYS1.NUCLEUS, and SYS1.AOS26, refer to the *VTAM Program Directory* for VTAM V4R4.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Target and distribution libraries
- VTAM network operator commands
- VTAM network operator messages
- Installation-wide exit routines
  - Session accounting
  - Session authorization.

### New and Changed Target and Distribution Libraries

Table 117 shows target and distribution libraries used to install VTAM that have been added or changed for this function.

For information about all new and changed target and distribution libraries used to install VTAM V4R4, refer to the *VTAM Installation and Migration Guide*.

*Table 117. New and Changed Target and Distribution Libraries*

Target Library	Distribution Library	Description
SYS1.MIGLIB	SYS1.AOS26	SYS1.MIGLIB is an MVS migration data set that contains VTAM formatted dump routines for the Interactive Problem Control Service (IPCS).
SYS1.SISTCLIB	SYS1.AOS26	SYS1.SISTCLIB is a new data set that contains VTAM modules loaded into common service area and extended common service area (CSA/ECSA) storage.

## Changed VTAM Network Operator Commands

Table 118 shows VTAM network operator commands that have been changed for this function. For information about how to use these VTAM network operator commands, refer to *VTAM Operation*.

Table 118. Changed VTAM Network Operator Commands

Command	Operand	Description
DISPLAY BFRUSE		The DISPLAY BFRUSE command now displays information about private storage usage and common service area and extended common service area (CSA/ECSA) storage usage for VTAM modules.
DISPLAY STORUSE		The DISPLAY STORUSE command now displays information about private storage usage and common service area and extended common service area (CSA/ECSA) storage usage for VTAM modules and buffers.

## New and Changed VTAM Network Operator Messages

This section shows VTAM network operator messages that have been added and changed for this function. For complete descriptions of these messages, refer to *VTAM Messages*.

**New Message:** The following message for VTAM network operators has been added:

---

**IST1565I**                      *type* **MODULES = currentK**

**Changed Messages:** The following messages for VTAM network operators have changed:

---

**IST001I**                      **VTAM START REJECTED** — *reason*

**Explanation:** New *reason* descriptions have been added to indicate the following:

- An insufficient amount of CSA storage is available for VTAM initialization.
- An insufficient amount of ECSA storage is available for VTAM initialization.
- A different release of VTAM than was previously active was started without re-IPLing MVS/ESA.
- A module is not in ISTCSLOD.
- An alias module is either not in the vector list of its load module or the module was loaded before the vector list.

---

**IST449I**                      *limitname = csa* , **CURRENT = current** , **MAXIMUM = maxlevel**

**Explanation:** The description of this message has changed to indicate that it is part of a group of messages that displays storage usage for VTAM buffers and modules.

---

**IST981I**                      **VTAM PRIVATE: CURRENT = *currentk*, MAXIMUM USED = *maximumk***

**Explanation:** This message no longer includes information about storage for VTAM modules.

---

**IST1242I**                      **POOL    CURRENT MAXIMUM [POOL    CURRENT MAXIMUM]**

**Explanation:** The description of this message has changed to indicate that it is part of a group of messages that displays storage usage for VTAM storage pools and modules.

---

**IST1262I**                      **MODULE *modulename* LOAD FAILED – *reason***

**Explanation:** New *reason* descriptions have been added to indicate the following:

- A module is not in ISTCSLOD.
- An alias module is either not in the vector list of its load module or the module was loaded before the vector list.

### Changed Installation-Wide Exit Routines

Table 119 shows installation-wide exit routines that have been changed for this function. For information about these installation-wide exit routines, refer to *VTAM Customization*.

---

*Table 119. Changed Installation-Wide Exit Routines*

Exit Routine	Description
Session accounting (ISTAUCAG)	You must link-edit the session accounting exit routine to the MVS data set SYS1.SISTCLIB. Because you place your session accounting exit routine in SYS1.SISTCLIB, you no longer need to re-IPL MVS to reformat link pack area storage.
Session authorization (ISTAUCAT)	You must link-edit the session authorization exit routine to the MVS data set SYS1.SISTCLIB. Because you place your session authorization exit routine in SYS1.SISTCLIB, you no longer need to re-IPL MVS to reformat link pack area storage.

---

## Choice of Communication Network Management (CNM) Routing Tables

In pre-V4R4 releases, there can be only one user-defined communication network management (CNM) table in the VTAM library. This table was named ISTMGC00.

In VTAM V4R4, multiple user-defined CNM routing tables can be included in the VTAM library. Defining multiple CNM routing tables allows you to have different CNM routing tables in the same library and to specify which one to use when VTAM is started. For example, you can start multiple VTAMs using the same VTAM library with each VTAM using a different CNM routing table. Or, you can start the same VTAM at different times using a different CNM routing table. Specifying different tables lets you have a unique CNM routing table for your test and production VTAM on the same system.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

You can code multiple CNM routing tables and store them in the VTAM library. To associate a particular table with a VTAM, code the new CNMTAB start option and specify the name of the CNM routing table to be used.

If the name specified is not found, a message will be issued and the internal table, ISTMGC01, will be used.

If you choose not to use the new CNMTAB start option, there is no change in how VTAM determines which CNM routing table will be used.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Start options
- VTAM network operator commands.

### New Start Option

Table 120 shows a new start option for this function. For information about how to specify this start option, refer to the *VTAM Resource Definition Reference*.

Table 120. New Start Option

Start Option	Operand	Description
CNMTAB		Specifies the name of the CNM routing table to be used by this VTAM.

### Changed VTAM Network Operator Command

Table 121 on page 168 shows a VTAM network operator command that has been changed for this function. For information about how to use this VTAM network operator command, refer to *VTAM Operation*.

Table 121. New and Changed VTAM Network Operator Command

Command	Operand	Description
DISPLAY VTAMOPTS	FUNCTION	Now displays information about the CNMTAB start option when FUNCTION=MESSAGES is specified.

### Delayed Disconnection When No LU-LU Session Is Established

In pre-V4R4 releases, VTAM does not disconnect a line for a switched physical unit (PU) that never establishes a logical unit to logical unit (LU-LU) session.

In VTAM V4R4, a new parameter for the DISCNTIM start option will start a timer when a line is connected. When the timer expires, VTAM will disconnect the line if no LU-LU sessions are established.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

### Implementation Overview

There are no new definition requirements for using the existing DISCNTIM start option. The start option is modified using the MODIFY VTAMOPTS command.

### New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the changed user interface that enables you to use this function. These changed user interfaces include a start option and a network operator command.

#### Changed Start Option

Table 122 on page 169 shows a start option that has been changed for this function. For information about how to specify this start option, refer to the *VTAM Resource Definition Reference*.



Table 122. Changed Start Option

Start Option	Operand	Description
DISCNTIM		A new value, <i>time_period2</i> , was added to the DISCNTIM start option to enable the function, and to designate a time, in seconds, to evaluate the line for potential disconnections.

## Dynamic Reconfiguration of Switched Resources

In pre-V4R4 releases, a switched major node is not supported by dynamic reconfiguration. Many changes to PU, LU, and PATH definitions require the switched major node to be deactivated. Common parameters for all PUs of a switched major node must be coded on each PU statement. GROUP support for a switched major node is not available. The length of the DIALNO field is fixed at 32 characters. Longer defined values are not permitted; smaller defined values result in no space savings.

In V4R4, you can dynamically add, delete, or change existing PU, LU, and PATH definition statements for a switched major node using the VARY ACT command with the UPDATE=ALL option.

GROUP support for most common PU and LU parameters for a switched major node has been added.

The size of the switched major node tables is now dynamically determined. You no longer need the MAXGRP, MAXDLUR, and MAXNO keywords on the VBUILD definition statement and the MAXPATH keyword on the PU definition statement. If coded, they will be ignored; no error message will be produced.

The DIALNO field has been changed to use only the amount of storage necessary to store the value, and has been increased to a maximum of 242 characters.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

Use the VARY ACT command with the UPDATE=ALL option to dynamically implement changed operand values on PU and LU definition statements and PATH keywords that you have made in a VTAMLST definition file for a switched major node.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Definition statements for the switched major node
- VTAM network operator commands
- VTAM network operator messages.

### New and Changed Definition Statements for the Switched Major Node

Table 123 shows definition statements used to define the switched major node that have been added or changed for this function. For information about how to code these definition statements, refer to the *VTAM Resource Definition Reference*.

*Table 123. New and Changed Definition Statements for the Switched Major Node*

Definition Statement	Operand	Description
GROUP	several	The GROUP definition statement for the switched major node is new. For a complete list of the operands added, refer to <i>VTAM Resource Definition Reference</i> .
PATH	DIALNO	The maximum field length has been changed from 32 to 242 characters.
PU	MAXPATH	The MAXPATH operand has been deleted. If you continue to use this operand on your definition statements it will be ignored; no error message will be produced.
VBUILD	MAXDLUR MAXGRP MAXNO	The MAXDLUR, MAXGRP, and MAXNO operands have been deleted. If you continue to use these operands on your definition statements they will be ignored; no error messages will be produced.

### Changed VTAM Network Operator Commands

Table 124 on page 171 shows VTAM network operator commands that have been changed for this function. For information about how to use these VTAM network operator commands, refer to *VTAM Operation*.

Table 124. Changed VTAM Network Operator Commands

Command	Operand	Description
VARY ACT	UPDATE=ALL	Allows you to dynamically implement changes you have made in a VTAMLST definition file to add, delete, or change existing PU, LU, and PATH definition statements for a switched major node.

### New and Changed VTAM Network Operator Messages

This section shows messages that have been added and changed for VTAM network operators. For complete descriptions of these messages, refer to *VTAM Messages*.

**New Message:** The following message for VTAM network operators has been added:

---

**IST1575i**                      **DIALNO FOR PID:** *pid(instance)*

**Changed Message:** The following messages for VTAM network operators have changed:

---

**IST149I**                      **LINE GRP TELEPHONE NUMBER OR LINE NAME PID GID CNT**

**Explanation:** The telephone line number has been increased.

---

**IST1318I**                      *parameter\_value*

**Explanation:** The telephone line number has been increased.

---

**IST1319I**                      *parameter\_value*

**Explanation:** The telephone line number has been increased.

---

**IST1351I**                      **DLURNAME DIAL NUMBER PID GID CNT**

**Explanation:** The telephone line number has been increased.

---

## Filtering Initiation Failures From Session Awareness (SAW) Data

In pre-V4R4 releases, application collecting session awareness (SAW) data is responsible for filtering unwanted session initialization failure data that is reported to the communication network management (CNM) application.

In VTAM V4R4, VTAM will filter initialization failure data before sending SAW data to the CNM application program based on the new SAW sense filter. Using the SAW sense filter, you are able to filter unwanted information, reducing application program processing overhead.

**Note:** This function was introduced in VTAM V4R3 and VTAM V4R2 through the program temporary fixes (PTFs) associated with APAR OW15191.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

### Implementation Overview

To restrict session failure information from being sent to a CNM application program receiving session awareness (SAW) data, code the SAW sense filter. The table contains a list of user defined sense codes that will not be reported to the CNM application program for initiation failures. Using the SAW sense filter allows you to reduce the amount of SAW data sent to an application by eliminating the session information identified by the table.

### New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- User-definable tables
- VTAM network operator commands
- VTAM network operator messages.

#### New User-Definable Table

Table 125 shows the SAW sense filter that has been added for this function. For information about how to code this user-definable table, refer to the *VTAM Resource Definition Reference*.

Table 125. New User-Defineable Table

Table Name	Description
SAW Sense Filter	Contains a list of session initialization failure sense codes that are not to be reported to the communication network management (CNM) application program collecting SAW data.

#### New and Changed VTAM Network Operator Commands

Table 126 on page 173 shows VTAM network operator commands that have been added or changed for this function. For information about how to use these VTAM network operator commands, refer to *VTAM Operation*.

Table 126. New and Changed VTAM Network Operator Commands

Command	Operand	Description
DISPLAY SNSFILTR		Allows you to display the current active SAW sense filter.
VARY ACT	ID	The ID operand now accepts the name of a SAW sense filter table. The VARY ACT command is used to activate a new table or replace the current table.

### New and Changed VTAM Network Operator Messages

This section shows messages for VTAM network operators that have been added or changed for this function. For complete descriptions of these messages, refer to *VTAM Messages*.

**New Message:** The following message for VTAM network operators has been added:

---

**IST1551I**                    *sense\_1 sense\_2 sense\_3 sense\_4 sense\_5*

**Changed Messages:** The following messages for VTAM network operators have changed:

---

**IST172I**                    **NO** *text*

**Explanation:** Message text has been updated to include the SAW filter table.

---

**IST350I**                    **DISPLAY TYPE =** *type*

**Explanation:** Message text has been updated to include the SAW filter table.

---

**IST1321I**                    **TABLE FOR** *tabletype [netid]*

**Explanation:** Message is issued in response to a DISPLAY SNSFILTR command.

---

## Interpret Table Enhancement

This function enables you to inform VTAM to remove user data from the beginning of data being handled by an VTAM interpret table.

**Note:** This function was introduced in VTAM V4R3 through the program temporary fixes (PTFs) associated with APAR OW24216.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

### Implementation Overview

To remove user characters from a logon sequence, code REMOVE=Y on the LOGCHAR macroinstruction in the interpret table. VTAM will remove the first non-blank character string and the following blank from the data before it is passed to the application program in the user data field of the CINIT request unit (RU). The remaining data will be shifted to the left and padded with blanks on the right. For example, if the following information is sent and REMOVE=Y is specified, VTAM removes "IMS10 " before it passes the information to the application program in the user data field of the CINIT RU.

```
IMS10 NAME PASSWORD  =====>  NAME PASSWORD
```

### New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include the interpret table.

#### Changed Macroinstruction for the Interpret Table

Table 127 shows a macroinstruction used to define the interpret table that has been changed for this function. For information about how to code this macroinstruction, refer to the *VTAM Resource Definition Reference*.

Table 127. Changes to Macroinstruction for the Interpret Table

Macroinstruction	Operand	Description
LOGCHAR	REMOVE	Indicates whether VTAM is to remove the first nonblank character string from data processed by the interpret table before passing to the application program.

### Reset LU Enhancement

In pre-V4R4 releases, session termination flow might include reset LU processing. Reset LU processing includes a DEACTLU request unit (RU) followed by an ACTLU RU to reset the LU session with the SSCP. Reset LU processing occurs only for dependent LUs to avoid hung resource problems created when an UNBIND response is not returned to the resource.

In V4R4, you have the option to eliminate the reset LU processing for specific resources. This enables you to decide which resources receive the

DACTLU/ACTLU RUs. Eliminating this processing for resources that cannot handle the reset LU processing reduces session termination processing.

**Note:** This function was introduced in VTAM V4R2 and VTAM V4R3 through the program temporary fixes (PTFs) associated with APAR OW15635.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	You do not need any additional software products to use the reset LU enhancement. If you use the RESET operand on an NCP resource defined to an NCP V4, APAR IR30967 is required.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

To use this function code the new RESETLU operand on the LU definition statement in the following major nodes:

- Local SNA
- LU group
- Model
- NCP
- Switched.

Coding RESETLU=NO prevents forced reset processing flows, which include a DACTLU request followed by an ACTLU request. This processing applies only to dependent LUs.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include a definition statement for the following major nodes:

- Local SNA
- LU group
- Model
- NCP
- Switched.

Table 128 on page 176 shows the definition statement that has changed in the local SNA, LU group, model, NCP, and switched major nodes that has changed for this function. For information about how to code this definition statement, refer to the *VTAM Resource Definition Reference*.

Table 128. Changed Definition Statement for the Local SNA, LU Group, Model, NCP, and Switched Major Nodes

Major Node	Definition Statement	Operand	Description
Local SNA LU Group Model NCP Switched	LU	RESETLU	RESETLU is a new operand that enables you to specify whether reset LU processing is performed during session termination of the LU. Reset LU processing includes the issuing of a DACTLU RU followed by an ACTLU RU.

### Search Retry After Dial-Out Failure

In pre-V4R4 releases, duplicate switched major node definition statements for switched resources could exist in a multiple VTAM environment. It was advisable to have only one set of definitions active or to define switched resources as both an LU and CDRSC to each VTAM that may dial-out to the resource. This prevented a subsequent session request flowing through a host, where the resource is not active, to fail due to the failure of the dial-out to the resource. The dial-out fails because the resource is already active.

In VTAM V4R4, multiple sets of switched definitions can be active concurrently without additional CDRSC definitions statements. Instead of failing subsequent session requests because attempted dial-out failure, the request is routed to another host until the active resource is located.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	No significant amount of additional storage is required to use search retry after dial-out failure. However, if a switched resource has been defined as both an LU and CDRSC, the CDRSC definitions can be removed. Reducing the CDRSC definitions will save storage.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.



## Implementation Overview

In a multiple VTAM environment, duplicate switched major node definition statements can exist for switched resources. Each host can activate a resource causing the resource to be in CONCT state for each host. A session request through one of the hosts would cause the resource to be in an active state for that host. If a subsequent request for the resource is routed to the host that shows the resource in CONCT state, the session request will be rejected because the attempt to dial-out to the resource will fail.

With the search retry after dial-out failure function, VTAM will not reject the session request because an attempt to dial-out to a switched resource fails; instead, the request will be rerouted until the resource is located. If the resource is not located in the network, the session request will be rejected. The search retry after dial-out failure is automatic. There are no user changes required to use this function.

---

## Support for OS/390 Data Set Concatenation

Support for OS/390 concatenation includes logical parameter library (parmlib) concatenation to SYS1.PARMLIB and alternate data sets specification for SYS1.LPALIB. These OS/390 enhancements enable you to isolate parmlib members that have been customized by an installation and to change the sequence in which these members are used. You may now use up to 10 concatenated data sets to contain a parameter file. SYS1.PARMLIB is appended to the concatenation list. A module that previously was placed in SYS1.LPALIB can now be moved to, or also placed in, other libraries used in an LPALIB concatenation.

In OS/390 Release 2, use the PARMLIB statement of the LOADxx parmlib member to specify the data sets for the logical parmlib concatenation. Use the SYSLIB statement of the PROGxx parmlib member for alternate data set selection for SYS1.LPALIB. For further information on specifying these statements, see the *OS/390 MVS Initialization and Tuning Reference*.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	To use the support for OS/390 concatenation, you must have, at a minimum, OS/390 Release 2.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

### Implementation Overview

Place members of SYS1.PARMLIB and SYS1.LPALIB used by VTAM in other data sets that have been defined to MVS through the logical parmlib concatenation and the alternate data sets for SYS1.LPALIB.

### Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include messages for TSO/VTAM network operators.

The following messages for TSO/VTAM network operators have been changed for this function. For complete descriptions of these messages, refer to *VTAM Messages*.

---

<b>IKT013I</b>	<b>PARAMETER FILE CANNOT BE OPENED - DEFAULT PARAMETERS USED</b>
----------------	------------------------------------------------------------------

**Explanation:** Reference to SYS1.PARMLIB has been removed. For OS/390, parameter members can now be placed in any data set in the logical parmlib concatenation.

---

<b>IKT014I</b>	<b>I/O ERROR READING MEMBER <i>member_name</i> - DEFAULT PARAMETERS USED</b>
----------------	------------------------------------------------------------------------------

**Explanation:** Reference to SYS1.PARMLIB has been removed. For OS/390, parameter members can now be placed in any data set in the logical parmlib concatenation. The parameter member name that received the I/O error has been added to the message.

---

<b>IKT031I</b>	<b>PARAMETER(S) SPECIFIED IN MEMBER <i>member_name</i> NOT VALID</b>
----------------	----------------------------------------------------------------------

**Explanation:** Reference to SYS1.PARMLIB has been removed. For OS/390, parameter members can now be placed in any data set in the logical parmlib concatenation.

---

### TCP/IP DLC Provision

VTAM V4R4 provides OS/390 TCP/IP OpenEdition with support for the following data link control (DLC) connections:

- Channel-to-channel (CTC)  
Provides connectivity to another host running OS/390 TCP/IP OpenEdition
- Common link access to workstations (CLAW)  
Provides connectivity to IP applications in an IBM 3172 Nways Interconnect Controller or RS/6000 processor
- LAN channel station (LCS)  
Provides connectivity to 3172/ICP with LAN adapters

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	Use the estimating storage worksheets in Appendix A, “Estimating Storage” in the <i>VTAM Installation and Migration Guide</i> to determine the total amount of storage you need for VTAM V4R4.
<b>Software Requirements</b>	To use the TCP/IP DLC provision, you must have, at a minimum, the following software products: <ul style="list-style-type: none"> <li>• OS/390 R3</li> <li>• OS/390 TCP/IP OpenEdition.</li> </ul>
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	The TCP/IP DLC provision exploits the “reduced data move” technology provided by communication storage manager (CSM). Reducing data movement on TCP/IP I/O operations maximizes system performance.

## Implementation Overview

When OS/390 TCP/IP OpenEdition activates a connection, VTAM dynamically creates the DLC environment. No VTAM system definitions are required. Then VTAM, on behalf of the CS OS/390 upper layer protocol (ULP), can communicate through MVS with an I/O device.

### Notes:

1. The APPN protocol stack will not utilize the DLC support.
2. The DLC provision does not support sharing of a single device or control unit address (CUA).

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- VTAM network operator commands
- VTAM network operator messages
- VTAM internal trace (VIT) entries
- FFST probes.

### Changed VTAM Network Operator Commands

Table 129 on page 180 shows VTAM network operator commands that have been changed for this function. For information about how to use these VTAM network operator commands, refer to *VTAM Operation*.

Table 129. Changed VTAM Network Operator Commands

Command	Operand	Description
DISPLAY TRL	CONTROL	CONTROL is a new operand that allows you to display either the entire list of TRLEs (defined and dynamic), or to display a subset of only defined or dynamic TRLEs.
	ULPID	ULPID is a new operand that allows you to specify the name of a CS OS/390 upper-layer protocol (ULP), for example, TCP/IP uses the procedure name.

## New and Changed VTAM Network Operator Messages

This section shows messages for VTAM network operators that have been added or changed for this function. For complete descriptions of these messages, refer to *VTAM Messages*.

**New Messages:** The following messages for VTAM network operators have been added:

IST1613I	TYPE = type	ATTN = attn	
IST1614I	RSIO = rsio	INPACKET = inpacket	INBYTE = inbyte
IST1615I	ARPACKET = arpacket	ARBYTE = arbyte	MAXRCVD = maxrcvd
IST1616I	WSIO = wsio	OTPACKET = otpacket	OUTBYTE = outbyte
IST1617I	AWPACKET = awpacket	AWBYTE = awbyte	MAXSENT = maxsent
IST1618I	READCCW = readccw	PCICNT = pcicnt	
IST1619I	WRITECCW = writeccw	APPEND = append	

**Changed Messages:** The following messages for VTAM network operators have been changed:

**IST087I** TYPE = line\_type, CONTROL = line\_control,

**Explanation:** This message is part of several different message groups that VTAM issues in response to DISPLAY ID commands.

**IST1221I** {WRITE|READ} DEV = device\_address STATUS = status STATE = system\_state

**Explanation:** VTAM issues this message as part of a message group in response to:

- A DISPLAY ID command to identify the operational status of all *READ* and **WRITE** subchannels
- A DISPLAY ID command for an MPC line or a transport resource list entry (TRLE)
- A DISPLAY TRL command for an active TRL entry.

**IST1230I** TIME = time DATE = date ID = id

**Explanation:** This message is the first in a group of messages that displays tuning statistics.

### New and Changed VTAM Internal Trace Entries

Table 130 shows VTAM internal trace (VIT) entries that have been added or changed for this function. For information about the VTAM internal trace, refer to *VTAM Diagnosis*.

Table 130. New and Changed VTAM Internal Trace Entries

Option	Entry	Description
CIO	ATTx	ATTT has been added to indicate an attention interrupt for a TCP/IP DLC connection.
	HIOx	HIoT has been added to indicate a Halt I/O SVC issued for a TCP/IP DLC connection.
	INTx	INTT has been added for interrupts between TCP/IP DLC connections.
	PKI, PKO	PKI and PKO have been added to indicate, respectively, a packet received by or sent from TCP/IP data link control (DLC).
	SIOx	SIOt has been added to indicate a Start I/O SVC issued for a TCP/IP DLC connection.

### New and Changed First Failure Support Technology Probes

Table 131 shows First Failure Support Technology (FFST) probes that have been added or changed for this function. For information about FFST probes, refer to *VTAM Diagnosis*.

Table 131. New and Changed First Failure Support Technology Probes

Probe	Component	Description
ISTTCC01	ISTTCTD	Multiple function keywords were encountered. TCP-DLC supports ACTPATH, DACTPATH, OPENPATH, and CLOSEPATH.
ISTTCC02	ISTTCCRI	Registration Manager or the DLC sent an unrecognizable RUPE.
ISTTCC03	ISTTCCRI	A store failure occurred trying to acquire storage for a RUPE.
ISTTCC04	ISTTCCRI	An unexpected RUPE was encountered when a RUPE was sent to Registration Manager.

## 31-Bit UCB Support

In V4R4, VTAM supports any UCB that is eligible to be put above the 16 meg line. This is specified by using the "ANY" option on the IODF panel. This eligibility includes local non-SNA, CTC, MPC, but not NCP or PU local SNA. NCP owns the UIM and it is not allowed.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

---

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	Messages IST1491I and IST1492I are no longer issued.
<b>Performance Impacts</b>	None.

---

### Implementation Overview

There is no implementation required for the 31-bit UCB support.

### New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include messages for VTAM network operators.

The following messages for VTAM network operators have been deleted:

---

<b>IST1491I</b>	<b>DYNAMIC ALLOCATION FAILED FOR <i>device_address</i></b>
<b>IST1492I</b>	<b>VTAM DOES NOT SUPPORT 31-BIT UCB ADDRESS</b>

---

## Chapter 13. Usability Enhancements

The following functions enhance the usability of VTAM:

- “DISPLAY SRCHINFO Command”
- “DISPLAY VTAMSTOR Command” on page 185
- “Prevention of Subtask Detach” on page 187
- “XID Message Group Enhancement” on page 188
- “XNETALS Start Option Enhancements” on page 190.

---

### DISPLAY SRCHINFO Command

The new DISPLAY SRCHINFO command allows you to query the network about outstanding subarea and APPN search requests.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

### Implementation Overview

There are no definition requirements needed for using the DISPLAY SCHRINFO command. Simply issue the new command to obtain information about outstanding requests.

The DISPLAY SCHRINFO command is a helpful analysis tool to identify requests related to session setup or APPN inquire delays.

### New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- VTAM network operator commands
- VTAM network operator messages
- Command and request/response unit (RU) types in VTAM messages
- IBM-supplied tables.

## New VTAM Network Operator Command

Table 132 shows the VTAM network operator command that has been added for this function. For information about how to use this VTAM network operator command, refer to *VTAM Operation*.

Table 132. New VTAM Network Operator Command

Command	Description
DISPLAY SRCHINFO	Obtains information about outstanding subarea and APPN requests during session activation.

## New and Changed VTAM Network Operator Messages

This section shows messages for VTAM network operators that have been added or changed for this function. For complete descriptions of these messages, refer to *VTAM Messages*.

**New Messages:** The following messages for VTAM network operators have been added:

IST1520I	<b>SUBAREA SEARCH INFORMATION:</b>
IST1521I	<i>sscp_dir</i> NAME CDINIT DSRLST IOCD INTOTH TOTAL
IST1522I	<i>sscpname cdinit dsrlst iocd intoth total</i>
IST1523I	<b>OLU            DLU            SID            RU</b>
IST1524I	<i>olu dlu sid ritype</i>
IST1525I	<b>TOTAL NUMBER OF OUTSTANDING SEARCHES = <i>srchcnt</i></b>
IST1526I	<b>APPN SEARCH INFORMATION:</b>
IST1527I	<i>cp_dir</i> NAME TYPE NATIVE BROADCAST DIRECTED TOTAL
IST1528I	<i>cpname type native broadcst directed total</i>
IST1529I	<b>OLU            DLU            SID            LOCATE</b>
IST1530I	<i>olu dlu sid locates</i>
IST1531I	<b>SID = <i>sid</i>    CP(OLU) = <i>origcp</i></b>
IST1532I	<b>OLU = <i>oluname</i>            DLU = <i>dluname</i></b>
IST1533I	<b>SEARCH CONCENTRATED = <i>conc</i>    RDS = <i>rds</i></b>
IST1534I	<b>SSCP/CP IN OLU DIRECTION = <i>olucp</i></b>
IST1535I	<b>REPLY RETURNED TO ORIGINATING CP = <i>reply</i></b>
IST1536I	<b>CONCENTRATED BEHIND <i>conc_pcid conc_mod</i></b>
IST1537I	<b>AWAITING REPLY FROM THE FOLLOWING NODE(S):</b>
IST1538I	<i>name    name    name</i>
IST1539I	<b>PCID MODIFIER = <i>pcidmod</i></b>
IST1540I	<b>SEARCH STATUS = <i>status</i>            SSCP(OLU) = <i>sscpolu</i></b>
IST1541I	<b>LOCATES PENDING = <i>locates</i>        CURRENT TASK = <i>task</i></b>
IST1542I	<b>NO ADJSSCP ROUTING INFORMATION AVAILABLE</b>
IST1543I	<b>REQUESTS CONCENTRATED BEHIND THIS SEARCH =</b> <i>nbr_conc</i>
IST1545I	<b>NODE ROLE VECTOR = <i>role</i></b>
IST1548I	<b>BROADCAST=<i>bdcst</i>    DIRECTED=<i>drctd</i></b>

**Changed Messages:** The following messages for VTAM network operators have changed:



---

**IST350I** **DISPLAY TYPE = type**

**Explanation:** Message has been updated to include SRCHINFO as a value for the *type* field.

---

**IST1315I** **DISPLAY TRUNCATED AT keyword = number**

**Explanation:** Explanation has been updated to include that message is issued in response to the DISPLAY SRCHINFO command.

---

**IST1358I** **NO QUALIFYING MATCHES for\_name**

**Explanation:** Explanation has been updated to include that message is issued in response to the DISPLAY SRCHINFO command.

---

**IST1454I** *count type* **DISPLAYED [FOR ID = rscname]**

**Explanation:** Explanation has been updated to include that message is issued in response to the DISPLAY SRCHINFO command.

---

### Command and RU Types in VTAM Messages

Table 133 shows command and RU types that can appear in VTAM messages that have been changed for this function.

---

*Table 133. Changed Command and RU Types in VTAM Messages*

---

Command or RU Type	Description
DSRLST	DSRLST replaces CD DSEARCH as the RU type.
IPS DSI	RU type added as the interprocess signal for DISPLAY SRCHINFO.

---

### Changed IBM-Supplied USS Table

Table 134 shows changes to the IBM-supplied operation-level USS table (ISTINCNO). For information about the IBM-supplied operation-level USS table, refer to the *VTAM Resource Definition Reference*.

---

*Table 134. Changed IBM-Supplied USS Table*

---

Table	Description
ISTINCNO	Updated with the new DISPLAY SRCHINFO command.

---

---

## DISPLAY VTAMSTOR Command

In pre-V4R4 releases, when a customer reported a problem, the only way to determine if they had applied a PTF was to dump VTAM and locate the module in storage.

In V4R4, the customer can use the new DISPLAY VTAMSTOR command to tell them the location of the module in storage and the date (Julian) in the module or the PTF number for the module. The storage can be displayed while VTAM is running. The command also provides the address of the module to help trace specific problems. Only modules which begin with IST, IUT, IVT, or ACY can be displayed. Some modules which are part of multi-csect load modules are not displayable.

An additional benefit of the command is the ability to display a resource such as an application, a line, PU, LU, or NCP or to display storage contents.

### Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

### Implementation Overview

Issue the DISPLAY VTAMSTOR command to display:

- The location and service level of a specified module
- The resource definition table entry of a specified resource or network address
- Storage contents.

### New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- VTAM network operator command
- VTAM network operator messages.

#### **New VTAM Network Operator Command**

Table 135 on page 187 shows the VTAM network operator command that has been added for this function. For information about how to use this VTAM network operator command, refer to *VTAM Operation*.

Table 135. New VTAM Network Operator Command

Command	Operand	Description
DISPLAY VTAMSTOR	ADDRESS	Displays the contents of storage at the address.
	LENGTH	Specifies the length of storage contents to display.
	MODULE	Displays the load address as well as the service level.
	NETADDR	Displays the associated resource name.
	NETID	Restricts the network address to a specific network.
	RESOURCE	Displays the resource definition table entry.
	XLENGTH	Specifies the length of storage contents (in hexadecimal) to display.

### New and Changed VTAM Network Operator Messages

This section shows messages for VTAM network operators that have been added or changed. deleted. For complete descriptions of these messages, refer to *VTAM Messages*.

**New Messages:** The following messages for VTAM network operators have been added:

IST1571I	<i>module_name</i> <b>ENTRY POINT IS</b> <i>address</i> <b>LEVEL IS</b> <i>svc_level</i>
IST1572I	<b>MODULE</b> <i>module_name</i> <b>CANNOT BE LOCATED</b>
IST1573I	<i>type</i> <b>STORAGE DISPLAY BEGINS AT LOCATION</b> <i>address</i>
IST1574I	<i>offset</i> <i>hexdata_1</i> <i>hexdata_2</i> <i>hexdata_3</i> <i>hexdata_4</i> <b>EBCDIC_data</b>
IST1620I	<b>SUBAREA = X'</b> <i>sa_hex</i> <b>' (sa_dec), ELEMENT = X'</b> <i>ex</i> <b>' (ele_dec)</b>
IST1625I	<b>STORAGE ADDRESS</b> <i>address</i> <b>IS UNAVAILABLE</b>

**Changed Messages:** The following messages for VTAM network operators have been changed:

IST658I	<i>command</i> <b>COMMAND FAILED — resource NOT FOUND</b>
---------	-----------------------------------------------------------

**Explanation:** This message is now issued when a D VTAMSTOR,NETADDR has a network address/netid combination that cannot be found in the network.

## Prevention of Subtask Detach

In pre-V4R4 releases, when ISTDCLM, ISTDSCSEX, or ISTDPUX0 abended five times, VTAM would not reattach the subtask. The only way to regain the function provided by the subtask was to restart VTAM.

In VTAM V4R4, these subtasks will no longer be detached after experiencing five abends.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	None.
<b>Performance Impacts</b>	None.

## Implementation Overview

There is no implementation required for the prevention of subtask detach.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include messages for VTAM network operators.

The following messages for VTAM network operators have been changed. For complete descriptions of these messages, refer to *VTAM Messages*.

---

### IST130I                      VTAM SUBTASK *subtask* INACTIVE — ABEND THRESHOLD EXCEEDED

**Explanation:** Three subtasks (ISTDCLM, ISTCSCEX, ISTPUCX0) have been deleted from this message because they will no longer be detached after experiencing five abends.

---

### IST132I                      VTAM SUBTASK *subtask* NOT REATTACHED — CANNOT BE FOUND

**Explanation:** Three subtasks (ISTDCLM, ISTCSCEX, ISTPUCX0) have been deleted from this message because they will no longer be detached after experiencing five abends.

---

## XID Message Group Enhancement

In pre-V4R4 VTAM releases, VTAM message IST467I is issued along with messages IST468I, IST469I, IST470I, and IST471I to identify XID mismatches.

In VTAM V4R4, the IST467I message group contains new messages to aid you in performing problem determination. The new messages indicate the XIDs received from and sent to the adjacent PU. The XID is displayed in hexadecimal and EBCDIC format, with the hexadecimal byte offset within the XID. If control vector X'22' (CV X'22') is present in the XID, messages stating the byte and bit offsets of the error are displayed. If a sense code is set in the CV X'22' by the adjacent node to identify the reason for the rejection of the XID, that sense code is also displayed.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	Messages IST468I, IST469I, IST470I, and IST471I are no longer issued in the IST467I message group. They are replaced by IST1574I, IST1580I, IST1582I, IST1583I, IST1584I, IST1585I, and IST1586I.
<b>Performance Impacts</b>	None.

## Implementation Overview

There is no implementation required for the XID message group enhancement.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include messages for VTAM network operators. For complete descriptions of these messages, refer to *VTAM Messages*.

### New Messages

The following messages for VTAM network operators have been added:

<b>IST1574I</b>	<i>offset hexdata_1 hexdata_2 hexdata_3 hexdata_4 EBCDIC_data</i>
<b>IST1580I</b>	<b>XID RECEIVED BY VTAM:</b>
<b>IST1582I</b>	<b>CONTROL VECTOR X'22' ANALYSIS</b>
<b>IST1583I</b>	<b>BYTE OFFSET OF FIRST BYTE IN ERROR = <i>byteoffset</i></b>
<b>IST1584I</b>	<b>BIT OFFSET OF FIRST BIT IN ERROR = <i>bitoffset</i></b>
<b>IST1585I</b>	<b>SENSE CODE = <i>sense</i></b>
<b>IST1586I</b>	<b>XID SENT BY VTAM:</b>

### Changed Message

The following message for VTAM network operators has been changed:

<b>IST467I</b>	<b>CONTACTED ERROR TYPE <i>type</i> FOR ID = <i>nodename</i></b>
----------------	------------------------------------------------------------------

**Explanation:** The message group described under this message contains new messages.

## Deleted Messages

The following messages for VTAM network operators have been deleted:

---

**IST468I**                      **XID1=*xid1***  
**Explanation:** This message has been replaced by IST1580I.

---

**IST469I**                      *xid1*  
**Explanation:** This message has been replaced by IST1574I.

---

**IST470I**                      **XID2=*xid2***  
**Explanation:** This message has been replaced by IST1586I.

---

**IST471I**                      *xid2*  
**Explanation:** This message has been replaced by IST1574I.

---

## XNETALS Start Option Enhancements

In pre-V4R4 releases, whatever was specified for the XNETALS start option would be used for all PUs.

In VTAM V4R4, you can override the value coded for the XNETALS start option by coding a value for XNETALS for specific PUs.

## Planning to Use This Function

Review the information in this section to determine if you have enough storage and the required software and hardware to use this function. This section also helps you understand any migration and performance impacts to your system as a result of using this function.

<b>Storage Requirements</b>	None.
<b>Software Requirements</b>	None.
<b>Hardware Requirements</b>	None.
<b>Migration Impacts</b>	NETID=(,NOXNETALS) is no longer valid. However, if it is coded it will default to XNETALS=NO for that PU.
<b>Performance Impacts</b>	None.

## Implementation Overview

You can now code the XNETALS operand on the GROUP, LINE, or PU statements with resolution at the PU level.

If XNETALS start option is coded, then its value will be used as the default for the PU definition. If XNETALS start option is not coded, then the default for APPN PUs is XNETALS=YES and the default for LEN PUs is XNETALS=NO.

## New and Changed User Interfaces That Enable You to Use This Function

This section provides an overview of the new and changed user interfaces that enable you to use this function. These new and changed user interfaces include:

- Start options
- Definition statements for major nodes
  - Local SNA major node
  - Model major node
  - Network Control Program major node
  - Switched major node
  - TCP major node
  - External communications adapter (XCA) major node
- VTAM network operator messages.

### New and Changed Definition Statements for Major Nodes

The definition statements used to define the following major nodes have changed for this function:

- Local SNA
- Model
- Network Control Program
- Switched
- TCP
- XCA.

For information about how to code these definition statements, refer to the *VTAM Resource Definition Reference*.

**Local SNA Major Node:** Table 136 shows a definition statement used to define the local SNA major node that has been changed for this function.

Table 136. Changed Definition Statement for the Local SNA Major Node

Definition Statement	Operand	Description
PU	XNETALS	New. XNETALS was added to eliminate interference with APPN migration.
	NETID	Changed. Deleted NETID=(,NOXNETLS) from this operand.

**Model Major Node:** Table 137 on page 192 shows a definition statement used to define the model major node that has been changed for this function.

Table 137. Changed Definition Statement for the Model Major Node

Definition Statement	Operand	Description
PU	XNETALS	New. XNETALS was added to eliminate interference with APPN migration.
	NETID	Changed. Deleted NETID=(,NOXNETLS) from this operand.

**NCP Major Node:** Table 138 shows a definition statement used to define the NCP major node that has been changed for this function.

Table 138. Changed Definition Statement for the NCP Major Node

Definition Statement	Operand	Description
PU	XNETALS	New. XNETALS was added to eliminate interference with APPN migration.
	NETID	Changed. Deleted NETID=(,NOXNETLS) from this operand.

**Switched Major Node:** Table 139 shows a definition statement used to define the switched major node that has been changed for this function.

Table 139. Changed Definition Statement for the Switched Major Node

Definition Statement	Operand	Description
PU	XNETALS	New. XNETALS was added to eliminate interference with APPN migration.
	NETID	Changed. Deleted NETID=(,NOXNETLS) from this operand.

**TCP Major Node:** Table 140 shows a definition statement used to define the TCP major node that has been changed for this function.

Table 140. Changed Definition Statement for the TCP Major Node

Definition Statement	Operand	Description
PU	XNETALS	New. XNETALS was added to eliminate interference with APPN migration.
	NETID	Changed. Deleted NETID=(,NOXNETLS) from this operand.

**XCA Major Node:** Table 141 on page 193 shows a definition statement used to define the XCA major node that has been changed for this function.



---

Table 141. Changed Definition Statement for the XCA Major Node

---

Definition Statement	Operand	Description
PU	XNETALS	New. XNETALS was added to eliminate interference with APPN migration.
	NETID	Changed. Deleted NETID=(,NOXNETLS) from this operand.

---

### New VTAM Network Operator Message

The following message for VTAM network operators has been added for this function. For a complete description of this message, refer to *VTAM Messages*.

---

**IST1589I**                      **XNETALS = *xnetalsvalue***



---

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## Bibliography

### VTAM V4R4 Publications

Following are descriptions of the books in the VTAM V4R4 library. The books are arranged in the following categories:

- Softcopy Information
- Marketing Information
- Planning
- Installation, Resource Definition, and Tuning
- Customization
- Operation
- Writing Application Programs
- Diagnosis
- VTAM AnyNet
- APPC Application Suite.

The complete set of unlicensed books in this section can be ordered using a single order number, SBOF-7011.

### Softcopy Information

#### IBM Networking Softcopy Collection

**Kit CD-ROM (SK2T-6012):** The softcopy library contains softcopy versions of the licensed and unlicensed books for VTAM V4R4.

All of the unlicensed and licensed VTAM books described in this section are available in softcopy on this CD-ROM. These softcopy files can be read using any of the IBM BookManager READ programs. They can also be read with the IBM Library Reader program shipped on this CD.

The CD also contains softcopy of the unlicensed books of many other products.

### Marketing Information

A Networking Overview and the following IBM Networking Previews are available:

- AnyNet
- VTAM.

Ask your IBM marketing representative for more information.

### Planning and Installation

#### VTAM Licensed Program

**Specifications (GC31-8379):** This flyer is the warranty for VTAM and includes:

- A list of new functions
- Descriptions of VTAM features
- Machine requirements
- Programming requirements.

**VTAM Release Guide (GC31-6545):** This guide provides an overview of the new functions in VTAM V4R4 and includes:

- Advantages of new functions
- Planning considerations for new functions
- Effect of new functions on existing functions
- Changes to commands, definition statements, and messages
- Programming requirements, such as the release of NCP required.

#### VTAM Installation and Migration Guide

**(GC31-8367):** This guide helps you upgrade VTAM V4R3, V4R2, V4R1, or V3R4.2 to VTAM V4R4. It includes:

- Installation procedures
- Planning to upgrade to VTAM V4R4
  - Upward and downward compatibility
  - Software and hardware requirements
  - Storage requirements
  - Impacts of new functions and enhancements performed without changes to user interfaces
  - Changes to installation process
- Upgrading user interfaces to VTAM V4R4
  - Changes to start options
  - Changes to buffer pools
  - Changes to definition statements
  - Changes to IBM-supplied default user-definable tables and modules
  - Changes to user-definable table macroinstructions
  - Changes to commands
  - Changes to messages
  - Changes to VTAM application programming interface
  - Changes to installation-wide exit routines
  - Changes to control blocks.

**VTAM Program Directory:** This document is shipped with the product tape and explains the steps for installing VTAM.

## Bibliography

**VTAM Glossary (GC31-8366):** This glossary defines terms and abbreviations for VTAM and related products. It includes information from the IBM *Dictionary of Computing*, SC20-1699.

### Planning for Integrated Networks

**(SC31-8062):** This book helps you plan for SNA (subarea and APPN) and TCP/IP networks. It includes discussion of protocol strategies, migration scenarios, processing goals, and management considerations.

### Resource Definition, Configuration, and Tuning

#### VTAM Network Implementation Guide

**(SC31-8370):** This book presents the major concepts involved in implementing a VTAM network, and includes:

- Buffer pools, slowdown, pacing, storage considerations
- Implementation considerations
- Sample major node definitions
- Migration considerations
- Tables and filters
- TSO, VCNS, and other programs that run with VTAM
- Tuning procedures
- VTAM start options.

Use this book in conjunction with the *VTAM Resource Definition Reference*.

#### VTAM Resource Definition Reference

**(SC31-8377):** This book describes each VTAM definition statement, start option, and macroinstruction for user tables. It also describes NCP definition statements that affect VTAM. The information includes:

- IBM-supplied default tables (logon mode and USS)
- Major node definitions
- User-defined tables and filters
- VTAM start options.

If you are unfamiliar with the major concepts involved in implementing a VTAM network, use this book in conjunction with the *VTAM Network Implementation Guide*.

#### VTAM Resource Definition Samples

**(SC31-8378):** This book contains sample definitions to help you implement VTAM functions in your networks, and includes sample major node definitions.

Use this book in conjunction with the *VTAM Network*

*Implementation Guide* and *VTAM Resource Definition Reference*.

## Operation

**VTAM Operation (SC31-8372):** This book serves as a reference for programmers and operators requiring detailed information about specific operator commands. The information includes:

- VTAM commands and start options
- Logon manager commands
- DISPLAY output examples (messages received)
- VSCS commands.

#### VTAM Operation Quick Reference

**(SX75-0208):** This book contains essential information about VTAM operator commands.

**VTAM Messages (GC31-8368):** This book describes the following types of messages and other associated information:

- Messages:
  - ELM messages for logon manager
  - IKT messages for TSO/VTAM
  - IST messages for VTAM network operators
  - ISU messages for sockets-over-SNA
  - IVT messages for the communications storage manager
  - IUT messages
  - USS messages
- Other information that displays in VTAM messages:
  - Command and RU types in VTAM messages
  - Node and ID types in VTAM messages
- Supplemental message-related information:
  - Message additions, deletions, and changes
  - Message flooding prevention
  - Message groups and subgroups
  - Message routing and suppression including descriptor codes, routing codes, and suppression levels for ELM, IKT, IST, and ISU messages
  - Message text and description formats
  - Message text of MSGLVL option messages including general information on the MSGLVL option
  - Message text of all VTAM network operator messages including variable field lengths

**VTAM Codes (GC31-8369):** This book describes codes and other information that display in VTAM messages:

- Sense codes including VTAM sense code hints, SNA sense field values for RPL-based macroinstructions, and 3270 SNA and non-SNA device sense fields
- Return codes for macroinstructions including ACB OPEN and CLOSE macroinstruction error fields, RTNCD-FDB2 return code combinations, and LU 6.2 RCPRI-RCSEC return codes
- Data link control (DLC) status codes
- Status codes including resource status and session state codes
- Wait state event codes and IDs
- Abend codes
- ATM network-generated cause and diagnostic codes.

## Using IBM CommandTree/2

**(SC31-7013):** IBM CommandTree/2 is a workstation product that enables an operator to construct commands and send them to a specified destination for processing. The VTAM command set library includes:

- VTAM commands
- Logon manager commands
- Help for commands and start options.

## Customization

**VTAM Customization (LY43-0075):** This book enables you to customize VTAM, and includes:

- Communication network management (CNM) routing table
- Logon-interpret routine requirements
- Logon manager installation-wide exit routine for the CLU search exit
- TSO/VTAM installation-wide exit routines
- VTAM installation-wide exit routines:
  - Command verification exit (ISTCMMND)
  - Configuration services XID exit (ISTEXCCS) with description of IBM-supplied default exit
  - Directory services management exit (ISTEXCDM)
  - Generic resource resolution exit (ISTEXCGR)
  - Performance monitor exit (ISTEXCPM)
  - SDDLU exit (ISTEXCSD) with description of IBM-supplied default exit

- Session accounting exit (ISTAUCAG)
- Session authorization exit (ISTAUCAT)
- Session management exit (ISTEXCAA) with example
- TPRINT processing exit (ISTRAEUE)
- USERVAR exit (ISTEXCUV) with description of IBM-supplied default exit
- Virtual route pacing window size calculation exit (ISTPUCWC)
- Virtual route selection exit (ISTEXCVR).

## Writing Application Programs

**VTAM Programming (SC31-8373):** This book describes how to use VTAM macroinstructions to send data to and receive data from (1) a terminal in either the same or a different domain, or (2) another application program in either the same or a different domain. The information includes:

- API concepts
  - Cryptography
  - RUs and exchanges
  - Session establishment and termination
- BIND area format
- Communication Network Management Interface
- Dictionary of VTAM macroinstructions
- OPEN or CLOSE errors
- Operating system differences
- Program Operator Coding requirements
- RAPI DSECTs and control block mappings
- RAPI global variables
- Vector lists
- RPL-based macroinstructions
- RPL RTNCD,FDB2 codes
- User exit routines.

## VTAM Guide to Programming for LU

**6.2 (SC31-8374):** This book describes how to use the VTAM LU 6.2 application programming interface for host application programs. This book applies to programs that use only LU 6.2 sessions or that use LU 6.2 sessions along with other session types. (Only LU 6.2 sessions are covered in this book.) The information includes:

- VTAM's implementation of the LU 6.2 architecture
- Design considerations for LU 6.2 application programs
- Negotiating session limits with partner LUs
- BIND image and response
- Allocating and deallocating conversations
- FMH-5 and PIP data
- Conversation states
- Sending and receiving data
- Using high performance data transfer (HPDT)

## Bibliography

- Session- and conversation-level security and data encryption
- Register usage
- Sync point services
- LU 6.2 global variables
- Vector lists
- Sense codes for FMH-7 and UNBIND
- RCPRI,RCSEC codes
- User exit routines.

### VTAM Programming Reference for LU

**6.2 (SC31-8375):** This book provides reference material for the VTAM LU 6.2 programming interface for host application programs. The information includes:

- APPCCMD macroinstructions
- Primary and secondary return codes (RCPRI, RCSEC)
- DSECTs
- Examples of using VTAM's LU 6.2 API
- Register usage

### VTAM Programming for CSM

**(SC31-8420):** This book describes how applications use the communications storage manager. The information includes:

- Creating and deleting buffer pools
- Obtaining and freeing buffers
- Return codes and reason codes
- DSECTs

### VTAM CMIP Services and Topology Agent Programming Guide

**(SC31-8365):** This book describes the Common Management Information Protocol (CMIP) programming interface for application programmers to use in coding CMIP application programs. The book provides guide and reference information about CMIP services and the VTAM topology agent and includes the following topics:

- Management information base (MIB) API functions
- CMIP message strings
- Special CMIP message strings
- Read queue exit routine
- Sample CMIP application program
- VTAM resources as CMIP objects
- Naming conventions for objects
- VTAM resources and OSI states
- Attributes to object cross-reference
- ASN.1 syntax for CMIP messages
- GDMO table format
- ACYAPHDH header file.

## Diagnosis

**VTAM Diagnosis (LY43-0078):** This book helps you identify a VTAM problem, classify it, and collect information about it before you call the IBM Support Center. The information collected includes traces, dumps, and other problem documentation. The information includes:

- Command syntax for running traces and collecting and analyzing dumps
- VIT entries
- Procedures for collecting documentation (VTAM, TSO)
- VTAM internal trace and VIT analysis tool
- FFST Probes
- Channel programs
- Flow diagrams
- Procedures for locating buffer pools
- CPCB operation codes
- Storage and control block ID codes
- PIU discard reason codes
- Offset names and locations for VTAM buffer pools.

### VTAM Data Areas for MVS/ESA Volume

**1 (LY43-0076):** This book describes VTAM data areas and can be used to read a VTAM dump. It is intended for IBM programming service representatives and customer personnel who are diagnosing problems with VTAM.

### VTAM Data Areas for MVS/ESA Volume

**2 (LY40-0077):** This book describes VTAM data areas and can be used to read a VTAM dump. It is intended for IBM programming service representatives and customer personnel who are diagnosing problems with VTAM.

## VTAM AnyNet

### VTAM AnyNet Guide to SNA over

**TCP/IP (SC31-8376):** This guide provides information to help you install, configure, use, and diagnose SNA over TCP/IP.

### VTAM AnyNet Guide to Sockets over

**SNA (SC31-8371):** This guide provides information to help you install, configure, use, and diagnose Sockets over SNA. It also provides information to help you prepare application programs to use sockets over SNA.

## APPC Application Suite



**APPC Application Suite User's Guide**

**(SC31-6532):** This book documents the end-user interface (concepts, commands, and messages) for the AFTP, ANAME, and APING facilities of the APPC application suite. Although its primary audience is the end user, administrators and application programmers may also find it useful.

**APPC Application Suite Administration**

**(SC31-6533):** This book contains the information that administrators need to configure the APPC application suite and to manage the APING, ANAME, AFTP, and A3270 servers.

**APPC Application Suite Programming**

**(SC31-6534):** This book provides the information application programmers need to add the functions of the AFTP and ANAME APIs to their application programs.

---

**Multiprotocol Transport Networking (MPTN) Architecture Publications**

Following are selected publications for MPTN:

*Networking Blueprint Executive Overview* (GC31-7057)

*Multiprotocol Transport Networking: Technical Overview* (GC31-7073)

*Multiprotocol Transport Networking: Formats* (GC31-7074)

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**OS/390 Publications**

Following are selected publications for OS/390:

*OS/390 Information Roadmap* (GC28-1727)

*OS/390 MVS Initialization and Tuning Reference* (SC28-1752)

*OS/390 MVS System Commands* (GC28-1781)

*OS/390 Up and Running!* (GC28-1726)

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**IBM System/390 Open Systems Adapter Publications**

*Planning for the System/390 Open Systems Adapter Feature* (GC23-3870)

*Open Systems Adapter Support Facility User's Guide* (SC28-1855)

*Using the S/390 Open Systems Adapter Support Facility for MVS/ESA* (SC23-3872)

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**Related Publications**

*MVS Data Areas Volume 3* (LY28-1166)

*MVS/ESA Linkage Editor and Loader* (SC26-4510)

*MVS/ESA Planning: Sysplex Management* (GC28-1620)

*MVS/ESA Setting up a Sysplex* (GC28-1449)

*MVS/ESA SPL: Application Development Guide* (GGC28-1821)

*MVS Planning: Problem Determination and Recovery* (GC28-1629)

*SNA Network Product Formats* (LY43-0081)

*SNA Technical Overview* (GC30-3073)

*SNA Transaction Programmer's Reference for LU 6.2* (GC30-3084)

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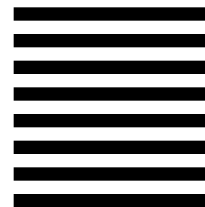
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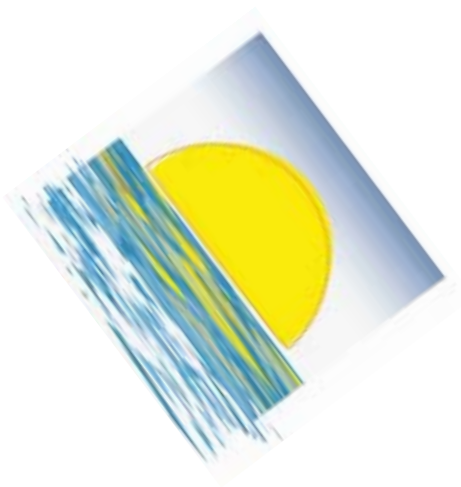




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