IBM

@server

iSeries

TCP/IP troubleshooting

Version 5 Release 3

IBM

@server

iSeries

TCP/IP troubleshooting

Version 5 Release 3

> **Note**
>
> Before using this information and the product it supports, be sure to read the information in "Notices," on page 119.

Contents

Chapter 1. TCP/IP troubleshooting

This topic is a centralized resource for finding answers to TCP/IP problems. You might have a general connectivity problem that is quickly identified or a more localized problem that requires in-depth consideration. Troubleshooting tools are provided below to help you solve the problem.

What's new for V5R3
This topic is organized in a new format. It also contains new and improved methods for troubleshooting TCP/IP.

Print this topic
Print or download a Portable Document Format (PDF) version of the TCP/IP troubleshooting documentation.

TCP/IP troubleshooter
Solve basic TCP/IP problems by using this interactive troubleshooter.

Troubleshooting tools and techniques
Use the troubleshooting tools and techniques that are available in OS/400® to solve TCP/IP problems.

Troubleshooting problems related to specific applications
If the problem is related to a specific application, such as Telnet or VPN, use this information to troubleshoot those applications.

Note: Read the "Code disclaimer information" for important legal information.

Code disclaimer information

This document contains programming examples.

IBM® grants you a nonexclusive copyright license to use all programming code examples from which you can generate similar function tailored to your own specific needs.

All sample code is provided by IBM for illustrative purposes only. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs.

All programs contained herein are provided to you "AS IS" without any warranties of any kind. The implied warranties of non-infringement, merchantability and fitness for a particular purpose are expressly disclaimed.

What's new for V5R3

This topic highlights changes to the TCP/IP troubleshooting topic.

New functions
- Watch support for tracing data
  Use the watch support parameters within the OS/400 trace commands to stop your traces in a timely manner. You can specify criteria within the trace parameters to automatically monitor and stop traces when certain events occur.
- Job trace enhancements

- You can simultaneously run multiple job trace sessions with generic job specification.
- You can simultaneously run multiple traces on the same job and collect cumulative information about the various components that are traced.
- Task dump using the PRTINTDTA command

  You can specify a task using the PRTINTDTA command to perform a task dump.

Topic redesign

The information has been reorganized. It now includes TCP/IP troubleshooting information in this format:

- An interactive TCP/IP troubleshooter that provides step-by-step instructions for solving common TCP/IP problems.
- A reference that lists many of the troubleshooting tools and techniques that OS/400 provides. Find instructions for using the tools from the character-based interface, from iSeries™ Navigator, or from both. Also, find tips for solving network problems.
- Troubleshooting information related to specific applications, such as Telnet or VPN.
- A server table that you can use to find out how servers, server jobs, job descriptions, and subsystems are mapped to one another. You can find out information about each server, such as the default port, the server type, and the start and end commands.

  As you troubleshoot TCP/IP you can refer to the server table for pertinent information, such as the name of the job for a particular server or to find out whether or not the server is shipped with a default value for the *Autostart servers* parameter.

What's new as of 24 January 2005

Miscellaneous changes have been made to the server table.

How to see what's new or changed

To help you see where technical changes have been made, this information uses:

- The ≫ image to mark where new or changed information begins.
- The ≪ image to mark where new or changed information ends.

To find other information about what's new or changed this release, see the Memo to Users 📖 .

Print this topic

To view or download the PDF version of this document, select TCP/IP troubleshooting (about 578 KB).

Saving PDF files

To save a PDF on your workstation for viewing or printing:

1. Right-click the PDF in your browser (right-click the link above).
2. Click **Save Target As...** if you are using Internet Explorer. Click **Save Link As...** if you are using Netscape Communicator.
3. Navigate to the directory in which you would like to save the PDF.
4. Click **Save**.

Downloading Adobe Acrobat Reader

You need Adobe Acrobat Reader to view or print these PDFs. You can download a copy from the Adobe Web site (www.adobe.com/products/acrobat/readstep.html) .

Chapter 2. TCP/IP troubleshooter

Use the interactive TCP/IP troubleshooter to solve basic TCP/IP troubleshooting problems.

Chapter 3. Troubleshooting tools and techniques

OS/400 offers several tools and techniques for troubleshooting TCP/IP on your server and the network. Use this list of tools and techniques to determine the most effective way to troubleshoot your TCP/IP problem.

Tools to verify your network structure
Use these tools to check basic network functions. For example, you can check the status of interfaces, routes, and connections, and you can determine whether the IP packets are reaching their destination.

Tools for tracing data and jobs
Find instructions for using various trace tools.

Troubleshooting tips
Use these tips to solve basic TCP/IP problems. Find out how to check logs and verify that your interfaces and other network components are active.

Advanced troubleshooting tools
Use these advanced problem solving techniques to solve complex problems. Most of these techniques require the collection of various debug information. In most situations, you should work with an IBM customer service representative when using these techniques.

Tools to verify your network structure

Netstat
Check the status of TCP/IP interfaces, routes, and connections.

Ping
Test connectivity between your local server and another node on the local or remote networks.

Trace route
Trace the route of IP packets to help you locate the source of the problem.

Netstat

Netstat is a tool for managing and monitoring the status of your server's interfaces, routes, and connections, and it is useful for troubleshooting TCP/IP problems. You can use Netstat whether you are using IPv4 or IPv6 connectivity on the network.

To access Netstat, select one of these interfaces:
- **Netstat from a character-based interface**
- **Netstat from iSeries Navigator**

Use Netstat from a character-based interface

From the character-based interface, use the Work with Network Status menu to work with the network status functions. You must have TCP/IP started on the server to use the menu options. The menu options are activated only when TCP/IP is started.

To start TCP/IP, type STRTCP on the command line, and press Enter.

To display the Work with Network Status menu, type NETSTAT or WRKTCPSTS on the command line, and press Enter.

Select one of these network components to begin troubleshooting:
- **Interfaces**
- **Routes**
- **Connections**

Interfaces

Verify that the appropriate IPv4 or IPv6 interfaces are configured on your server, and make sure they are active.

IPv4 interfaces

To display information about the IPv4 interfaces on your server:
1. Select option 1 on the Work with Network Status menu.

   You should have at least two active interfaces. Verify that these interfaces are active:
   - Loopback (127.0.0.1)
   - OS/400 IP address interface. This is the interface on your local server.
2. If these interfaces are not active, select option 9 (Start) to start the interfaces.

You might want to check the status of other interfaces. For example, if you are trying to Ping interfaces on other hosts on the network, you should verify that those interfaces are active.

IPv6 interfaces

To display information about the IPv6 interfaces on your server:
1. Select option 4 on the Work with Network Status menu.

   You should have at least five active interfaces. Verify that these interfaces are active:
   - Loopback (::1)
   - Link-local unicast. For example, fe80::260:94ff:feec:c4b
   - Link-local, all nodes group. For example, ff02::1
   - Node-local, all nodes group. For example, ff01::1
   - Solicited node. For example, ff02::1:ffec:c4b
2. If these interfaces are not active, select option 9 (Start) to start the interfaces.

You might want to check the status of other interfaces. For example, if you are trying to Ping interfaces on other hosts on the network, you should verify that those interfaces are active.

Routes

Your server needs routes to send packets to other servers or hosts. The route determines the path that a packet takes to its destination.

If you are trying to Ping an interface address and do not receive a reply, you should verify that your routes are configured and available. To communicate between a local and remote network, whether you are using IPv4 or IPv6 connectivity, you should have at least these two types of routes configured on the server:
- A direct route (*DIRECT) allows packets to travel between interfaces on the local network. It is automatically configured and activated by the server for each interface.

- A default route (*DFTROUTE) allows packets to travel to hosts that are not directly connected to your network. It provides a path for the packets to take. A default route identifies a specific node as a next hop to which the packets travel and then continue their trip to their final destination on a different network. The packets take the default route whenever there is no other (more specific) route matching the destination IP address.

Keep in mind that routes are unidirectional. Just because a packet from a client can get to your system does not mean that your system can send a packet to the client.

Verify that the appropriate IPv4 or IPv6 routes are configured on your server.

IPv4 routes

To display information about the IPv4 routes on your server:
1. Select option 2 on the Work with Network Status menu.
2. Select option 5 (Display details) for details about a specific route.

If you do not have a default route configured, you should configure it now.

To configure a default route, follow these steps:
1. At the command line, type CFGTCP to access the Configure TCP/IP menu.
2. Select option 2 (Work with TCP/IP Routes).
3. Select option 1 (Add) to go to the Add TCP/IP Route (ADDTCPRTE) display.
4. For the *Route destination* prompt, specify *DFTROUTE.
5. For the *Subnet mask* prompt, specify *NONE.
6. For the *Next hop* prompt, specify the appropriate IP address.

As an alternative, you can configure a default route using the **New IPv4 Route** wizard in iSeries Navigator. See the route information in iSeries Navigator for more information.

IPv6 routes

To display information about the IPv6 routes on your server:
1. Select option 5 on the Work with Network Status menu.
2. Select option 5 (Display details) for details about a specific route.

For IPv6, the Internet Protocol automatically configures default routes for each interface on the server. However, if you prefer, you can use the **New IPv6 Route** wizard in iSeries Navigator to create new routes yourself. See the route information in iSeries Navigator for more information.

Connections
Verify the status of your IPv4 and IPv6 connections.

For both IPv4 and IPv6 connections, you should verify the following:
- You should have at least one passive listening connection for each of the servers you need to use. A passive listening connection indicates that the connection is ready for work. Passive listening connections are indicated by an asterisk in the Remote Address and Remote Port columns. See the server table for a list of all the servers and their associated jobs and subsystems.
- The passive listening connections should not be ended. If they have been ended, then remote systems are unable to use the servers represented by the connections.

IPv4 connection status

To display information about the status of your IPv4 connections:

1. Select option 3 on the Work with Network Status menu.

2. If you need to end and restart the passive listening connection, you should do it by ending and restarting the server. At the command line, type ENDTCPSVR *myserver (where *myserver* is the server you want to end) and STRTCPSVR *myserver. If you are ending and restarting a host server, type ENDHOSTSVR *myserver (where *myserver* is the server you want to end) and STRHOSTSVR *myserver. See the server table to find out how to start and end various servers.

IPv6 connection status

To display information about the status of your IPv6 connections:

1. Select option 6 on the Work with Network Status menu.

2. If you need to end and restart the passive listening connection, you should do it by ending and restarting the server. At the command line, type ENDTCPSVR *myserver (where *myserver* is the server you want to end) and STRTCPSVR *myserver. See the server table to find out how to start and end various servers.

> **Note:** IBM provides a limited number of servers that support IPv6.

Use Netstat from iSeries Navigator

iSeries Navigator is a graphical user interface that provides dialog boxes and wizards to configure and manage TCP/IP. To use the network status functions in iSeries Navigator, follow these steps:

1. In iSeries Navigator, expand your **iSeries server —> Network —> TCP/IP Configuration**.

2. Expand **IPv4** to access the status of interfaces, routes, and connections for your IPv4 connectivity, or expand **IPv6** to access the status of interfaces, routes, connections, and the neighbor cache for your IPv6 connectivity.

3. Expand **Lines** to view a list of the physical lines and tunnel lines used for TCP/IP.

Select one of these network components to begin troubleshooting:

- **Interfaces**
- **Routes**
- **Connections**

Interfaces

Verify that the appropriate IPv4 or IPv6 interfaces are configured on your server, and make sure they are active.

IPv4 interfaces

To display information about the IPv4 interfaces on your server, follow these steps:

1. In iSeries Navigator, expand your **iSeries server —> Network —> TCP/IP Configuration —> IPv4**.

2. Select **Interfaces**.

   You should have at least two active interfaces. Verify that these interfaces are active:
   - Loopback (127.0.0.1)
   - OS/400 IP address interface. This is the interface on your local server.

3. If these interfaces are not active, right-click the IP address of the interface you want to start, and select **Start**.

You many want to check the status of other interfaces. For example, if you are trying to Ping interfaces on other hosts on the network, you should verify that those interfaces are active.

To display information about the IPv6 interfaces on your server, follow these steps:

1. In iSeries Navigator, expand your **iSeries server —> Network —> TCP/IP Configuration —> IPv6**.
2. Select **Interfaces**.

   You should have at least five active interfaces. Verify that these interfaces are active:
   - Loopback (::1)
   - Link-local unicast. For example, fe80::260:94ff:feec:c4b
   - Link-local, all nodes group. For example, ff02::1
   - Node-local, all nodes group. For example, ff01::1
   - Solicited node. For example, ff02::1:ffec:c4b
3. If these interfaces are not active, right-click the IP address of the interface you want to start, and select **Start**.

You might want to check the status of other interfaces. For example, if you are trying to ping interfaces on other hosts on the network, you should verify that those interfaces are active.

Routes

Your server needs routes to send packets to other servers or hosts. The route determines the path that a packet takes to its destination.

If you are trying to ping an interface address and do not receive a reply, you should verify that your routes are configured and available. To communicate between a local and remote network, whether you are using IPv4 or IPv6 connectivity, you should have at least these two types of routes configured on the server:

- A direct route (*DIRECT) allows packets to travel between interfaces on the local network. It is automatically configured and activated by the server for each interface.
- A default route (*DFTROUTE) allows packets to travel to hosts that are not directly connected to your network. It provides a path for the packets to take. A default route identifies a specific node as a next hop to which the packets travel and then continue their trip to their final destination on a different network. The packets take the default route whenever there is no other (more specific) route matching the destination IP address.

Keep in mind that routes are unidirectional. Just because a packet from a client can get to your server does not mean that your server can send a packet to the client.

To display information about the IPv4 routes on your server, follow these steps:

1. In iSeries Navigator, expand your **iSeries server —> Network —> TCP/IP Configuration —> IPv4**.
2. Select **Routes**.
3. Right-click the IP address in the Remote Network column of the route you want to see, and select **Properties**.

If you do not have a default route configured, you should configure it now. To configure an IPv4 default route, follow these steps:

1. In iSeries Navigator, expand your **iSeries server —> Network —> TCP/IP Configuration —> IPv4**.
2. Right-click **Routes** and select **New Route**.

3. Follow the wizard's instructions to create a new default route.

IPv6 routes

To display information about the IPv6 routes on your server, follow these steps:

1. In iSeries Navigator, expand your **iSeries server —> Network —> TCP/IP Configuration —> IPv6**.
2. Select **Routes**.
3. Right-click the IP address in the Destination Address column of the route you want to see, and select **Properties**.

For IPv6, the Internet Protocol automatically configures default routes for each interface on the server. However, if you prefer, you can use the **New IPv6 Route** wizard in iSeries Navigator to create new IPv6 routes yourself.

To configure an IPv6 default route, follow these steps:

1. In iSeries Navigator, expand your **iSeries server —> Network —> TCP/IP Configuration —> IPv6**.
2. Right-click **Routes** and select **New Route**.
3. Follow the wizard's instructions to create a new default route.

Connections
Verify the status of your IPv4 and IPv6 connections.

For both IPv4 and IPv6 connections, you should verify the following:

- You should have at least one passive listening connection for each of the servers you need to use. A passive listening connection indicates that the connection is ready for work. Passive listening connections are indicated by an asterisk in the Remote Address and Remote Port columns. See the server table for a list of all the servers and their associated jobs and subsystems.
- The passive listening connections should not be ended. If they have been ended, then remote systems are unable to use the servers represented by the connections.

IPv4 connection status

To display information about the status of your IPv4 connections, follow these steps:

1. In iSeries Navigator, expand your **iSeries server —> Network —> TCP/IP Configuration —> IPv4**.
2. Select **Connections**.
3. If you need to end and restart the passive listening connection, then you should do it by ending and restarting the server. To end and restart a server, follow these steps:
   a. In iSeries Navigator, expand your **iSeries server —> Network —> Servers**.
   b. Select **TCP/IP** for TCP/IP servers or select **iSeries Access** for host servers, right-click the server you want to end and restart, and select **End**.
   c. Right-click the server you want to restart, and select **Start**.

IPv6 connection status

To display information about the status of your IPv6 connections, follow these steps:

1. In iSeries Navigator, expand your **iSeries server —> Network —> TCP/IP Configuration —> IPv6**.
2. Select **Connections**.
3. If you need to end and restart the passive listening connection, then you should do it by ending and restarting the server. To end and restart a server, follow these steps:
   a. In iSeries Navigator, expand your **iSeries server —> Network —> Servers**.

b. Select **TCP/IP**, right-click the server you want to end and restart, and select **End**.

c. Right-click the server you want to restart, and select **Start**.

Note: IBM provides a limited number of servers that support IPv6.

Ping

Use the Packet Internet Groper (Ping) function to test IP-level connectivity between two TCP/IP capable interfaces or systems. Ping sends out a special IP packet to a specified host. If the destination host receives this special packet, it replies to you with a message which indicates to you that you can communicate with that host. You can use the Ping utility in two different ways:

- Use it to test your local TCP/IP configuration. For example, after setting up TCP/IP on the server for the first time you can use Ping to test the TCP/IP configuration.
- Use Ping to test your ability to communicate with other hosts on the local or remote networks.

Note: You can use Ping for both IPv4 and IPv6 connectivity.

To use the Ping utility, select one of these interfaces:

- **Ping from a character-based interface**
- **Ping from iSeries Navigator**

Ping from a character-based interface

Use the PING command to test your TCP/IP connectivity. For example, if you want to test whether your data is traveling from your server to an interface with IP address 10.5.5.1 and host name FIRSTHOST, type PING '10.5.5.1' or PING *firsthost* at the command line.

You can specify either the IP address or host name of the remote node you want to reach. Ping appends the local domain to a host name if a domain name is not specified or if a period (.) does not appear at the end of the specified host name.

A successful Ping means your packets are reaching the 10.5.5.1 interface. An unsuccessful Ping indicates there is a problem with the connectivity between your server and interface 10.5.5.1.

Use the Ping command to test connectivity to these three nodes:

- **Ping the loopback interface on your server**
  Ping the loopback interface to verify that your TCP/IP software is installed, started, and working properly.
- **Ping your own server**
  Ping the local interface to test whether packets can reach interfaces on your local area network (LAN).
- **Ping the interface on a network not directly attached to your local network**
  Ping the remote interface to test whether packets can leave your network and reach a remote system.

Ping the loopback interface on your server

Description

Ping the loopback interface to verify that your TCP/IP software is installed and working properly. You can perform the test without being connected to a physical line or network.

OS/400 reserves the IP address 127.0.0.1, the host name LOOPBACK, and the line description value of *LOOPBACK for verifying the software. Similarly for IPv6, OS/400 reserves the IP address ::1 and the line description *LOOPBACK6 for this purpose. However, the IPv6 loopback interface does not have a corresponding host name because host tables are currently not supported for IPv6.

At the command line, type these commands:
- For IPv4:
  `PING '127.0.0.1'` or `PING LOOPBACK`
- For IPv6:
  `PING '::1'`

See Ping parameters to fine-tune the Ping command to get the most accurate results.

Prompt on the Ping command by selecting F4 for complete details on the Ping parameters.

Failures might indicate these problems:
- The local host table does not have an entry for the IPv4 LOOPBACK host name and IP address of 127.0.0.1. Add the entry to the host table. This is only relevant for IPv4 because host tables do not currently support IPv6.

  To verify the host table entries, follow these steps:
  1. At the command line, type `CFGTCP` (Configure TCP/IP).
  2. Select option 10 (Work with TCP/IP Host Table Entries).
  3. Verify that the host table contains an entry for the LOOPBACK host name and IP address 127.0.0.1.
- The loopback interface is not active. To activate the loopback interface:
  1. At the command line, type `NETSTAT`.
  2. Select option 1 (Work with TCP/IP interface status) for IPv4 interfaces, or select option 4 (Work with IPv6 interface status) for IPv6 interfaces.
  3. Scroll down to find the loopback interface (127.0.0.1 or ::1), and select option 9 (Start) from the Work with TCP/IP interface status menu.
- TCP/IP has not been started. To start TCP/IP, type `STRTCP` (Start TCP/IP) at the command line.

See Common error messages to find out what to do about error messages you can receive after sending Ping requests.

Ping your own server

Ping the local interface to test whether packets can reach interfaces on your local area network (LAN). For IPv4, this is the IP address of a manually configured interface. For IPv6, this is the IP address of an automatically configured interface. It is also useful to ping an interface that is beyond your local server but attached to the LAN.

At the command line, type these commands:
- For IPv4:
  `PING 'nnn.nnn.nnn.nnn'` or `PING hostname`
- For IPv6:
  `PING 'x.x.x.x.x.x.x.x'`

See Ping parameters to fine-tune the Ping command to get the most accurate results.

Prompt on the Ping command by selecting F4 for complete details on the Ping parameters.

Failures might indicate these problems:
- The TCP/IP stack has not been activated on your server. At the command line, type `STRTCP` to start the stack.
- The local host table does not have an entry for the IPv4 host name and IP address. Add the entry to the host table. This is only relevant for IPv4 because host tables do not currently support IPv6.

  To verify the host table entries, follow these steps:
  1. At the command line, type `CFGTCP` (Configure TCP/IP).
  2. Select option 10 (Work with TCP/IP Host Table Entries).
  3. Verify that the host table contains an entry for the host name and IP address.
- Your line description or local interface has not been properly configured. The line should be varied on, and the interface should be started.
- If you are using IPv6, the IPv6 stack has not been activated on your server. If your IPv6 line and interfaces are properly configured, then the IPv6 stack should start when TCP/IP starts.
- If you are trying to ping an IPv6 address, the interface's lifetime might have expired. Check the status of the interface. If the lifetime has expired, the interface will not be active. If the interface is not active, check the interface properties and remove the limited lifetime definition from the interface properties, if necessary.

See Common error messages to find out what to do about error messages you might receive after sending Ping requests.

Ping the interface on a network not directly attached to your local network

Description

Ping a remote interface to test whether packets can leave your network and reach a remote system. Ping a remote domain name system (DNS) to make sure your server can resolve domain names.

Procedure

At the command line, type these commands:
- For IPv4:
  `PING 'nnn.nnn.nnn.nnn'` or `PING hostname`
- For IPv6:
  `PING 'x.x.x.x.x.x.x.x.x'`

See Ping parameters to fine-tune the Ping command to get the most accurate results.

Prompt on the Ping command by selecting F4 for complete details on the Ping parameters.

Results

Failures might indicate these problems:
- TCP/IP has not been started. To start TCP/IP, type `STRTCP` (Start TCP/IP) at the command line.
- Remote system is not available.

- Frame size problem — the frame size on the line description should be greater than or equal to the maximum transmission unit (MTU) of the interface.
- Network, router, next hop, or bridge problem.
- Default route is not configured on your server.
- Remote system or intermediate firewall has ICMP Echo requests or replies disabled.
- If you have multiple IP addresses and subnets, make sure IP datagram forwarding is set to *YES.
- If the interface you are trying to reach is configured to an Ethernet adapter, you might need to change the Ethernet standard in the Ethernet line description. Specify either the correct Ethernet standard or *ALL.
- DNS or host name table problem. For example, if the Ping works for the interface's IP address but not the host or domain name, you need to check your host table or DNS entries.

See Common error messages to find out what to do about error messages you might receive after sending Ping requests.

Ping parameters

The Ping command includes various parameters, such as packet length and wait time for a response. The default wait time of 1 second allows the remote system enough time to respond in most networks. However, if the remote system is far away or if the network is busy, increasing the wait time parameter can improve the results.

It is recommended that the parameter values be left at their default values. Be aware that if you do change them, a combination of large packet length and short wait time might not give the network enough time to transmit and receive the response, and time-outs can occur. If the network is not given enough time to transmit and receive the response, it can appear that you do not have connectivity to a system when, in fact, you do.

Ping from iSeries Navigator

iSeries Navigator is a graphical user interface that provides dialog boxes and wizards to configure and manage TCP/IP. Use the Ping utility in iSeries Navigator to test your TCP/IP connectivity.

1. In iSeries Navigator, expand your **iSeries server —> Network**.
2. Right-click **TCP/IP Configuration**, and select **Utilities —> Ping**.
3. Specify the IP address or host name. If you are testing by using the host name, you must select the Protocol for host names.
4. Click **Ping Now** to send the Ping. View the responses to your Ping in the list of results.

Use the Ping utility to test the reachability to these three nodes:
- **Ping the loopback interface on your server**
  Ping the loopback interface to verify that your TCP/IP software is installed and working properly.
- **Ping your own server**
  Ping the local interface to test whether packets can reach interfaces on your local area network (LAN).
- **Ping the interface on a network not directly attached to your local network**
  Ping the remote interface to test whether packets can leave your network and reach a remote system.

Ping the loopback interface on your server

Description

Ping the loopback interface to verify that your TCP/IP software is installed and working properly. You can perform the test without being connected to a physical line or network.

OS/400 reserves the IP address 127.0.0.1, the host name LOOPBACK, and the line description value of *LOOPBACK for verifying the software. Similarly for IPv6, OS/400 reserves the IP address ::1 and the line description *LOOPBACK6 for this purpose. However, the IPv6 loopback interface does not have a corresponding host name because host tables are currently not supported for IPv6.

Procedure

1. In iSeries Navigator, expand your **iSeries server —> Network**.
2. Right-click **TCP/IP Configuration**, and select **Utilities —> Ping**.
3. Specify the loopback interface IP address or host name. If you are testing by using the host name, you must select the Protocol for host names.
4. Click **Ping Now** to send the Ping. View the responses to your Ping in the list of results.

Results

Failures might indicate these problems:
- The local host table does not have an entry for the LOOPBACK host name and IP address of 127.0.0.1. Add the entry to the host table. This is only relevant for IPv4 because host tables do not currently support IPv6.

  To verify the host table entries, follow these steps:
  1. In iSeries Navigator, expand your **iSeries server —> Network**.
  2. Right-click **TCP/IP Configuration** and select **Host Table**.
  3. Verify that the host table contains an entry for the LOOPBACK host name and IP address 127.0.0.1.
- The loopback interface is not active. To activate the loopback interface:
  - For IPv4:
    1. In iSeries Navigator, expand your **iSeries server —> Network —> TCP/IP Configuration —> IPv4 —> Interfaces**.
    2. In the right pane, right-click the loopback interface (127.0.0.1) and select **Start**.
  - For IPv6:
    1. In iSeries Navigator, expand your **iSeries server —> Network —> TCP/IP Configuration —> IPv6 —> Interfaces**.
    2. In the right pane, right-click the loopback interface (::1) and select **Start**.
- TCP/IP has not been started.

See Common error messages to find out what to do about error messages you might receive after sending Ping requests.

Ping your own server

Description

Ping the local interface to test whether packets can reach interfaces on your local area network (LAN). For IPv4, this is the IP address of a manually configured interface. For IPv6, this is the IP address of an automatically configured interface.

Procedure

1. In iSeries Navigator, expand your **iSeries server —> Network**.
2. Right-click **TCP/IP Configuration**, and select **Utilities —> Ping**.
3. Specify the IP address or host name for one of the interfaces on your LAN. If you are testing by using the host name, you must select the Protocol for host names.

4. Click **Ping Now** to send the Ping. View the responses to your Ping in the list of results.

Failures might indicate these problems:

* The TCP/IP stack has not been activated on your server. At the command line, type `STRTCP` to start the stack.
* The local host table does not have an entry for the host name and IP address. Add the entry to the host table. This is only relevant for IPv4 because host tables do not currently support IPv6.

  To verify the host table entries, follow these steps:

  1. In iSeries Navigator, expand your **iSeries server —> Network**.
  2. Right-click **TCP/IP Configuration** and select **Host Table**.
  3. Verify that the host table contains an entry for the host name and IP address.
* Your line description or local interface has not been properly configured. The line should be varied on, and the interface should be started.
* If you are using IPv6, the IPv6 stack has not been activated on your server. If your IPv6 line and interfaces are properly configured, then the IPv6 stack should start when TCP/IP starts.
* If you are trying to ping an IPv6 address, the interface's lifetime might have expired. Check the status of the interface. If the lifetime has expired, the interface will not be active. If the interface is not active, check the interface properties and remove the limited lifetime definition from the interface properties, if necessary.

See Common error messages to find out what to do about error messages you might receive after sending Ping requests.

Ping the interface on a network not directly attached to your local network

Ping a remote interface to test whether packets can leave your network and reach a remote system. Ping a remote domain name system (DNS) to make sure your server can resolve domain names.

1. In iSeries Navigator, expand your **iSeries server —> Network**.
2. Right-click **TCP/IP Configuration**, and select **Utilities —> Ping**.
3. Specify the IP address or host name of a remote interface. If you are testing by using the host name, you must select the Protocol for host names.
4. Click **Ping Now** to send the Ping. View the responses to your Ping in the list of results.

Failures might indicate these problems:

* TCP/IP has not been started.
* Remote system is not available.
* Frame size problem — the frame size on the line description should be greater than or equal to the maximum transmission unit (MTU) of the interface.
* Network, router, next hop, or bridge problem.
* Default route is not configured on your server.
* Remote system or intermediate firewall has ICMP Echo Requests or Replies disabled.

- If you have multiple IP addresses and subnets, make sure IP datagram forwarding is set to *YES.
- If the interface you are trying to reach is configured to an Ethernet adapter, you might need to change the Ethernet standard in the Ethernet line description. Specify either the correct Ethernet standard or *ALL.
- DNS or host name table problem. For example, if the Ping works for the interface's IP address but not the host or domain name, you need to check your host table or DNS entries.

See Common error messages to find out what to do about error messages you might receive after sending Ping requests.

Common error messages

When you use the PING command to verify the connection to another host in the network, TCP/IP could give you an error message. Use this table to identify common error messages and to determine what you should do to solve the problems.

Error message	What you should do
Message ID TCP2670 `Not able to complete request. TCP/IP services are not available`	TCP/IP has not been started yet or has not completed starting. Use the NETSTAT command to see if TCP/IP is active.
Message ID TCP3423 `No TCP/IP service available`	• TCP/IP has not been started yet or has not completed starting. Use the NETSTAT command to see if TCP/IP is active. • All jobs might not be started in the QSYSWRK subsystem. Use the Work with Active Jobs (WRKACTJOB) command to verify that the QSYSWRK subsystem and related jobs are active. Specifically, the QTCPIP job must be active. If they are not active, look in the job log or system default output queue for any messages. **Note:** If you are using TCP/IP when the operating system is in restricted state the QTCPIP job is not active.
Message ID TCP3409 `Not able to establish connection with remote host system`	Check your configured interfaces, their related line descriptions, and the TCP/IP routes.
Message ID TCP3213 `Cannot reach remote system`	TCP/IP could not find a route to the requested destination. Check NETSTAT option 2 and verify that a *DFTROUTE or equivalent network route has been configured and is active.
Message ID TCP3206 `Remote host did not respond to VFYTCPCNN within 10 seconds for connection verification 1.`	• Your configuration is probably correct, but you do not get an answer back from the remote system. Ensure that the remote host is able to reach your system. Call the remote system operator and ask them to verify the connection to your system. • Check the host tables or remote name server (if you are using a name server) for both systems, and the TCP/IP interfaces and routes. The remote name server might not be able to serve you for some reason. • If you are using an Ethernet line, make sure you specified the correct Ethernet standard or *ALL.
Message ID TCP3202 `VFYTCPCNN:  Unknown host xxxxxx where` xxxxxx is the host name.	The host name could not be resolved to an IP address, either using the host table or a name server. Check the local host table or the remote name servers (if you are using a name server) for the remote host's entry. Verify that you can reach the remote name server by issuing a Ping to the remote name server.

Trace route

The trace route function allows you to trace the route of IP packets to a user-specified destination system so you can locate the problem. The route can involve many different systems along the way. Each system along the route is referred to as a hop. You can trace all hops along the route or specify the starting and ending hops to be traced.

Trace route displays a list of routers between your local network and the destination node. Examine the list of routers that the trace encounters to locate the problem on the network. For example, if the trace stops at a particular router, the problem might lie with that router or somewhere on the network after that point.

Use trace route for both IPv4 and IPv6 connectivity.

To access the trace route utility, select one of these interfaces:
- **Trace route from a character-based interface**
- **Trace route from iSeries Navigator**

Trace route from a character-based interface

To use trace route from the character-based interface, you can specify the destination system by system name or IP address. Either a valid IPv4 or IPv6 address will be accepted.

Specify any of these examples at the command line:
- `TRACEROUTE `*`SYSNAME`*
- `TRACEROUTE '10.1.1.1'`
- `TRACEROUTE '::1'`

Trace route from iSeries Navigator

To use trace route from iSeries Navigator, follow these steps:

1. In iSeries Navigator, expand your **iSeries server —> Network**.
2. Right-click **TCP/IP Configuration**, and select **Utilities —> Trace Route**.
3. Specify the IP address or host name. If you are testing by using the host name, you must select the Protocol for host names.
4. Click **Trace** to send the trace. View the list of routes that the trace discovered.

Tools for tracing data and jobs

Communications trace
See if your data is being transmitted correctly across the network. Use this tool to trace, format, and display your data.

Trace connection
Trace encrypted data to locate the source of the problem. Also, trace data that flows over connections such as virtual Ethernet and OptiConnect. These connections do not support the general communications trace function.

Trace TCP application
Trace data that pertains to specific TCP/IP applications.

Job trace
Trace data in any job to help identify your problem.

Advanced trace function: Watch support
Find out how to maximize the benefits of the trace functions.

Communications trace

Use the communications trace function to troubleshoot TCP/IP. Communications trace is a service function that allows the data that flows over a communications line, such as a local area network (LAN) or wide area network (WAN), to be captured for analysis. The communications trace traces only the packets received by or sent from OS/400. It does not trace other packets flowing on the network. Once the data has been traced, the raw data can be dumped into a stream file, or it can be formatted and placed in a spooled file to be displayed or printed.

If your system is multihomed, data might be sent on one interface and received on a different interface. In this situation, you should trace two communications lines to see packets that are sent and received.

Communications trace can be used for troubleshooting both IPv4 and IPv6 communications.

Use communications trace in these situations:
- Your problem analysis procedures do not give enough information about the problem.
- You suspect that a protocol violation is the problem.
- You suspect that line noise is the problem.
- You want to know if your application is transmitting information correctly across the network.
- You want to know if you have performance problems with network congestion or data throughput.

To use the CL commands to perform a communications trace, you must have *SERVICE special authority, or you must be authorized to the service trace function of Operating System/400® through iSeries Navigator. See the chapter on user profiles in iSeries Security Reference ![book icon] for more information about this type of authority.

The Trace connection function is an alternative method of getting a trace that is similar to a communications trace. See Trace connection for more information.

To use the communications trace function, perform these tasks:

Plan a communications trace
These preliminary steps are required before you can perform a communications trace.

Perform a communications trace
These are the steps required to perform the communications trace.

Additional communications trace functions
Read about more functions associated with the communications trace.

Plan a communications trace

Before starting to work with a communications trace, perform these tasks:

1. Obtain the name of the line description associated with the TCP/IP interface with which you are having the problem or which is used by the application or network with which you are having a problem. Use NETSTAT *IFC to determine the name of the line description associated with the interface.

2. Ensure that the line is varied on and that the TCP/IP interface associated with the line has been started so that TCP/IP data can be sent and received over the interface and the line. Use NETSTAT *IFC to verify that the interface is active.

What to do next

Perform a communications trace

Perform a communications trace

You must use CL commands in the character-based interface to perform a communications trace. Follow these steps to perform a communications trace:

1. Start a communications trace
2. End a communications trace
3. Dump a communications trace
4. Print a communications trace
5. View the contents of a communications trace
6. Read a communications trace
7. Delete a communications trace

Start a communications trace

This action starts a communications trace for the specified line or network interface description.

Note: A communications trace can no longer be used to trace data on a network server description (*NWS). Use the communications trace function to trace data on either a specific line (*LIN) or a network interface description (*NWI).

If your system is multihomed, data might be sent on one interface and received on a different interface. In this situation, you should trace two communications lines to see packets that are sent and received.

To start a communications trace, follow these steps:

1. (Optional step) To collect very large traces you need to set the value for maximum storage size on the system. This value represents the amount of storage, in megabytes, that the communications trace function can allocate to contain the trace data from all traces run. This can only be done through the System Service Tools (SST) menu.

   To specify the value for maximum storage size, follow these steps:

   a. At the command line, type STRSST (Start System Service Tools).
   b. Type your Service Tools user ID and password.
   c. Select option 1 (Start a Service Tool).
   d. Select option 3 (Work with communications trace).
   e. Press F10 (Change size).
   f. For the *New maximum storage size* prompt, specify a sufficient amount of storage for the traces you collect, and press Enter.
   g. Press F3 (Exit) to exit System Service Tools.

2. At the command line, type STRCMNTRC.
3. For the *Configuration object* prompt, specify the name of the line, such as TRNLINE.
4. For the *Type* prompt, specify the type of resource, either *LIN or *NWI.
5. For the *Buffer size* prompt, specify a sufficient amount of storage for the anticipated volume of data. For most protocols, 8 MB is sufficient storage. For a 10/100 Ethernet connection, 16 MB through 1 GB is sufficient. If you are uncertain, specify 16 MB for the maximum amount of storage allowed for the protocol.
6. For the *Communications trace options* prompt, specify *RMTIPADR if you want to limit the data collected to a trace of one remote interface. Otherwise, use the default value.
7. For the *Remote IP address* prompt, specify the IP address associated with the remote interface to which the trace data will be collected.

The communications trace continues until one of the following occurs:
- The ENDCMNTRC command is run.
- A physical line problem causes the trace to end.
- The *Trace full* prompt specifies *STOPTRC and the buffer becomes full.

What to do next

End a communications trace

End a communications trace
In order to format and display the trace, you must first end the trace. This action ends the trace but saves the data in the communications trace buffer.

To end a communications trace, follow these steps:
1. At the command line, type ENDCMNTRC.
2. For the *Configuration object* prompt, specify the same line you specified when you started the trace, such as TRNLINE.
3. For the *Type* prompt, specify the type of resource, either *LIN or *NWI.

What to do next
- Dump a communications trace (This is an optional step that might be useful to you.)
- Print a communications trace (Continue with this step if you prefer to print the raw data without dumping it).

Dump a communications trace
If you are using Internet Protocol version 6 (IPv6), you must dump the trace data into a stream file by following these steps. However, if you are using IPv4, this is an optional part of the communications trace process.

Dumping the data to a stream file offers several advantages. Consider these advantages when deciding whether to use this function:
- You can run new traces without losing data from the existing trace.
- You can run an initial program load (IPL) on the server and still keep the raw trace data in the stream file.
- You can format trace data multiple times, even after you run an IPL or delete the prior trace buffer. If you do not dump the raw data to a stream file and you delete the trace or IPL the server, you will not be able to format the trace again.
- You can use a custom formatter to analyze the trace data.

To dump a communications trace, follow these steps:
1. Create a directory, such as mydir. See the CRTDIR (Create Directory) command description in the Control Language (CL) topic, to create a directory.
2. At the command line, type DMPCMNTRC.
3. For the *Configuration object* prompt, specify the same line you specified when you started the trace, such as TRNLINE.
4. For the *Type* prompt, specify the type of resource, either *LIN or *NWI.
5. For the *To stream file* prompt, specify the path name, such as /mydir/mytraces/trace1.

What to do next

Print a communications trace

Print a communications trace

You can print the communications trace data from two different sources, depending on how you collected the trace. You can print from the raw data you collected, or you can print from a stream file in which you previously dumped the raw data.

Note: To print the communications trace data from a stream file, you must have Java™ (5722JV1) installed on the system.

This action writes the communications trace data for the specified line or network interface description to a spooled file or an output file.

Print from raw data collected

If you collected the raw data without dumping it, follow these steps to print the data:

1. At the command line, type `PRTCMNTRC`.
2. For the *Configuration object* prompt, specify the same line you specified when you started the trace, such as `TRNLINE`, and press Enter.
3. For the *Type* prompt, specify the type of resource, either `*LIN` or `*NWI`.
4. For the *Character code* prompt, specify either `*EBCDIC` or `*ASCII`. You should print the data twice, once specifying `*EBCDIC` and then specifying `*ASCII`.
5. For the *Format TCP/IP data* prompt, type `*YES`, and press Enter twice.
6. Perform steps 1 through 5 again, but specify the other character code.

Print from stream file

If you dumped the data to a stream file, follow these steps to print the data:

1. At the command line, type `PRTCMNTRC`.
2. For the *From stream file* prompt, specify the path name, such as `/mydir/mytraces/trace1`, and press Enter.
3. For the *Character code* prompt, specify `*EBCDIC` or `*ASCII`. You should print the data twice, once specifying `*EBCDIC` and then specifying `*ASCII`.
4. Perform steps 1 through 3 again, but specify the other character code.

What to do next

View the contents of a communications trace

View the contents of a communications trace

To view the contents of a communications trace, follow these steps:

1. At the command line, specify `WRKSPLF`.
2. On the **Work with Spooled File** dialog, press F11 (View 2) to view the date and time of the spooled file with which you want to work. If `More...` appears on the display and you need to continue searching for the spooled file, page forward or backward through the list of files; otherwise, continue with the next step.
3. Specify 5 in the Opt column next to the spooled file you want to display. The last files contain the most recent communications traces.
4. Verify that this is a communications trace for the line traced and that the times that the trace started and ended are correct.

What to do next

Read a communications trace

Read a communications trace

The communications trace displays several types of information. The first part of the communications trace summarizes the prompts that you specified when you started the trace, such as the name of the *Configuration object*. Page down to find a list of items, such as *Record Number* and *S/R*, with associated definitions. These items represent titles that are later used to identify sections of the communications trace data. It might be useful to refer back to this list as you read the trace data. This figure shows the preliminary information in a communications trace.

```
                          Display Spooled File
File . . . . . :   QTCPPRT                              Page/Line    1/1
Control . . . . .    _____                             Columns      1 - 130
Find . . . . . .
*...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8....+....9...
  COMMUNICATIONS TRACE      Title: 'BLANK                    01/15/02   15:34:46
    Trace Description  . . . . . :   'BLANK
    Configuration object . . . . :   TRNLINE
    Type . . . . . . . . . . . . :   1                1=Line, 2=Network Interface
                                                      3=Network server
    Object protocol  . . . . . . :   TRN
    Start date/Time  . . . . . . :   01/15/02  15:33:31.896
    End date/Time  . . . . . . . :   01/15/02  15:33:40.468
    Bytes collected  . . . . . . :   9060
    Buffer size  . . . . . . . . :   16384            kilobytes
    Data direction . . . . . . . :   3                1=Sent, 2=Received, 3=Both
    Stop on buffer full  . . . . :   N                Y=Yes, N=No
    Number of bytes to trace
      Beginning bytes  . . . . . :   *CALC            Value, *CALC, *MAX
      Ending bytes   . . . . . . :   *CALC            Value, *CALC
    Select Trace Options:
    ------------------
    Remote Controller  . . . . . :                    Name,  *ALL
    Remote MAC Address . . . . . :                    Value, *ALL
    Remote SAP . . . . . . . . . :                    Value, *ALL
    Local SAP  . . . . . . . . . :                    Value, *ALL
    IP Identifier  . . . . . . . :                    Value, *ALL
    Remote IP Address  . . . . . :                    Value, *ALL
    Format Options:
    ------------
    Controller name  . . . . . . :   *ALL             *ALL, name
    Data representation  . . . . :   1                1=ASCII, 2=EBCDIC, 3=*CALC
    Format SNA data only . . . . :   N                Y=Yes, N=No
    Format RR, RNR commands  . . :   N                Y=Yes, N=No
    Format TCP/IP data only  . . :   Y                Y=Yes, N=No
      IP address . . . . . . . . :   *ALL               *ALL, address
      IP address . . . . . . . . :   *ALL               *ALL, address
      IP port  . . . . . . . . . :   *ALL               *ALL, IP port
    Format UI data only  . . . . :   N                Y=Yes, N=No
    Format MAC or SMT data only  :   N                Y=Yes, N=No
    Format Broadcast data  . . . :   Y                Y=Yes, N=No
  COMMUNICATIONS TRACE       Title: 'BLANK                   01/15/02   15:34:46
  Record Number . . . . .   Number of record in trace buffer (decimal)
  S/R . . . . . . . . . .   S=Sent    R=Received    M=Modem Change
  Data Length . . . . . .   Amount of data in record (decimal)
  Record Status . . . . .   Status of record
  Record Timer  . . . . .   Time stamp. Based on communications hardware, the time
                            stamp will be either:
                              1.  10 microsecond resolution time of day
                                  (HH:MM:SS.NNNNN) based on the system time when the
                                  trace was stopped
                              2.  100 millisecond resolution relative timer with
                                  decimal times ranging from 0 to 6553.5 seconds
  Data Type . . . . . . .   EBCDIC data, ASCII data or Blank=Unknown
  Controller name . . . .   Name of controller associated with record
  Command . . . . . . . .   Command/Response information
  Number sent . . . . . .   Count of records sent
  Number received . . . .   Count of records received
  Poll/Final  . . . . . .   ON=Poll for Commands, Final for Responses
  Destination MAC Address . . . . . Physical address of destination
  Source MAC Address  . . . . . . . Physical address of source
  DSAP  . . . . . . . . .   Destination Service Access Point
  SSAP  . . . . . . . . .   Source Service Access Point
  Frame Format  . . . . .   LLC (Logical Link Control) or MAC (Media
                            Access Control)
F3=Exit   F12=Cancel   F19=Left   F20=Right   F24=More keys
```

After reading the preliminary information, page down to the actual TCP/IP data in the communications trace. A row of titles, starting with *Record Number*, identifies each section of the data records. Each record number represents a frame, and it includes information that should help you debug the problem that you are having with TCP/IP on this server or in the associated network.

If you find an asterisk (*) after a record number, for example, 31*, be aware that the asterisk represents missing trace data. This missing trace data appears when communications trace records are dropped. Communications trace data is collected by the input/output processor (IOP). If the communications line is very busy, the IOP prioritizes all the network traffic and gives a higher priority to the data path input/output than to the communications trace information. Under these circumstances, the IOP might drop some of the communications trace records. This can indicate that the IOP is not capable of handling the excessive speeds or traffic on the network.

If your communications trace is missing data, consider these options:
- Simply acknowledge that your communications line is busy and that frames will be missing from your communications trace.
- Investigate the traffic on the communications line to determine if there is traffic that can be moved to another line or TCP/IP interface.

This figure shows the TCP/IP data portion of the communications trace.

You have completed the basic steps in the communications trace process. However, if you want to start a new trace on the same line, you must first delete the existing communications trace.

What to do next

Delete a communications trace

Delete a communications trace

You must delete a communications trace before starting a new trace on the same line. The communications trace can be deleted after the trace has ended. This action deletes the communications trace buffer for the specified line or network interface description.

To delete a communications trace, follow these steps:
1. At the command line, type DLTCMNTRC.
2. For the *Configuration object* prompt, specify the name of the line, such as TRNLINE.
3. For the *Type* prompt, specify the type of resource, either *LIN or *NWI.

Go to Additional communications trace functions to find out how to check the status of a trace and determine storage space.

Additional communications trace functions

The Check Communications Trace (CHKCMNTRC) command and Check Communications Trace (QSCCHKCT) API provide additional communications trace functions.

Check a communications trace

You might want to find out if communications traces currently exist on your server. Use the Check Communications Trace (CHKCMNTRC) command to return the communications trace status for a specific line or network interface description, or for all of the traces of a specific type that exist on the server. The status is returned to you in a message.

To check the status of a communications trace, follow these steps:
1. At the command line, type CHKCMNTRC.
2. For the *Configuration object* prompt, specify the name of the line, such as TRNLINE, or specify *ALL if you want to check the status of all traces for a specific type.
3. For the *Type* prompt, specify the type of resource, either *LIN or *NWI.

Programmatically check storage space

Use the Check Communications Trace (QSCCHKCT) API to programmatically check the maximum space allocated for traces and the sizes, in bytes, of all traces in active or stopped status on the server. See the Application Programming Interfaces (API) topic for more information about the Check Communications Trace (QSCCHKCT) API.

Trace connection

The Trace connection (TRCCNN) command is a service function that provides output similar to the general communications trace. The TRCCNN SET (*ON) TRCTYPE(*IP) SIZE(128000) traces data at the Licensed Internal Code TCP/IP layer.

Trace connection is useful for situations in which the general communications trace is not available or not effective. For example:
- You have TCP applications that use Secure Sockets Layer (SSL) or you use IP security. In either case, the data that flows over the communications line is encrypted. Therefore, the general communications trace might not be helpful if you need to see the data. Trace connection traces the data before encryption and after decryption and therefore, can be used when the general communications trace is not effective.
- You are using TCP/IP over a connection that does not support the general communications trace function, such as Loopback, OptiConnect, or Twinaxial. In this situation, you can use the trace connection as an alternative method for generating a trace.

To use the CL commands to perform a trace connection, you must have *SERVICE special authority, or be authorized to the Service Trace function of Operating System/400 through iSeries Navigator. See the chapter on user profiles in iSeries Security Reference for more information about this type of authority.

See the TRCCNN (Trace Connection) command description in the CL command topic for parameters and examples associated with this command.

Trace TCP application

The Trace TCP application (TRCTCPAPP) command is used to trace information that pertains to specific TCP/IP application servers. This function is typically used at the request of IBM service personnel. For troubleshooting information related to some of these specific application servers, see Troubleshooting problems related to specific applications.

TRCTCPAPP is supported by these applications:
- Certificate Services server
- Directory Services server
- Distributed data management (DDM/DRDA) running over TCP/IP
- File Transfer Protocol (FTP)
- Host servers
  - Central server
  - Database server
  - Data queue server
  - Network print server
  - Remote command server
  - Server mapper
  - Signon server
- HTTP server (Apache)
- Layer Two Tunneling Protocol (L2TP)
- Packet rules
- Point-to-Point Protocol (PPP)
- Quality of Service (QoS)
- Simple Mail Transfer Protocol (SMTP) client and server
- Simple Network Time Protocol (SNTP) client and server
- Telnet
- Virtual Private Network (VPN) server
- Virtual terminal APIs

To use the CL commands to perform this type of trace, you must have *SERVICE special authority, or be authorized to the service trace function of Operating System/400 through iSeries Navigator. See the chapter on user profiles in iSeries Security Reference ⬛ for more information about this type of authority.

See the Trace TCP application (TRCTCPAPP) command description in the CL command topic for parameters and examples associated with this command.

Job trace

Job trace is a problem analysis tool that allows you to look at what any application is doing. Use job trace as a first step in locating a problem with an application. You can turn on job trace in any job and see the call and return flows of that application. Job trace records the raw data and then stores it in a set of database files.

The job trace is performed using a series of CL commands, such as STRTRC (Start Trace), ENDTRC (End Trace), and PRTTRC (Print Trace). Starting a job trace consumes relatively few system resources.

However, ending the job trace and printing the job trace require more time and processing resources. If you have a limited amount of interactive capability available on your system, you might want to submit the ENDTRC and PRTTRC to batch.

Note that if the application code is created with OPTIMIZE(40), the optimization disables call and instruction tracing. Although you can specify LICOPT (CallTracingAtHighOpt) to enable job call tracing, the optimization might still disable some calls. Therefore, job trace might not be effective when using OPTIMIZE(40).

Use job trace in these situations:
- You want to debug any job on your system. See the server table to understand the correlation between the servers and the applications and jobs they represent.
- You want to troubleshoot your sockets application.
- You are developing an application for OS/400 and encounter a problem. By tracing the application, you can identify the problem.

To use the CL commands to perform a job trace, you must have *SERVICE special authority, or be authorized to the service trace function of Operating System/400 through iSeries Navigator. See the chapter on user profiles in iSeries Security Reference 📖 for more information about this type of authority.

Use the following job trace instructions as a guide. The example demonstrates how to use job trace to troubleshoot a sockets application. Sockets adds information to the job trace output when errors are returned on the sockets APIs. You might need to specify different parameters, depending on the type of application you are troubleshooting. Note that communications trace is also useful when troubleshooting sockets applications.

To trace a job, follow these steps:
1. Identify the job that needs to be traced. Use the server table as a reference in identifying jobs and their corresponding servers.
2. Start a job trace
3. Re-create the problem
4. End a job trace
5. Print a job trace
6. Delete a job trace

See Advanced job trace functions for more information.

Start a job trace

This action starts a job trace for one or more jobs. You can start any number of trace sessions, but active trace session identifiers must be unique across the system.

To start a job trace, follow these steps:
1. At the command line, type STRTRC (Start Trace), and press F4 (Prompt).
2. For the *Session ID* prompt, specify a meaningful session identifier, such as `mytrace`. You will use this session identifier later, to specify the trace you want to end or print.
3. For the *Jobs* parameter, you need to specify values for these three prompts. Remember that you cannot specify the value *ALL for all three of these prompts. At least one of the prompts must contain a value other than *ALL.
   - For the *Jobs, Job Name* prompt, choose one of these options:
     - To trace only the job that issued the Start trace (STRTRC) command, type * .

- To trace a specific job, specify the name of the job you want to trace, such as *job*. You can specify up to ten jobs.
- To trace a set of jobs that all begin with the same string, specify the job name in a manner such that it is not a specific job, such as *job**. This traces all jobs that begin with the prefix JOB. See Start multiple generic traces to find out different ways to format a generic job trace.
- To trace all the jobs, type *ALL. However, tracing all jobs is not recommended.
- For the *Jobs, User* prompt, specify the name of the user of the job, such as USER. Other valid values include USER* and *ALL. However, tracing all users is not recommended.
- For the *Jobs, Number* prompt, type *ALL or the job number. If you type *ALL, the *Job Name* prompt specification is considered a generic job name.

4. For the *Thread ID to include* prompt, type *ALL unless you want to trace a specific thread.
5. For the *Maximum storage to use* prompt, specify a value that you think will be large enough to collect the trace information you need. The amount of storage used for the trace buffer depends on how long the trace runs and how busy the job being traced is. The default value is 10000 KB (10 MB).
6. For the *Trace full* prompt, type *WRAP or *STOPTRC, depending on what you want to happen when the trace buffer gets full. If you want to collect trace information until the problem occurs, type *WRAP; the older trace information is overlaid with newer trace information when the buffer is full. If you do not want the trace information to be overlaid, type *STOPTRC.
7. For the *Trace type* prompt, type *ALL to store all of the job trace data.
8. For the *Trace type: Component* prompt, type *SOCKETS.
9. For the *Trace type: Trace level*, specify *VERBOSE.
10. For the *Trace filter* prompt, type *NONE. If you want to use a filter to collect specific information in the trace, specify the name of the trace filter, such as `tracefiltername`. If you have not already created a trace filter, do so by using the Add Trace Filter (ADDTRCFTR) command. The trace filter applies to the *FLOW trace only.
11. Press Enter. You should receive the message STRTRC session ID MYTRACE successfully started.

What to do next

Re-create the problem

Re-create the problem

Re-create the problem by repeating the series of actions you previously took.

What to do next

End a job trace

End a job trace

This action ends the trace and stores the collected trace records in a set of database files. The stored trace records stay in the database files until you run the Delete Trace Data (DLTTRC) command.

To end a job trace, follow these steps:
1. At the command line, type ENDTRC, and press F4 (Prompt).
2. For the *Session ID* prompt, specify the name of the trace you want to end, such as *mytrace*.
3. For the *Data option* prompt, type *LIB to store the trace data in database files so it can be printed later.
4. For the *Data library* prompt, specify the name of the library in which the trace data will be stored, such as *lib*. The library must exist prior to running the ENDTRC command. If you do not specify a specific library, the default library QGPL is used.
5. Press Enter. You should receive the message ENDTRC session ID MYTRACE successfully saved into library LIB.

Note: The ENDTRC (End Trace) process can use a substantial amount of processing time and resources. If you have a limited amount of interactive capability available on your system, you might want to submit the ENDTRC to batch.

What to do next

Print a job trace

Print a job trace

This action formats and writes the stored trace records to a spooled output file or to a database output file.

To print a job trace, follow these steps:
1. At the command line, type `PRTTRC` (Print Trace), and press F4 (Prompt).
2. For the *Data member* prompt, type `mytrace`.
3. For the *Data library* prompt, type `lib`. This is the same library you specified under the ENDTRC command, and press Enter.
4. Outfile support allows you to programmatically process the trace information that was collected. This is most useful if you want to develop your own custom trace output formatter. See the Print Trace Data (PRTTRC) command description in the CL command topic for more information about the *Outfile* parameter.

Note: The PRTTRC (Print Trace) process can use a substantial amount of processing time and resources. If you have a limited amount of interactive capability available on your system, you might want to submit the PRTTRC to batch.

What to do next

Delete a job trace

Delete a job trace

This action deletes the trace records that were stored in the database files as a result of the ENDTRC command.

To delete a job trace, follow these steps:
1. At the command line, type `DLTTRC` (Delete Trace Data), and press F4 (Prompt).
2. For the *Data member* prompt, type `mytrace`.
3. For the *Data library* prompt, type `lib`. This is the same library you specified under the ENDTRC command.
4. Press Enter. You should receive the message `Removing data member name MYTRACE from database files.`

See Advanced job trace functions for more information.

See Watch support to learn about watch support parameters that enable you to automatically monitor traces and stop the traces in a timely manner.

Advanced job trace functions

Job trace offers some advanced functions that enhance the results of the job trace.

  Multiple generic traces
  Run multiple generic job traces simultaneously.

Trace type information is cumulative
Enhances the value of your trace output and allows you to simultaneously run multiple job traces on the same jobs.

Multiple generic traces

The generic job trace allows you to trace jobs in several different ways. You can designate specific criteria to get precise results from the trace. The generic job trace allows you to:

- Start an unlimited number of job traces. This allows you to trace more than one job at a time. This capability has additional considerations if you are using the TRCTYPE prompt for tracing additional components. See Trace type information is cumulative for more information.
- Start more than one trace session that has the generic job specification.

These examples show several different ways to specify a generic job name for your trace. These are all valid formats. Note that in all cases, the job number is *ALL:

- Generic job name, full user name:
  STRTRC SSNID(TEST) JOB((*ALL/USER/JOB*))
- Full job name, generic user name:
  STRTRC SSNID(TEST) JOB((*ALL/USER*/JOB))
- Full job name, full user name:
  STRTRC SSNID(TEST) JOB((*ALL/USER/JOB))
- Generic job name, generic user name:
  STRTRC SSNID(TEST) JOB((*ALL/USER*/JOB*))

Trace type information is cumulative

You can simultaneously run multiple traces on the same job. In addition, you can view the results of all the traces within the output of each trace.

If you are tracing the same job in more than one trace session, and you are using the Trace type prompt, the Trace type component selections will accumulate and the results of all trace types will be included in the output of all of the trace sessions.

For example, you and your colleague both need to troubleshoot problems on the same Web server jobs. You start a job trace using the Start trace (STRTRC) command with these parameters: JOBTRCTYPE(*ALL) and TRCTYPE(*HTTP). Some time later, your colleague starts a trace using the STRTRC command with these parameters: JOBTRCTYPE(*ALL), and TRCTYPE(*SOCKETS).

Both traces contain the call and return flow for the period of time each trace is active. However, the additional TRCTYPE data that is collected is cumulative; that is, as new traces are started the trace types accumulate and the requested trace type information is collected until all traces are ended.

When your trace starts, it is collecting only the *HTTP trace type information. When your colleague's trace starts, your output and your colleagues' output both contain the same type of information; they contain both the *HTTP trace type information and the *SOCKETS trace type information. Even if you end your trace shortly after your colleague begins a trace, your colleague's trace continues to collect both *HTTP and *SOCKETS trace type information until that trace ends.

Advanced trace function: Watch support

Watch support enhances the trace functions in OS/400 by automatically monitoring and ending traces when certain predetermined criteria are met. This prevents the loss of valuable trace data and reduces the amount of time you need to spend monitoring traces.

For example, when you start a trace on a busy server, it is possible for large amounts of trace data to be collected very quickly so that the trace buffer wraps, overlaying previous trace data. By the time you can manually determine the problem has occurred and stop the trace, the previous trace data needed to solve

the problem has been overlaid. The result is lost trace data. The watch function solves this problem by allowing you to set certain watch criteria using the watch parameters. When a failure occurs, there is often a message or a Licensed Internal Code log that is generated at the time of the failure. You can specify which messages or Licensed Internal Code logs should be monitored during the trace collection, and when they occur the server automatically ends the trace.

Find out how to use watch support with the OS/400 trace functions:

- Scenarios: Use watch support with traces
  See two scenarios that demonstrate how you can use the watch function when you perform a trace.
- Watch parameters
  See the parameters that you can use for watch support.
- Watch exit programs
  See the exit programs that are used for the watch function, including an example exit program.
- Traces that use the watch parameters
  See a list of the OS/400 trace functions that use watch support.

Scenarios: Use watch support with traces

You can enhance the OS/400 trace functions, such as communications trace and job trace, by using watch support. See these scenarios for more information:

- Use watch support with a communications trace
- Use watch support with a job trace

Use watch support with a communications trace

Situation

You notice that Telnet sessions are dropping intermittently on the system, but nothing else seems to be wrong. When the sessions drop, message TCP2617 is sent to the QSYS/QSYSOPR message queue.

Solution

You need to perform a communications trace using watch support so that the trace is automatically stopped when the TCP2617 message is sent to QSYSOPR. This allows you to capture only the data that you need to analyze the problem and prevents the trace from running longer than necessary.

Steps

To perform the communications trace using watch support, follow these steps:

1. Start the communications trace:
    a. At the command line, type STRCMNTRC and press F4.
    b. For the *Configuration object* prompt, specify the name of the line, such as TRNLINE.
    c. For the *Type* prompt, specify the type of resource, such as *LIN.
    d. For the *Watch for message, Message identifier* prompt, type TCP2617.
    e. For the *Watched message queue, Message queue* prompt, type *SYSOPR. This ensures that the communications trace stops running when the TCP2617 message is sent to the QSYSOPR message queue.
    f. For the *Length of time to watch* prompt, type 2880. The value 2880 indicates that the communications trace runs for a maximum of two days (2880 minutes) if the message does not occur. When two days elapse, the trace ends. If you do not want the trace to end if the message does not occur during the specified time, specify *NOMAX for this parameter.
2. Verify that the watch support started:
    a. At the command line, type DSPLOG and press F4.
    b. For the *Log* prompt, type QHST.

You should see this message: Job *jobnumber*/*user*/QSCCMN*xxxx* started on mm/dd/yy at hh:mm:ss in subsystem QUSRWRK in QSYS. Job entered system on mm/dd/yy at hh:mm:ss where user is the name of the user that runs the STRCMNTRC command and where xxxx indicates a unique identifier for the watch job. Note that CMN in the middle of the job name indicates that the watch job was started by the STRCMNTRC command.

3. Verify that the watch support is running:
   At the command line, type WRKACTJOB SBS(QUSRWRK).

   You should see the watch job running in the QUSRWRK subsystem. The job is typically in DEQW status if the watched message has not been sent.

4. Once the TCP2617 message is sent to the QSYS/QSYSOPR message queue, you should verify that the trace has ended:
   At the command line, type DSPMSG MSGQ(*SYSOPR).

   You should see the CPI3999 message which indicates that the STRCMNTRC command was ended because of reason code 02. Reason code 02 indicates that Watch for event criteria met because of message id TCP2617 found in QSYS/QSYSOPR.

5. Format the trace output using the Print Communications Trace (PRTCMNTRC) command to analyze the collected trace data. You might see that information is sent to the remote system but a response is not sent back. This indicates that the problem lies outside the local server.

Use watch support with a job trace

Situation

You write a sockets server application that occasionally fails. When the application fails, the TCP3B04 socket API error is sent to the job log.

Solution

You need to perform a job trace using watch support so that the trace is automatically stopped when the TCP3B04 error is sent to the job log. This allows you to capture only the data that you need to analyze the problem and prevents the trace from running longer than necessary.

Steps

To perform the job trace using watch support, follow these steps:
1. Start the job trace.
   a. At the command line, type STRTRC and press F4.
   b. For the *Session ID* prompt, specify a meaningful session identifier, such as *mytrace*.
   c. For the *Jobs* parameter, specify these values:
      • For the *Jobs, Job Name* prompt, type the job name, such as SOCKETAPP.
      • For the *Jobs, User* prompt, specify the user ID, such as *user*.
      • For the *Jobs, Number* prompt, type *ALL.
   d. For the *Watch for message, Message identifier* prompt, type TCP3B04.
   e. For the *Watched message queue, Message queue* prompt, type *JOBLOG. This ensures that the communications trace stops running when the TCP3B04 message is sent to the job log.
   f. For the *Watched job* parameter, specify these values:
      • For the *Jobs, Job Name* prompt, type SOCKETAPP.
      • For the *Jobs, User* prompt, specify the user ID, such as *user*.
      • For the *Jobs, Number* prompt, type *ALL.
2. Verify that the watch support started:
   a. At the command line, type DSPLOG and press F4.
   b. For the *Log* prompt, type QHST.

You should see this message: `Job jobnumber/user/QSCSTTxxxx started on mm/dd/yy at hh:mm:ss in subsystem QUSRWRK in QSYS. Job entered system on mm/dd/yy at hh:mm:ss` where user is the name of the user that runs the STRTRC command and where xxxx indicates a unique identifier for the watch job. Note that STT in the middle of the job name indicates that the watch job was started by the STRTRC command.

3. Verify that the watch support is running:
   At the command line, type `WRKACTJOB SBS(QUSRWRK)`.

   You should see the watch job running in the QUSRWRK subsystem. The job is usually in DEQW status if the watched message has not been sent.

4. Once the TCP3B04 message is sent to the jobnumber/user/SOCKETAPP job log, you should verify that the trace has ended:
   At the command line, type `DSPMSG MSGQ(*SYSOPR)`.

   You should see the CPI3999 message which indicates that the STRTRC command was ended because of reason code 02. Reason code 02 indicates that `Watch for event criteria met because of message id TCP3B04 found in jobnumber/user/SOCKETAPP`.

5. Format the trace output using the Print Trace (PRTTRC) command to analyze the data you collected.

Watch parameters

The trace commands have the following parameters to specify the watch criteria. See the trace commands help for the descriptions of each parameter:

- Watch for message (WCHMSG)
- Watched message queue (WCHMSGQ)
- Watched job (WCHJOB)
- Watch for LIC log entry (WCHLICLOG)
- Length of time to watch (WCHTIMO)
- Trace program (TRCPGM)
- Time interval (TRCPGMITV)

Watch exit programs

You can specify these exit programs in the trace program parameter to extend the capability of the watch function. Click these links to learn how you can implement these exit programs:

- Exit Program for Watch for Trace Event
- Trace Exit Program for Trace TCP Application command

See the example program that you can use for both of these exit programs.

Watch exit program example

This is sample code for a watch trace exit program. It is written in iSeries Command Language (CL).

Use this exit program as a starting point to help you create your own watch trace program. You can modify the code to allow the program to perform additional function. Find out how you can extend the capability of the watch function using the watch exit program example.

Note: Read the "Code disclaimer information" on page 1 for important legal information.

```
/*********************************************************/
/* THIS IS A SAMPLE CODE FOR WATCH FOR TRACE EVENT       */
/* FACILITY                                              */
/*                                                       */
/* FUNCTION: WHEN THE TRACE OPTION SETTING PARAMETER     */
/* INDICATES THAT A MESSAGE ID MATCHED WITH THE ONE BEING*/
/* WATCHED, THIS PROGRAM WILL PRINT THE HISTORY LOG AND  */
/* STOP THE TRACE COMMAND EXECUTION. OTHERWISE, THIS     */
/* WILL INDICATE TO CONTINUE WITH THE EXECUTION.         */
```

```
/*                                                       */
/* NOTE: MYLIB/MYOBJECT IS A DATA AREA THAT IS           */
/*   CONTINUOUSLY CHANGING DURING THE PROCESS. THE USER  */
/*   WANTS TO DUMP IT PERIODICALLY TO CHECK HOW ITS      */
/*   CONTENT IS CHANGING AND WHAT IS THE FINAL VALUE     */
/*   WHEN THE WATCHED MESSAGE OCCURS. THIS DATA AREA     */
/*   WILL BE DUMPED AT THE BEGINNING (*ON), WHEN THE     */
/*   INTERVAL TIME ELAPSES (*INTVAL), AND WHEN THE       */
/*   WATCHED MESSAGE OCCURS (*MSGID)                     */
/*                                                       */
/* THE FOLLOWING IS AN EXAMPLE OF THE WATCH FOR TRACE    */
/* EVENTS PARAMETERS, AS THEY WOULD BE SPECIFIED FOR A   */
/* TRACE COMMAND ISSUING THE CURRENT SAMPLE CODE:        */
/*                                                       */
/* WCHMSG((CPF0001)) TRCPGM(MYLIB/WCHEXTP) TRCPGMITV(30) */
/*********************************************************/
PGM PARM(&TRCOPTSET &RESERVED &OUTPUT &COMPDATA)
          DCL         VAR(&TRCOPTSET) TYPE(*CHAR) LEN(10) /* +
                        Reason why the program was called */
          DCL         VAR(&RESERVED) TYPE(*CHAR) LEN(10) /* This +
                        parameter is only used of TRCTCPAPP +
                        command and it is not relevant for Watch +
                        for Trace Event Facility */
          DCL         VAR(&OUTPUT) TYPE(*CHAR) LEN(10) /* +
                        Indicates if watch facility should stop +
                        or continue running */
          DCL         VAR(&COMPDATA) TYPE(*CHAR) LEN(92) /* Not +
                        needed for this sample */
/*********************************************************/
/*             BEGIN OF PROGRAM PROCESSING               */
/*********************************************************/
   IF         COND(&TRCOPTSET *EQ '*ON       ') THEN(DO) +
                        /* If the program was called at the +
                        beginning of the processing.         */
            /*  This section is usually used to set up +
                the environment before the trace starts */
          DMPOBJ      OBJ(MYLIB/MYOBJECT) OBJTYPE(*DTAARA) /* Dump +
                        Object for problem determination */
          CHGVAR      VAR(&OUTPUT) VALUE('*CONTINUE ') /* Let the +
                        trace to continue running */
   ENDDO       /* End if *ON */
   ELSE        CMD(IF COND(&TRCOPTSET *EQ '*MSGID    ') +
                        THEN(DO)) /* If the message id matched */
          DSPLOG      LOG(QHST) OUTPUT(*PRTSECLVL) /* Print the +
                        History Log */
          DMPOBJ      OBJ(MYLIB/MYOBJECT) OBJTYPE(*DTAARA) /* Dump +
                        object for problem determination */
          CHGVAR      VAR(&OUTPUT) VALUE('*STOP     ') /* +
                        Indicates Watch Facility to Stop */
   ENDDO       /* End if *MSGID */
   ELSE        CMD(IF COND(&TRCOPTSET *EQ '*INTVAL   ') +
                        THEN(DO)) /* If the exit program was +
                        called because the interval +
                        elapsed                            */
            /*  This section is usually used to perform +
                tasks periodically. Like dumping objects, +
                checking conditions and optionally end +
                the watch facility     */
          DMPOBJ      OBJ(MYLIB/MYOBJECT) OBJTYPE(*DTAARA) /* Dump +
                        object for problem determination */
          CHGVAR      VAR(&OUTPUT) VALUE('*CONTINUE ') /* Let the +
                        trace and the watch facility to continue +
                        running */
   ENDDO       /* End if *INTVAL */
```

```
     ELSE        CMD(CHGVAR VAR(&OUTPUT) VALUE('*CONTINUE ')) +
                    /* Otherwise, watch facility will +
                    continue running */
   ENDPGM
```

Extend the watch function using the watch exit program example

Use the sample exit program as a starting point to help you create your own watch trace program. You can modify the code to allow the program to perform additional function.

This table provides suggestions for ways you can extend the capability of the watch function on your system by performing different actions based on the Trace option setting parameter in the exit program. Refer to each Trace option setting parameter value and the corresponding sample functions that can be performed.

Trace option setting parameter value	Sample functions that can be performed

*ON	• To set up the environment right before the trace starts. For example:
	  – Start a process
	  – Run commands
	  – Change some special values
	• To register the status of the system right before the trace starts. For example:
	  – Retrieve system values
	  – Dump a job
	  – Dump key objects for problem analysis
	• To verify that everything is ready for the trace and the watch function to start. For example:
	  – Check certain system values
	  – Check for the existence of key objects.
	
	If the exit program detects that something is not ready, the value *STOP for the Output parameter could be specified to prevent the trace command and the watch function from starting.

*MSGID or *LICLOG	• To register the final status of the system right after the event being watched for occurs. For example:
	  – Retrieve system values
	  – Dump a job
	  – Dump key objects for problem analysis
	• To set the environment back to the initial status. For example:
	  – End a process
	  – Run commands
	  – Change special values

*COMPDATA	The exit program can determine whether the trace and the watch function should stop or continue running. This is determined by returning *STOP or *CONTINUE for the Output parameter.

Trace option setting parameter value	Sample functions that can be performed
*INTVAL	• To perform activities periodically. For example, dump key objects for problem analysis.
	• To check conditions periodically. For example, check for the existence of key objects. The exit program can determine whether the trace and the watch function should stop or continue running. This is determined by returning *STOP or *CONTINUE for the Output parameter.
*WCHTIMO	To set the environment back to the initial status. For example:
	• End a process
	• Run commands
	• Change some special values

Traces that use watch support

You can use watch support with these types of traces:

- Job trace
- Communications trace
- Licensed Internal Code trace
- Trace TCP application
- Trace connection

Troubleshooting tips

Use the server table to help you troubleshoot TCP/IP
Use this table to find out how servers, server jobs, job descriptions, and subsystems are mapped to one another. You can find out information about each server, such as the default port, the server type, and the start and end commands.

As you use the following troubleshooting tips, you can refer to the server table for pertinent information, such as the name of the job for a particular server or to find out whether the server is shipped with a default value of *YES or *NO for the *Autostart* parameter.

Check jobs, jog logs, and messages
View jobs, job logs and messages to identify problems and make adjustments to solve them.

Check for active filter rules
Find out if filter rules are stifling your communication.

Verify system startup considerations for networking
Learn how to start subsystems, TCP/IP, interfaces, and servers in the correct order and learn how to locate problems associated with startup.

Vary on communications lines, controllers, and devices
Let TCP/IP vary on your lines, controllers and devices automatically.

Verify logical partition (LPAR) configuration
Verify that the LPAR configuration is correct.

Troubleshoot IPv6–related problems
Use these tips to troubleshoot IPv6.

Server table

Use this table to locate a variety of information related to specific servers.

The first column provides the following information:

Server name
: The server name identifies the server. In most cases, this is the name of the server as it appears in iSeries Navigator.

To start:
: The method that is used to start the server. Some servers are started by using CL commands, such as STRTCPSVR *DHCP. Other servers start when certain subsystems or jobs are started.

To end:
: The method that is used to end the server. Some servers are ended by using CL commands, such as ENDTCPSVR *DHCP. Other servers end when certain subsystems are ended.

Product:
: The name of the licensed product under which this server is shipped.

Server type:
: The server type is a 30 byte character string that uniquely identifies the server to the system. All IBM-supplied servers have their server type begin with QIBM_. The server type is set by the server job using the Change Job API.

The subsequent columns provide the following information:

Job description:
: The name and library of the job description that is used by this server's job to perform the work for this server. For example, QTCP/QTGSTELN indicates library QTCP and job description QTGSTELN.

Subsystem:
: The name of the subsystem where this particular server runs.

Job name:
: The name of the job(s) that are active for this server.

Shipped default value for *Autostart servers* **parameter:**
: OS/400 is shipped to you with certain default values specified for the *Autostart servers* parameter for many of the servers. When the value is set to *YES, the server will start automatically when TCP/IP is started. When the value is set to *NO, the server will not start automatically when TCP/IP is started. If the server does not support the Autostart servers function, then no value is indicated for this parameter.

> **Note:** To view or change the *Autostart servers* parameter, follow these steps:
>
> - **From the character based interface**
>   Type CHG*xxx*A at the OS/400 command line, where *xxx* is the name of the server. For example, CHGFTPA to work with the attributes of the FTP server. The *Autostart servers* parameter appears at the top of the list of parameters.
> - **From iSeries Navigator**
>   In iSeries Navigator, the equivalent of the *Autostart servers* parameter is indicated as one of the properties of a server, **Start when TCP/IP is started**.
>   1. In iSeries Navigator, expand your **iSeries server —> Network —> Servers**.
>   2. Click **TCP/IP**, **iSeries Access**, **DNS**, or **User-Defined**, depending on the type of server you want to view.
>   3. In the right pane, right-click the server you want to view, such as FTP.
>   4. On the **General** page, verify whether **Start when TCP/IP is started** is selected.

Default port:

The port from which the server job listens for client requests. Some of the ports indicate a service name within parentheses. This service name refers to the name that is defined in the Service Table Entries.

Note: To view the Service Table Entries display, type `WRKSRVTBLE` at the OS/400 command line.

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
ASFTomcat Basic Servlet and JSP Engine for the Apache Web Server **To Start:** STRTCPSVR *ASFTOMCAT **To End:** ENDTCPSVR *ASFTOMCAT **Product:** 5722–DG1 *BASE option **Server Type:** QIBM_ASFTOMCAT_xxxxxx (where *xxxxxx* is the name of the server instance)	QHTTPSVR/QZTC	QSYSWRK	Name of the instance (user defined)	*NO	8009
Block I/O Daemon **To Start:** STRNFSSVR *BIO **To End:** ENDNFSSVR *BIO **Product:** 5722–SS1 **Server Type:** QIBM_NFS_BIOD	QSYS/QP0LBIOD	QSYSWRK	QNFSBIOD*	*NO	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
BootP DHCP Relay Agent **To Start:** STRTCPSVR *DHCP **To End:** ENDTCPSVR *DHCP **Product:** 5722–SS1 **Server Type:** QIBM_BOOTP_DHCP_RA	QSYS/QTODDJDS	QSYSWRK	QTODDHCPR	*NO	67 (dhcps) 942
BootP Server **To Start:** STRTCPSVR *BOOTP **To End:** ENDTCPSVR *BOOTP **Product:** 5722–SS1 **Server Type:** QIBM_BOOTP	QSYS/QTODBTPJ	QSYSWRK	QTBOOTP	*NO	67 (bootps)
CCServer Agent **To Start:** STRMGDSYS **To End:** ENDMGDSYS **Product:** 5722–MG1 **Server Type:** QIBM_CCSERVER	QSYS/QSYSWRK	QSYSWRK	QCQNCMPS	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Central Server **To Start:** 1) Starts when the subsystem starts 2) If subsystem is active and the jobs are not active, issue STRPJ SBS (*subsystem name*) PGM(QSYS/QZSCSRVS), where *subsystem name* is QUSRWRK or the user-configured subsystem **To End:** Ends when the subsystem ends **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_CENTRAL	QSYS/QZBSJOBD	QUSRWRK or configurable	QZSCSRVS	*YES	No port is used
Central Server Daemon **To Start:** STRHOSTSVR *CENTRAL **To End:** ENDHOSTSVR *CENTRAL **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_CENTRAL	QSYS/QZBSJOBD	QSYSWRK	QZSCSRVSD	*YES	8470 (as-central) 9470 (as-central-s)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
CIM Object Manager **To Start:** STRTCPSVR *CIMOM **To End:** ENDTCPSVR *CIMOM **Product:** 5722–SS1 **Server Type:** QIBM_CIMOM	QSYS/QYCMJOBD	QSYSWRK	QYCMCIMOM	Not applicable	5988 (wbem-http)
Cluster Resource Services **To Start:** Starts via QSYSWRK subsystem autostart entry **To End:** Ends when the QSYSWRK subsystem ends **Product:** 5722–SS1 **Server Type:** QIBM_CLUSTER_RESOURCE_SERVICES	QSYS/QCSTSRCD	QSYSWRK	QCSTCTSRCD	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Cluster Resource Services **To Start:** Starts when the daemon QCSTCTSRCD job starts **To End:** Ends when the daemon QCSTCTSRCD job ends **Product:** 5722–SS1 **Server Type:** QIBM_CLUSTER_RESOURCE_SERVICES	QSYS/QCSTSRCD	QSYSWRK	QCSTCTRMCD QCSTCTCASD	Not applicable	657
Cluster Resource Services **To Start:** Starts when the daemon QCSTCTRMCD job starts **To End:** Ends when the daemon QCSTCTRMCD job ends **Product:** 5722–SS1 **Server Type:** QIBM_CLUSTER_RESOURCE_SERVICES	QSYS/QCSTSRCD	QSYSWRK	QSVRMSERMD QCSTHRMD QYUSCMCRMD QYUSALRMD	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Cluster Resource Services **To Start:** APIs: Start Cluster Node, Create Cluster Resource Group, Create Cluster, or Add Cluster Node Entry CL commands: STRCLUNOD, CRTCRG, CRTCLU, or ADDCLUNODE **To End:** End Cluster Node API or ENDCLUNOD CL command **Product:** 5722–SS1 **Server Type:** QIBM_CLUSTER_RESOURCE_SERVICES	QGPL/QDFTJOBD	QSYSWRK	QCSTCTL QCSTCRGM CRG–name	Not applicable	No port is used
Cluster Resource Services **To Start:** APIs: Start Cluster Node, Create Cluster Resource Group, Create Cluster, or Add Cluster Node Entry CL commands: STRCLUNOD, CRTCRG, CRTCLU, or ADDCLUNODE **To End:** End Cluster Node API or ENDCLUNOD CL command **Product:** 5722–SS1 **Server Type:** QIBM_CLUSTER_RESOURCE_SERVICES	QSYS/QCSTSRCD	QSYSWRK	QCSTCRGRM QCSTSAM QCSTCTCFRM	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Clustered Hash Table Server **To Start:** STRCHTSVR **To End:** ENDCHTSVR **Product:** 5722–SS1 **Server Type:** QIBM_CHT	QGPL/QDFTJOBD	QSYSWRK	Clustered Hash table (CHT) name	Not applicable	No port is used
Collection Services Server **To Start:** Starts automatically when an application uses the QPMWKCOL function. **To End:** Ends when there are no application requests for data collection. **Product:** 5722–SS1 **Server Type:** QIBM_COLLECTION_SERVICES	QGPL/QCOLJOBD	QSYSWRK	QPMASERV	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Collection Services Server **To Start:** Submitted by QYPSPFRCOL if configured (QYPSCSCA API or CHGPRFCOL CMD) **To End:** Ends automatically when data collection (QYPSPFRCOL) ends or current collection is cycled (restarted). **Product:** 5722–SS1 **Server Type:** QIBM_COLLECTION_SERVICES	QSYS/QYPSJOBD	QSYSWRK	CRTPFRDTA	Not applicable	No port is used
Collection Services Server **To Start:** Starts by QPMASERV job **To End:** Ends when QPMASERV ends. **Product:** 5722–SS1 **Server Type:** QIBM_COLLECTION_SERVICES	QGPL/QCOLJOBD	QSYSWRK	QPMACLCT	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Collection Services Server **To Start:** QYPSSTRC API, GUI, or STRPRFCOL command. Can also be started by application requests for data. **To End:** QYPSENDC API, GUI, or ENDPFRCOL and if there are no active application data requests. **Product:** 5722–SS1 **Server Type:** QIBM_COLLECTION_SERVICES	QSYS/QYPSJOBD	QSYSWRK	QYPSPFRCOL	Not applicable	No port is used
Collection Services Server **To Start:** Starts when the QYPSPFRCOL job starts if user category is configured and collection is enabled **To End:** Ends automatically when data collection (QYPSPFRCOL job) ends or current collection is cycled (restarted). **Product:** 5722–SS1 **Server Type:** QIBM_COLLECTION_SERVICES	QGPL/QPMUSRCAT	QSYSWRK (default but depends on category owner JOBD)	Category name	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Commerce Payments **To Start:** Product-specific commands **To End:** Product-specific commands **Product:** 5733-PYS **Server Type:** Not applicable	Subsystem of installed version of WebSphere®	QSYSWRK	User-specified name of the instance	Not applicable	Configurable
Connect FlowManager **To Start:** Starts using Connect Web Admin interface **To End:** Ends using Connect Web Admin interface **Product:** 5733–CO2 **Server Type:** QIBM_CONNECT_FM	Same as user profile	QCONNECT	QBEFMNTR QBEFSRVR	Not applicable	No ports are used
Content Manager for iSeries **To Start:** STRTCPSVR **To End:** ENDTCPSVR **Product:** 5722–VI1 *BASE and 5722–VI1 Option 1 **Server Type:** None	User-defined	QSERVER or user-defined	User-defined	*NO	User-defined

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Controlled End TCP/IP Processing **To Start:** STRTCP **To End:** ENDTCP **Product:** 5722–SS1 **Server Type:** QIBM_TOC_ENDTCP_CONTROLED	QSYS/QTOCTCPIP	QSYSWRK	QTCPEND	Not applicable	No port is used
Customer Information Control System (CICS®) TCP/IP Server **To Start:** STRCICS **To End:** ENDCICS **Product:** 5722–DFH **Server Type:** QIBM_CICS	Specified in CICS's control region user profile	CICS's control region subsystem	AEGWPWKR and AEGWPSSN	Not applicable	1435 (ibm-cics)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Database Server **To Start:** 1) Starts when the subsystem starts 2) If subsystem is active and the jobs are not active, issue STRPJ SBS(*subsystem name*) PGM(QSYS/QZDAS0INIT), where *subsystem name* is QUSRWRK or the user-configured subsystem **To End:** Ends when the subsystem ends **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_DATABASE	QGPL/QDFTSVR	QUSRWRK or configurable	QZDASOINIT	*YES	No port is used
Database Server Daemon **To Start:** STRHOSTSVR *DATABASE (Requires QSERVER up) **To End:** ENDHOSTSVR *DATABASE **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_DATABASE	QSYS/QZBSJOBD	QSERVER	QZDASRVSD	*YES	8471 (as-database) 8478 (as-transfer) 9471 (as-database-s)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Database SSL Server **To Start:** 1) Starts when the subsystem starts 2) If subsystem is active and the jobs are not active, issue STRPJ SBS(*subsystem name*) PGM(QSYS/QZDASSINIT), where *subsystem name* is QUSRWRK or the user-configured subsystem **To End:** Ends when the subsystem ends **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_DATABASE	QGPL/QDFTSVR	QUSRWRK or configurable	QZDASSINIT	*YES	No port is used
Datalink File Manager **To Start:** STRTCPSVR *DLFM **To End:** ENDTCPSVR *DLFM **Product:** 5722–SS1 **Server Type:** QIBM_DLFM	QGPL/QDFTJOBD	QSYSWRK	QZDFMCOD QZDFMCPD QZDFMDGD QZDFMGCD QZDFMRTD QZDFMSVR QZDFMUPD QZDFMCHD (A child server job that receives and processes DLFM requests as needed. Multiple instances of the QZDFMCHD job can run simultaneously.)	*NO	20001 (dlfm)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Data Queue Server **To Start:** 1) Starts when the subsystem starts 2) If subsystem is active and the jobs are not active, issue STRPJ SBS(*subsystem name*) PGM(QSYS/QZHQSSRV), where *subsystem name* is QUSRWRK or the user-configured subsystem **To End:** Ends when the subsystem ends **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_DTAQ	QSYS/QZBSJOBD	QUSRWRK or configurable	QZHQSSRV	*YES	No port is used
Data Queue Server Daemon **To Start:** STRHOSTSVR *DTAQ **To End:** ENDHOSTSVR *DTAQ **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_DTAQ	QSYS/QZBSJOBD	QSYSWRK	QZHQSRVD	*YES	8472 (as-dtaq) 9472 (as-dtaq-s)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
DB2® Text Extender Administration Server **To Start:** SBMJOB invoked by dessrvsp stored procedure **To End:** Ends automatically when task is complete. To interrupt abnormally, use ENDJOB. **Product:** 5722–DE1 Option 1 **Server Type:** QIBM_TEXT_EXTENDER_ADMIN	QGPL/QDFTJOBD	QSYSWRK	DESSRVBG	Not applicable	No port is used
DB2 Text Extender Daemon **To Start:** SBMJOB invoked by CALL PGM(QDB2TX/TXSTART) **To End:** CALL PGM(QDB2TX/TXSTOP) **Product:** 5722–DE1 Option 1 **Server Type:** QIBM_TEXT_EXTENDER_DAEMON	QGPL/QDFTJOBD	QSYSWRK	DESDEM	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
DB2 Text Extender Update Index Server **To Start:** SBMJOB invoked by desdem program **To End:** Ends automatically when task is complete. To interrupt abnormally, use ENDJOB. **Product:** 5722–DE1 Option 1 **Server Type:** QIBM_TEXT_EXTENDER_UPDATE	QGPL/QDFTJOBD	QSYSWRK	DESXCTL	Not applicable	No port is used
DHCP **To Start:** STRTCPSVR *DHCP **To End:** ENDTCPSVR *DHCP **Product:** 5722–SS1 **Server Type:** QIBM_DHCP	QSYS/QTODDJDS	QSYSWRK	QTODDHCPS	*NO	67 (dhcps) 942

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
DNS Server **To Start:** STRTCPSVR *DNS **To End:** STRTCPSVR *DNS **Product:** 5722–SS1 Option 31 **Server Type:** QIBM_DNS	QDNS/QTOBJOBD	QSYSWRK	QTOBDNS (BIND 4) QTOBD*xxxxx* (BIND 8, *xxxxx* chosen by customer)	*NO	53 (domain)
Domino **To Start:** STRTCPSVR *DOMINO or STRDOMSVR **To End:** ENDTCPSVR *DOMINO or ENDDOMSVR **Product:** Domino® 6.0.x: 5733–LD6 Domino 6.5.x: 5733–L65 or later **Server Type:** QIBM_DOMINO	Same as subsystem	Notes® subsystem or configurable	Job names vary	*NO	Configurable (typically 1352)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
DRDA® DDM Server TCP/IP **To Start:** 1) Starts when the subsystem starts 2) If subsystem is active and the jobs are not active, issue STRPJ SBS(subsystem name) PGM(QGPL/QRWTSRVR), where subsystem name is QUSRWRK or the user-configured subsystem **To End:** Ends when the subsystem ends **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QRW_SVR_DDM_DRDA	QGPL/QDFTSVR	QUSRWRK or configurable	QRWTSRVR	*YES	No port is used
DRDA DDM Server TCP/IP Listener **To Start:** STRTCPSVR *DDM **To End:** ENDTCPSVR *DDM **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QRW_SVR_DDM_DRDA	jobd in QUSER profile (defaults to QGPL/QDFTJOBD)	QSYSWRK	QRWTLSTN	*YES	446 (drda) 447 (ddm) 448 (ddm-ssl)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Extended Dynamic Remote SQL **To Start:** STRTCPSVR *EDRSQL **To End:** ENDTCPSVR *EDRSQL **Product:** 5722–SS1 **Server Type:** QIBM_EDRSQL	QSYS/QXDAJOBD	QSYSWRK	QXDAEDRSQL	*NO	4402 (as-edrsql)
E-Z Setup Servers **To Start:** Starts via QSYSWRK subsystem autostart entry **To End:** Ends when QSYSWRK subsystem is ended **Product:** 5722–SS1 **Server Type:** QIBM_ALTCOMM	QSYS/QNEOJOBD	QSYSWRK	QNEOSOEM	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
File Server Daemon and Server **To Start:** STRHOSTSVR *FILE (Requires QSERVER up) **To End:** ENDHOSTSVR *FILE **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_FILE	QSYS/QZBSJOBD	QSERVER	QPWFSERVSD	*YES	8473 (as-file) 8477 (as-netdrive) 9473 (as-file-s)
File Server S2 **To Start:** 1) Starts when the subsystem starts 2) If subsystem is active and the jobs are not active, issue STRPJ SBS(*subsystem name*) PGM(QSYS/QPWFSERVS2), where *subsystem name* is QSERVER or the user-configured subsystem **To End:** ENDSBS QSERVER (or user configured subsystem) **Product:** 5722–SS1 **Server Type:** QIBM_NETDRIVE	QGPL/QDFTSVR	QSERVER or configurable	QPWFSERVS2	*YES	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
File Server SO **To Start:** 1) Starts when the subsystem starts 2) If subsystem is active and the jobs are not active, issue STRPJ SBS(*subsystem name*) PGM(QSYS/QPWFSERVSO), where *subsystem name* is QSERVER or the user-configured subsystem **To End:** ENDSBS QSERVER (or user configured subsystem) **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_FILE	QGPL/QDFTSVR	QSERVER or configurable	QPWFSERVSO	*YES	No port is used
File Server SSL Server **To Start:** 1) Starts when the subsystem starts 2) If subsystem is active and the jobs are not active, issue STRPJ SBS(*subsystem name*) PGM(QSYS/QPWFSERVSS), where *subsystem name* is QSERVER or the user-configured subsystem **To End:** ENDSBS QSERVER (or user configured subsystem) **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_FILE	QGPL/QDFTSVR	QSERVER or configurable	QPWFSERVSS	*YES	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
FTP **To Start:** STRTCPSVR *FTP **To End:** ENDTCPSVR *FTP **Product:** 5722–TC1 **Server Type:** QIBM_FTP	QUSRSYS/QTMFTPS	QSYSWRK or configurable	QTFTP*	*YES	21 (ftp-control) 990 (ftps-control)
Graphical Debug Server (Hub) **To Start:** STRTCPSVR *DBG **To End:** ENDTCPSVR *DBG **Product:** 5722–SS1 **Server Type:** QIBM_DEBUG_SERVER	QGPL/QDFTJOBD	QSYSWRK	QTESDBGHUB	*NO	4026 (as-debug)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Graphical Debug Server **To Start:** Started by the QTESDBGHUB server in the previous entry and is attached to a user interface **To End:** Ends when the user interface quits **Product:** 5722–SS1 **Server Type:** QIBM_DEBUG_SERVER	Job description that is indicated in the debug user profile	QUSRWRK	QTESDBGSVR	*NO	No port is used
HTTP Server **To Start:** STRTCPSVR *HTTP **To End:** ENDTCPSVR *HTTP **Product:** 5722–DG1 *BASE option **Server Type:** QIBM_HTTP_xxxxx (where xxxxx is the name of the server instance)	QHTTPSVR/QZHBHTTP	QHTTPSVR	Name of the instance (for example, ADMIN)	*NO	80 (www-http) 2001 (as-admin-http) 2010 (as-admin-https)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
IBM Director **To Start:** Qshell script /qibm/userdata/director/bin/twgstart **To End:** Qshell script /qibm/userdata/director/bin/twgend **Product:** 5722-DR1 **Server Type:** QIBM_DIRECTOR_AGENT QIBM_DIRECTOR	QCPMGTDIR/QCPMGTDIR	QSYSWRK	QCPMGTAGT QCPMGTSVR	Not applicable	14247 14248
IBM Directory Server **To Start:** STRTCPSVR *DIRSRV **To End:** ENDTCPSVR *DIRSRV **Product:** 5722–SS1 **Server Type:** QIBM_DIRSRV_SERVER	QSYS/QDIRSRV	QSYSWRK	QDIRSRV	*YES	389 (ldap) 636 (ldaps)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
InfoPrint Server Font Downloader **To Start:** STRFNTDWN **To End:** ENDFNTDWN **Product:** 5722-IP1 **Server Type:** QIBM_IPS_FONTDOWNLOADER	QGPL/QDFTJOBD	QUSRWRK	QXTFRNTDWN	Not applicable	8251
InfoPrint Server/400 Transform Job **To Start:** Spawned by transform manager **To End:** Ended by transform manager **Product:** 5722-IP1 **Server Type:** QIBM_IPS_TRANSFORM_JOB	QGPL/QDFTJOBD	QUSRWRK	QADBDAEMON QXIODAEMON	Not applicable	No port is used
InfoPrint Server/400 Transform Manager **To Start:** STRTFMMGR **To End:** ENDTFMMGR **Product:** 5722-IP1 **Server Type:** QIBM_IPS_TRANSFORM_MGR	QGPL/QDFTJOBD	QUSRWRK	QXTRTFMMGR	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Internet Daemon (INETD) Super Server **To Start:** STRTCPSVR *INETD **To End:** ENDTCPSVR *INETD **Product:** 5722–SS1 **Server Type:** QIBM_INETD	QSYS/QTOINETD	QSYSWRK	QTOGINETD	*NO	13 (daytime) 37 (time)
Internet PTF Delivery Server **To Start:** Starts on demand by iPTF process **To End:** Ends by the iPTF process **Product:** 5722–SS1 **Server Type:** QIBM_PTF	Varies, based on user profile starting server	QSYSWRK	QESISRV	Not applicable	Dynamically assigned

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
iSeries Access for Web PDF Server **To Start:** Started by the iSeries Access for Web printer servlet support when any user needs to transform a spooled file to PDF using InfoPrint Server support. **To End:** Ends when you end the QIWAPDFSRV job. **Product:** iSeries Access for Web (5722–XH2) **Server Type:** QIBM_IWA_PDF_SVR	jobd in QUSER profile (defaults to QGPL/QDFTJOBD)	QSYSWRK	QIWAPDFSRV QIVACMDSRVA	Not applicable	8490 (as-iwapdfsrv)
iSeries NetServer™ Daemon **To Start:** STRTCPSVR *NETSVR **To End:** ENDTCPSVR *NETSVR **Product:** 5722–SS1 **Server Type:** QIBM_NETSERVER	QSYS/QZLSSERVER	QSERVER	QZLSSERVER	*YES	137 TCP (netbios-ns) 137 UDP (netbios-ns) 138 UDP (netbios-dgm) 139 TCP (netbios-ssn) 445 TCP (cifs)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
iSeries NetServer Server **To Start:** 1) Starts when the subsystem starts 2) If subsystem is active and the jobs are not active, issue STRPJ SBS(*subsystem name*) PGM(QSYS/QZLSFILE), where *subsystem name* is QSERVER or the user-configured subsystem **To End:** ENDSBS QSERVER (or user configured subsystem) **Product:** 5722–SS1 **Server Type:** QIBM_NETSERVER	QGPL/QDFTSVR	QSERVER or configurable	QZLSFILE	*YES	No port is used
LDAP Publishing Agent **To Start:** Starts when QSYSWRK subsystem is started **To End:** Ends when QSYSWRK subsystem is ended **Product:** 5722–SS1 **Server Type:** QIBM_DIRSRV_PUB_AGENT	QSYS/QGLDPUBA	QSYSWRK	QGLDPUBA	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
LDAP Publishing Engine **To Start:** Starts when QSYSWRK subsystem is started **To End:** Ends when QSYSWRK subsystem is ended **Product:** 5722–SS1 **Server Type:** QIBM_DIRSRV_PUB_ENGINE	QSYS/QGLDPUBE	QSYSWRK	QGLDPUBE	Not applicable	No port is used
Licensed Internal Code 3494 TCP/IP Tape Server **To Start:** Started by the Licensed Internal Code when a 3494 tape library is varied on. **To End:** Ended by the Licensed Internal Code when the last 3494 tape library is varied off. **Product:** 5722–999 **Server Type:** QIBM_TASK_TCPIPTAPE	None	None	None	Not applicable	3494 (ibm3494)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
LPD **To Start:** STRTCPSVR *LPD **To End:** ENDTCPSVR *LPD **Product:** 5722–TC1 **Server Type:** QIBM_LPD	QTCP/QTMPLPD	QSYSWRK	QTLPD*	*NO	515 (lpd)
Managed System Agent **To Start:** STRMGDSYS **To End:** ENDMGDSYS **Product:** 5722-MG1 **Server Type:** QIBM_MANAGED_SYSTEM	QSYS/QSYSWRK	QSYSWRK	QCQEPMON	Not applicable	No port is used
Management Central Agent **To Start:** Started by main Management Central Server as needed **To End:** Not applicable **Product:** 5722–SS1 **Server Type:** QIBM_MGMTCENTRAL_AGENT	QSYS/QYPSJOBD	QSYSWRK	QYPSAPI QYPSPTF QYPSRMTCMD QYPSGETINV QYPSPRC QYPSUSRADM QYPSBDTSVR	*YES	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Management Central Server **To Start:** STRTCPSVR *MGTC **To End:** ENDTCPSVR *MGTC **Product:** 5722–SS1 **Server Type:** QIBM_MGMTCENTRAL	QSYS/QYPSJOBD	QSYSWRK	QYPSJSRV	*YES	5544 (as-mgtcrlj) 5555 (as-mgtctrl) 5566 (as-mgtctrl-ss) 5577 (as-mgctrl-cs)
Mount Server **To Start:** STRNFSSVR *MNT **To End:** ENDNFSSVR *MNT **Product:** 5722–SS1 **Server Type:** QIBM_NFS_MNTD	QSYS/QP0LMNTD	QSYSWRK	QNFSMNTD	*NO	No port is used
MQ Series Server **To Start:** STRMQMLSR **To End:** ENDMQMLSR **Product:** 5724-B41 **Server Type:** QIBM_MQSERIES	QMQM/QMQMJOBD	QSYSWRK	RUNMQLSR	Not applicable	1414

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Network Lock Manager **To Start:** STRNFSSVR *NLM **To End:** ENDNFSSVR *NLM **Product:** 5722–SS1 **Server Type:** QIBM_NFS_NLMD	QSYS/QP0LLCKD	QSYSWRK	QNFSNLMD	*NO	No port is used
Network Print Server **To Start:** 1) Starts when the subsystem starts 2) If subsystem is active and the jobs are not active, issue STRPJ SBS(*subsystem name*) PGM(QSYS/QNPSERVS), where *subsystem name* is QUSRWRK or the user-configured subsystem **To End:** Ends when the subsystem ends **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_NETPRT	QSYS/QZBSJOBD	QUSRWRK or configurable	QNPSERVS	*YES	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Network Print Server Daemon **To Start:** STRHOSTSVR *NETPRT **To End:** ENDHOSTSVR *NETPRT **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_NETPRT	QSYS/QZBSJOBD	QSYSWRK	QNPSERVD	*YES	8474 (as-netprt) 8479 (as-vrtprint) 9474 (as-netprt-s)
Network Station® Login Daemon **To Start:** CALL QYTCV2/QYTCUSVR ('STRTCPSVR ') **To End:** CALL QYTCV2/QYTCUSVR ('ENDTCPSVR ') **Product:** 5648–C07 **Server Type:** QIBM_NSLOGIN	QYTCV2/QYTCNSLD	QSYSWRK	QYTCNSLD	*NO	256

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Network Status Monitor	QSYS/QP0LSTATD	QSYSWRK	QNFSNSMD	*NO	No port is used
To Start: STRNFSSVR *NSM					
To End: ENDNFSSVR *NSM					
Product: 5722–SS1					
Server Type: QIBM_NFS_NSMD					
NFS Server	QSYS/QP0LNFSD	QSYSWRK	QNFSNFSD*	*NO	2049
To Start: STRNFSSVR *SVR					
To End: ENDNFSSVR *SVR					
Product: 5722–SS1					
Server Type: QIBM_NFS_NFSD					
OnDemand Daemon	QRDARS/QRDARS400	QSYSWRK	QRLGMGR	*YES	1445
To Start: STRTCPSVR *ONDMD					
To End: ENDTCPSVR *ONDMD					
Product: 5722–RD1 Option 5					
Server Type: QIBM_ON_DEMAND					

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
OnDemand Common Server **To Start:** STRTCPSVR *ONDMD **To End:** ENDTCPSVR *ONDMD **Product:** 5722–RD1 Option 10 **Server Type:** QIBM_ON_DEMAND	QRDARS/QOND400	QSYSWRK	Instance name	*YES	1450
OnDemand Server **To Start:** STRTCPSVR *ONDMD **To End:** ENDTCPSVR *ONDMD **Product:** 5722–RD1 Option 5 **Server Type:** QIBM_ON_DEMAND	QRDARS/QRDARS400	QSYWRK	QRLGSRV	*YES	1445
Open List Server **To Start:** Dynamically starts when needed **To End:** Ends when no longer needed **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QGYE_SVR	Varies	Variable (usually same as QZRCSRVS job)	QGYSERVER	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
PASE Syslog **To Start:** Starts by running /usr/sbin/syslogd in i5/OS™ PASE **To End:** ENDJOB CL command or the kill utility in i5/OS PASE **Product:** 5722-SS1 Option 33 **Server Type:** Not applicable	Varies (User can choose)	Varies (User can choose)	PGM-syslogd Also user-defined	Not applicable	UDP 514 (syslog)
POP **To Start:** STRTCPSVR *POP **To End:** ENDTCPSVR *POP **Product:** 5722–TC1 **Server Type:** QIBM_POP	QTCP/QTMMTPS	QSYSWRK	QTPOP*	*NO	110 (pop3)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
QoS Policy Agent **To Start:** STRTCPSVR *QOS **To End:** ENDTCPSVR *QOS **Product:** 5722–SS1 **Server Type:** QIBM_QOS	QSYS/QTOQJOBDR	QSYSWRK	QTOQSRVR	*NO	No port is used
QoS RSVP Agent **To Start:** STRTCPSVR *QOS **To End:** ENDTCPSVR *QOS **Product:** 5722–SS1 **Server Type:** QIBM_QOS	QSYS/QTOQJOBDR	QSYSWRK	QTOQRAGENT	*NO	1698
QuickPlace® Server **To Start:** STRTCPSVR *LQP or STRLQPSVR **To End:** ENDTCPSVR *LQP or ENDLQPSVR **Product:** 5733-LQP **Server Type:** QIBM_QUICKPLACE	Same as subsystem	QPLACE00 or Notes subsystem	Configurable	*NO	Same as Domino HTTP task (typically 80)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Remote Command Agent **To Start:** STRMGDSYS **To End:** ENDMGDSYS **Product:** 5722–MG1 **Server Type:** QIBM_REMOTE_COMMAND	QSVMSS/QVARRCV	QSYSWRK	QVARRCV	Not applicable	No port is used
Remote Command Server **To Start:** 1) Starts when the subsystem starts 2) If subsystem is active and the jobs are not active, issue STRPJ SBS(*subsystem name*) PGM(QSYS/QZRCSRVS), where *subsystem name* is QUSRWRK or the user-configured subsystem **To End:** Ends when the subsystem ends **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_RMTCMD	QSYS/QZBSJOBD	QUSRWRK or configurable	QZRCSRVS	*YES	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Remote Command Server Daemon **To Start:** STRHOSTSVR *RMTCMD **To End:** ENDHOSTSVR *RMTCMD **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_RMTCMD	QSYS/QZBSJOBD	QSYSWRK	QZRCSRVSD	*YES	8475 (as-rmtcmd) 9475 (as-rmtcmd-s)
RExec **To Start:** STRTCPSVR *REXEC **To End:** ENDTCPSVR *REXEC **Product:** 5722–TC1 **Server Type:** QIBM_REXEC	QTCP/QTMXRXCS	QSYSWRK	QTRXC*	*NO	512 (exec)
RouteD **To Start:** STRTCPSVR *ROUTED **To End:** ENDTCPSVR *ROUTED **Product:** 5722–SS1 **Server Type:** QIBM_ROUTED	QSYS/QTOROUTED	QSYSWRK	QTRTD*	*NO	UDP 520 (routed)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
RPC **To Start:** STRNFSSVR *RPC **To End:** ENDNFSSVR *RPC **Product:** 5722–SS1 **Server Type:** QIBM_NFS_RPCD	QSYS/QP0LRPCD	QSYSWRK	QNFSRPCD	*NO	111 (sunrpc)
Server Port Mapper **To Start:** STRHOSTSVR *SVRMAP **To End:** ENDHOSTSVR *SVRMAP **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SRV_SVRMAP	QSYS/QZBSJOBD	QSYSWRK	QZSOSMAPD	*YES	449 (as-svrmap)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Service Agent Hardware Problem Reporting **To Start:** Started by autostart job, or STRSRVAGT command **To End:** ENDSRVAGT command **Product:** 5722–SS1 **Server Type:** QIBM_SERVICE_AGENT_PRB	QSYS/QS9SRVAGT	QSYSWRK	QS9PRBMON QS9PALMON	Not applicable	No port is used
Service Agent Inventory Transmission **To Start:** Submitted from QYPSSRV **To End:** ENDJOB **Product:** 5722–SS1 **Server Type:** QIBM_SERVICE_AGENT_INV	QSYS/QSJINV	QSYSWRK	QYIVRIIS	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Signon Server **To Start:** 1) Starts when the subsystem starts 2) If subsystem is active and the jobs are not active, issue STRPJ SBS(*subsystem name*) PGM(QSYS/QZSOSIGN), where *subsystem name* is QUSRWRK or the user-configured subsystem **To End:** Ends when the subsystem ends **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_SIGNON	QSYS/QZBSJOBD	QUSRWRK or configurable	QZSOSIGN	*YES	No port is used
Signon Server Daemon **To Start:** STRHOSTSVR *SIGNON **To End:** ENDHOSTSVR *SIGNON **Product:** 5722–SS1 **Server Type:** QIBM_OS400_QZBS_SVR_SIGNON	QSYS/QZBSJOBD	QSYSWRK	QZSOSGND	*YES	8476 (as-signon) 9476 (as-signon-s)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Simple Network Time Protocol Service **To Start:** STRTCPSVR *NTP **To End:** ENDTCPSVR *NTP **Product:** 5722–SS1 **Server Type:** QIBM_NTP	QSYS/QTOTNTP	QSYSWRK	QTOTNTP	*NO	123 (ntp)
SMTP Bridge Client **To Start:** STRTCPSVR *SMTP **To End:** ENDTCPSVR *SMTP **Product:** 5722–TC1 **Server Type:** QIBM_SMTP_BR_CLIENT	QUSRSYS/QTMSMTPS	QSYSWRK or configurable	QTSMTPBRCL	*YES	No port is used
SMTP Bridge Server **To Start:** STRTCPSVR *SMTP **To End:** ENDTCPSVR *SMTP **Product:** 5722–TC1 **Server Type:** QIBM_SMTP_BR_SERVER	QUSRSYS/QTMSMTPS	QSYSWRK or configurable	QTSMTPBRSR	*YES	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
SMTP Client Daemon **To Start:** STRTCPSVR *SMTP **To End:** ENDTCPSVR *SMTP **Product:** 5722–TC1 **Server Type:** QIBM_SMTP_CLIENT	QUSRSYS/QTMSMTPS	QSYSWRK or configurable	QTSMTPCLTD	*YES	No port is used
SMTP Client **To Start:** Starts when the client daemon job QTSMTPCLTD starts the client prestart jobs **To End:** Ends when the client daemon job QTSMTPCLTD ends the client prestart jobs **Product:** 5722–TC1 **Server Type:** QIBM_SMTP_CLIENT	QUSRSYS/QTMSMTPS	QSYSWRK or configurable	QTMSCLCLTP	*YES	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
SMTP Mail Scheduler **To Start:** STRTCPSVR *SMTP when configured **To End:** ENDTCPSVR *SMTP **Product:** 5722–TC1 **Server Type:** QIBM_SMTP_MAIL_SCHED	QUSRSYS/QTMSMTPS	QSYSWRK or configurable	QTSMTPSCH	*YES	No port is used
SMTP Server Daemon **To Start:** STRTCPSVR *SMTP **To End:** ENDTCPSVR *SMTP **Product:** 5722–TC1 **Server Type:** QIBM_SMTP_SERVER	QUSRSYS/QTMSMTPS	QSYSWRK or configurable	QTSMTPSRVD	*YES	25 (smtp)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
SMTP Server **To Start:** Starts when the server daemon job QTSMTPSRVD starts the server prestart jobs **To End:** Ends when the server daemon job QTSMTPSRVD ends the server prestart jobs **Product:** 5722–TC1 **Server Type:** QIBM_SMTP_SERVER	QUSRSYS/QTMSMTPS	QSYSWRK or configurable	QTSMTPSRVP	*YES	No port is used
SNMP Agent **To Start:** STRTCPSVR *SNMP (Cannot be started from iSeries Navigator) **To End:** ENDTCPSVR *SNMP (Cannot be ended from iSeries Navigator) **Product:** 5722–SS1 **Server Type:** QIBM_SNMP	QSYS/QSYSWRK	QSYSWRK	QSNMPSA	*NO	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
SNMP Agent **To Start:** STRTCPSVR *SNMP (Cannot be started from iSeries Navigator) **To End:** ENDTCPSVR *SNMP (Cannot be ended from iSeries Navigator) **Product:** 5722–SS1 **Server Type:** QIBM_SNMP	QSYS/QTMSNMP	QSYSWRK	QTMSNMPRCV	*NO	161 (snmp)
SNMP Agent **To Start:** STRTCPSVR *SNMP (Cannot be started from iSeries Navigator) **To End:** ENDTCPSVR *SNMP (Cannot be ended from iSeries Navigator) **Product:** 5722–SS1 **Server Type:** QIBM_SNMP	QSYS/QTMSNMP	QSYSWRK	QTMSNMP	*NO	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
SNMP Trap Manager **To Start:** STRTRPMGR (Cannot be started from iSeries Navigator) **To End:** ENDTRPMGR (Cannot be ended from iSeries Navigator) **Product:** 5722–SS1 **Server Type:** QIBM_SNMP	QSYS/QTMSNMP	QSYSWRK	QTRPMGR	*NO	No port is used
SNMP Trap Manager **To Start:** STRTRPMGR (Cannot be started from iSeries Navigator) **To End:** ENDTRPMGR (Cannot be ended from iSeries Navigator) **Product:** 5722–SS1 **Server Type:** QIBM_SNMP	QSYS/QTMSNMP	QSYSWRK	QTRPRCV	*NO	162 (snmp-trap)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
SQL **To Start:** Automatically started at first use of a function that needs the server, such as server mode SQL. **To End:** ENDPJ SBS(QSYSWRK) PGM(QSQSRVR) **Product:** 5722-ST1 **Server Type:** QIBM_SQL	QGPL/QDFTSVR	QSYSWRK	QSQSRVR	*NO	No port is used
System Manager **To Start:** STRSYSMGR **To End:** ENDSYSMGR **Product:** 5722-SM1 **Server Type:** QIBM_SYSTEM_MANAGER	QSMU/QNSECS	QSYSWRK	QECS	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
TCP/IP Event Monitor **To Start:** STRTCP **To End:** ENDTCP **Product:** 5722–SS1 **Server Type:** QIBM_TOC_TCPMONITOR	QSYS/QTOCTCPIP	QSYSWRK	QTCPMONITR	Not applicable	No port is used
TCP/IP Interface Daemon **To Start:** STRTCP **To End:** ENDTCP **Product:** 5722–SS1 **Server Type:** QIBM_TOC_QTCPIP	QSYS/QTOCTCPIP	QSYSWRK	QTCPIP	Not applicable	No port is used
TCP/IP L2TP Server Job **To Start:** STRTCPPTP **To End:** ENDTCPPTP **Product:** 5722–SS1 **Server Type:** QIBM_TOCPPP_L2TP	QSYS/QTOCPPJOBD	QSYSWRK	QTPPPL2TP	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
TCP/IP Point-to-Point Session **To Start:** STRTCPPTP **To End:** ENDTCPPTP **Product:** 5722–SS1 **Server Type:** QIBM_TOCPPP_SSN*	QSYS/QTOCPPJOBD	QUSRWRK or configurable (prestart jobs)	QTPPPL2SSN (L2TP job) or QTPPPSSN (other type job)	Not applicable	No port is used
TCP/IP Point-to-Point Session **To Start:** STRTCPPTP **To End:** STRTCPPTP **Product:** 5722–SS1 **Server Type:** QIBM_TOCPPP_SSN*	QSYS/QTOCPPJOBD	QSYSWRK	QTPPDIALxx where xx is a number QTPPANSxxx where xxx is a number	Not applicable	No port is used
TCP/IP PPP Control Job **To Start:** STRTCPPTP **To End:** ENDTCPPTP **Product:** 5722–SS1 **Server Type:** QIBM_TOCPPP_CTL	QSYS/QTOCPPJOBD	QSYSWRK	QTPPPCTL	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
TCP/IP SLIP session **To Start:** STRTCPPTP **To End:** ENDTCPPTP **Product:** 5722–SS1 **Server Type:** QIBM_TOCSLIP_SSN*	QSYS/QTOCPPJOBD	QSYSWRK	QTPPDIAL*xx* QTPPANS*xxx*	Not applicable	No port is used
TELNET Device Manager **To Start:** STRTCPSVR *TELNET when QAUTOVRT system value is greater than 0 **To End:** Not applicable **Product:** 5722–TC1 **Server Type:** QIBM_TELNET_DEVMGR	QTCP/QTGSTELN	QSYSWRK	QTVDEVICE	*YES	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
TELNET Server **To Start:** STRTCPSVR *TELNET when QAUTOVRT system value is greater than 0 **To End:** ENDTCPSVR *TELNET **Product:** 5722–TC1 **Server Type:** QIBM_TELNET_SERVER	QTCP/QTGSTELN	QSYSWRK	QTVTELNET	*YES	23 (telnet) 992 (telnet-ssl)
Text Search Engine Background Process **To Start:** SBMJOB invoked by Update Index Server program DESXCTL **To End:** Ends automatically when task is complete. To interrupt abnormally, use ENDJOB. **Product:** 5722–DE1 Option 3 **Server Type:** QIBM_TEXT_SEARCH_BGPROC	QGPL/QDFTJOBD	QSYSWRK	IMOSMBCK	Not applicable	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Text Search Engine Daemon **To Start:** CALL PGM(QDB2TX/TXSTART) **To End:** CALL PGM(QDB2TX/TXSTOP) **Product:** 5722–DE1 Option 3 **Server Type:** QIBM_TEXT_SEARCH_DAEMON	QGPL/QDFTJOBD	QSYSWRK	IMOSMDEM	Not applicable	No port is used
Transfer Function Server TCP/IP **To Start:** 1) Starts when the subsystem starts 2) If subsystem is active and the jobs are not active, issue STRPJ SBS (QSERVER) PGM(QIWS/QTFPJTCP) **To End:** Ends when the subsystem ends **Product:** 5722–SS1 Option 12 **Server Type:** QIBM_XFER_FUNCTION	QGPL/QDFTJOBD	QSERVER	QTFPJTCP	*YES	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Triggered Cache Manager	QTCM/QZHT	QSYSWRK	User Defined	*NO	7049
To Start: STRTCPSVR *TCM					
To End: ENDTCPSVR *TCM					
Product: 5722–DG1 Option 1					
Server Type: QIBM_TCMNx (where x is a unique number for each server)					
Trivial FTP	QSYS/QTODTFTP	QSYSWRK	QTTFT*	*NO	UDP 69 (tftp)
To Start: STRTCPSVR *TFTP					
To End: ENDTCPSVR *TFTP					
Product: 5722–SS1					
Server Type: QIBM_TFTP					

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
Virtual Print Server TCP/IP **To Start:** 1) Starts when the subsystem starts 2) If subsystem is active and the jobs are not active, issue STRPJ SBS(QSYSWRK) PGM(QIWS/QIWVPPJT) **To End:** Ends when the subsystem ends **Product:** 5722–SS1 Option 12 **Server Type:** QIBM_VRT_PRINT	QGPL/QDFTJOBD	QSYSWRK	QIWVPPJT	*YES	No port is used
VPN Connection Manager **To Start:** STRTCPSVR *VPN **To End:** ENDTCPSVR *VPN **Product:** 5722–SS1 **Server Type:** QIBM_VPN	QSYS/QTOVMAN	QSYSWRK	QTOVMAN	*NO	No port is used

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
VPN Connection Manager **To Start:** STRTCPSVR *VPN **To End:** ENDTCPSVR *VPN **Product:** 5722–SS1 **Server Type:** QIBM_VPN	QSYS/QTOKMAN	QSYSWRK	QTOKVPNIKE	*NO	No port is used
WebFacing Server **To Start:** STRTCPSVR *WEBFACING **To End:** ENDTCPSVR *WEBFACING **Product:** 5722–SS1 **Server Type:** QIBM_WEBFACING	QSYS/QSYSJOBD	QSYSWRK	QQFWFSVR	*NO	4004 (as-WebFacing)

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
WebSphere Application Server V4 Advanced Edition, Administration Server **To Start:** Either when SBS starts (default Admin server) or explicit command **To End:** Through WAS UI **Product:** 5733–WA4 **Server Type:** QIBM_WSA_ADMIN	QEJBADV4/QEJBJOBD	QEJBADV4	Configurable (default of QEJBADMIN)	Not applicable	900 9000
WebSphere Application Server V4 Advanced Edition, Application Server **To Start:** Through WAS UI or automatic at start of admin server **To End:** Through WAS UI **Product:** 5733–WA4 **Server Type:** QIBM_WSA_EJBSERVER	QEJBADV4/QEJBJOBD	QEJBADV4	Configurable (default of DEFAULT_SE)	Not applicable	9080

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
WebSphere Application Server V4 Advanced Single Server Edition, Application Server **To Start:** Either when SBS starts (default server) or explicit command **To End:** Through WAS UI **Product:** 5733–WS4 **Server Type:** QIBM_WSA_EJBSERVER	QEJBAES4/QEJBJOBD	QEJBAES4	Configurable (default of DEFAULT_SE)	Not applicable	900 9000 9080
WebSphere Application Server V5 Express **To Start:** Can be started via QShell script or Web ADMIN **To End:** Can be ended via QShell script or Web ADMIN **Product:** 5722–IWE Option 2 **Server Type:** QIBM_WSA_EJBSERVER	QASE5/QASE5	QASE5	Configurable instance name	Not applicable	Configurable

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
WebSphere Application Server V5, Application Server **To Start:** Either when SBS starts (default server) or explicit command **To End:** Explicit command **Product:** 5733–WS5 Option 2 **Server Type:** QIBM_WSA_EJBSERVER	QEJBAS5/QEJBJOBD	QEJBAS5	Configurable (default of SERVER1)	Not applicable	9090 9043 2809 8880 9080 7873 5557 5558 5559 9501 9502 9503
WebSphere Application Server V5 Network Deployment Edition, Application Server **To Start:** Through WAS admin interfaces or automatic at start of node agent **To End:** Through WAS UI **Product:** 5733–WS5 Option 2, 5 **Server Type:** QIBM_WSA_EJBSERVER	QEJBAS5/QEJBJOBD	QEJBAS5	Configurable (default of SERVER1)	Not applicable	9810 8880 9080 7873 9501 9502 9503

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
WebSphere Application Server V5 Network Deployment Edition, Deployment Manager **To Start:** Either when SBS starts (default server) or explicit command **To End:** Explicit command **Product:** 5733–WS5 Option 5 **Server Type:** QIBM_WSA_EJBSERVER	QEJBAS5/QEJBNDJOBD	QEJBASND5	Configurable (default of DMGR)	Not applicable	9090 9043 9809 8879 7989 9401 9402 9403 9100 7277
WebSphere Application Server V5 Network Deployment Edition, Node Agent **To Start:** Either when SBS starts (default instance) or explicit command **To End:** Through WAS UI or explicit command **Product:** 5733–WS5 Option 2, 5 **Server Type:** QIBM_WSA_EJBSERVER	QEJBAS5/QEJBJOBD	QEJBAS5	NODEAGENT	Not applicable	Configurable

Server Name	Job Description	Subsystem	Job Name	Shipped default value for Autostart parameter	Default Port
WebSphere Host On-Demand Service Manager **To Start:** STRTCPSVR *HOD **To End:** ENDTCPSVR *HOD **Product:** 5733–A59 **Server Type:** QIBM_HOST_ONDEMAND	Configurable (default is QGPL/QDFTJOBD)	QSYSWRK	QHODSVM	*NO	8999
Workload Management Server **To Start:** STRWLM (CHGWLMA must be run prior to first start of server) **To End:** ENDWLM **Product:** 5798–WLD **Server Type:** QIBM_WLM_SERVER	QWLMDE/QWLMDE	QSYSWRK	QWLMSVR	Not applicable	Configurable

Check jobs, job logs, and message logs

If you are having problems with TCP/IP connectivity, you should take a look at the jobs that are running on your server. All work on your server is performed through jobs. Most jobs have associated job logs that record the jobs' activities. The job log contains information such as when the job starts and ends, which commands are running, and error messages. Here are some ways to use jobs and job logs to help solve your TCP/IP problems:

- **Verify that necessary jobs exist**
- **Check the job logs for error messages or other indication of problems**
- **Change the message logging level on job descriptions and active jobs**
- **Other job considerations**

Verify that necessary jobs exist

TCP/IP requires that certain basic jobs are running. For normal usage, you need to have the QTCPIP job running in the QSYSWRK subsystem. The QTCPIP job controls starting and ending TCP/IP interfaces. However, you can run TCP/IP when the operating system is in the restricted state. In this case, the QTCPIP job is not active.

In addition, you should have at least one job for each of the servers you are attempting to use.

To verify the required jobs, select one of these interfaces:

- **Verify jobs from a character-based interface**
- **Verify jobs from iSeries Navigator**

Verify jobs from a character-based interface

Verify the QTCPIP job

To find the QTCPIP job using the character-based interface, follow these steps:

1. At the command line, type `WRKACTJOB SBS(QSYSWRK)` (Work with Active Jobs).
2. Press F7 (Find).
3. At **String** type `QTCPIP` to search for the job. When found, the QTCPIP job is displayed at the top of the subsystem/job list.

Verify one job for each server

To verify that you have at least one job for each of the servers you are attempting to use, follow these steps:

1. At the command line, type WRKSBS (Work with Subsystems).
2. View the list of subsystems, and locate QSYSWRK.
3. Select option 8 (Work with subsystem jobs) in front of QSYSWRK, and press Enter.
4. View the list of jobs associated with QSYSWRK. Locate at least one job for each of the applications you are attempting to use and verify that each of the jobs is active.

In addition to verifying active jobs in the QSYSWRK subsystem, you should verify jobs in the QUSRWRK and QSERVER subsystems. If you have servers that run in their own subsystems, you should also check the jobs in those subsystems.

See the server table to find the job name associated to the server you want to verify.

Verify jobs from iSeries Navigator

Verify the QTCPIP job

To find the QTCPIP job, follow these steps:

1. In iSeries Navigator, expand your **iSeries server –> Work Management –> Server Jobs**.
2. From the Edit menu, select **Find (Ctrl+F)**.
3. In the **Search for** field, type **Qtcpip**. All the job columns are searched for the job.
4. Click **Find**. iSeries Navigator will highlight your job once it is found.

Verify one job for each server

To see if you have at least one job for each of the servers you are attempting to use, follow these steps:

1. In iSeries Navigator, expand your **iSeries server –> Work Management –> Subsystems –> Active Subsystems**.
2. Click **Qsyswrk**.
3. View the list of jobs in the **Job name** column in the right pane, and locate at least one job for each of the applications you are attempting to use.

In addition to verifying active jobs in the QSYSWRK subsystem, you should verify jobs in the QUSRWRK and QSERVER subsystems. If you have servers that run in their own subsystems, you should also check the jobs in those subsystems.

See the server table to find the job name associated to the server you want to verify.

Check the job logs for error messages and other indication of problems

A job log is a record of the activities associated with a particular job, such as the time an interface started and processing delays or failures. Job logs help you identify the source of your problem.

To work with job logs, select one of these interfaces:
- **Check job logs from a Character-based interface**
- **Check job logs from iSeries Navigator**

Check job logs using the character-based interface

To access the job log for an active job or server job, follow these steps:

1. At the command line, type WRKACTJOB (Work with Active Jobs).
2. Press F7 (Find) to locate the specific job. See the server table if you need help finding the job name associated to the server.
3. Select option 5 (Work with) in front of the job in the listing.
4. On the Work with Job Display, select option 10 (Display Job Log if Active or on Job Queue), and press Enter. View the messages displayed in the Job Log to help identify problems associated with this job.

Check job logs using iSeries Navigator

To access the job log for an active job or server job, follow these steps:

1. In iSeries Navigator, expand your **iSeries server –> Work Management –> Active Jobs** or **Server Jobs**. You can see a job log from any place within work management that you access jobs (for example, through the subsystem area or the memory pool area).
2. Right-click a job (for example, Qsyswrk) and select **Job Log**. View the messages displayed in the Job Log to help identify problems associated with this job.

To view more details of a message, double-click a specific message ID. A **Message Details** dialog appears. This dialog shows the details of the message as well as the message help. The detailed message gives you information to help solve a problem.

Change the message logging level on job descriptions and active jobs

If you are having problems with TCP/IP or the server jobs, you might need to change the Message logging level text value on the job description or on the active job associated with your TCP/IP server. You should change the Message logging level text value from the default value *NOLIST to *SECLVL. The value *SECLVL causes a job log to be generated. It is helpful to review the job log for messages that can identify problems.

Note that changes to job descriptions do not affect currently running jobs. You must end and then restart the server for the change to take effect.

To change the message logging levels on job descriptions or on active jobs, select one of these interfaces:
- **Change message logging levels from a character-based interface**
- **Change message logging levels from iSeries Navigator**

Change the message logging level from a character-based interface

Change the message logging level on a job description

To change the message logging level on the job description, follow these steps using the character-based interface:
1. At the command line, type WRKJOBD (Work with Job Descriptions), and press F4 (Prompt).
2. For the *Job description* prompt, specify the name of the job description, such as MYJOBD.
3. For the *Library* prompt, specify the library that contains the job description you want to change, and press Enter.
4. On the Work with Job Descriptions display, select option 2 (Change) in front of the job description you want to change, and press Enter.
5. On the Change Job Description display, page down to the **Message logging**.
6. For the *Message Logging* prompt, type 4 for the *Level* parameter, 00 for the *Severity* parameter, *SECLVL for the *Text* parameter, and press Enter.
7. You must end and then restart the server for the change to take effect. At the command line, type ENDTCPSVR *MYSERVER, where MYSERVER is the server you want to stop. Then, type STRTCPSVR *MYSERVER to restart the server. Be aware that if you only type ENDTCPSVR, the default *ALL will end all of the TCP servers.

   If you need to end and restart a server that is not started with the STRTCPSVR command, you need to specify different commands. See the server table for the appropriate commands to end and restart those servers.

Change the message logging level on an active job

To change the message logging level of a server job that is currently active, follow these steps:
1. At the command line, type CHGJOB, and press F4 (Prompt).
2. For the *Job name* prompt, specify the name of the job you want to change, such as MYJOB, and press Enter. See the server table to find the job name associated to your server.
3. On the Change Job display, page down to **Message logging**.
4. For the *Message Logging* prompt, type 4 for the *Level* parameter, 00 for the *Severity* parameter, type *SECLVL for the Text parameter, and press Enter.

Change the message logging level from iSeries Navigator

You must use the character-based interface to change the message logging level text value on a job description.

Change the message logging level on an active job

To change the message logging level of a server that is currently active, follow these steps:

1. In iSeries Navigator, expand your **iSeries server –> Work Management –> Server Jobs**.
2. Right-click the job you want to change and select **Properties**.
3. Click the **Job Log** tab.
4. Select **Create printer output for job log if job ends normally**, select **Print message, cause, and recovery**, and click **OK**.

Other job considerations

Job log maximum size

If you are having problems with storage consumption, you might need to change the job log maximum size on the server job. You should specify a relatively small size for the job log to avoid consuming excessive storage and, in some cases, excessive processing time. These types of resource consumption occur when the system produces job logs. For example, if a repetitive error occurs on a long running server job, your job log fills up with repetitive messages and increases your storage consumption level.

The value specified for the *Job message queue maximum size* (JOBMSGQMX) parameter for the job indicates the size of the job log. This value, along with the rest of the job's properties, is given to the job when the job is started. Some server jobs specify this value in the job description used by the job. Other server jobs specify this value by defaulting to the setting of the QJOBMSGQMX system value.

The recommended value for the *JOBMSGQMX* parameter is 8 MB. You cannot change the value for this parameter by using the Change Job (CHGJOB) command. However, you can change the value by accessing the parameter through the job description using the Change Job Description (CHGJOBD) command.

Job log full action

When the job log reaches its maximum capacity as determined by the *JOBMSGQMX* parameter, several different actions can occur depending on the value specified in the *Job message queue full action* (JOBMSGQFL) parameter for the job. In most cases, the job description indicates *WRAP as the default value. Many server jobs specify this value in the job description used by the jobs.

You should verify that *WRAP is specified for the JOBMSGQFL parameter by accessing the job description. This value ensures that the job log messages overlay one another when the job log reaches its maximum capacity. Be aware that other values, such as *NOWRAP, can cause the server job to end when the job log reaches its maximum capacity.

Check for active filter rules

Your network communications might be failing because IP packet filters are stopping your incoming or outgoing data. Packet filter rules are designed to protect a network by filtering packets according to rules that the network administrator defines. Packet rules might have been created on either your server or the destination system, and the packet rules might filter data that is incoming or outgoing. Rules might have also been defined on one or more intermediate routers.

To find out whether you have active filter rules on your server, follow these steps:

1. In iSeries Navigator, expand your **iSeries server—> Network–> IP policies –> Packet rules**. If the right pane is empty, then your server is not currently using packet rules. If the right pane contains a list of interfaces, then proceed with the next step.
2. Select the interface that you suspect contains the active filter rules.
3. View the list of active packet rules in the right pane. Click **Help** to find out how to edit and work with packet rules.

To remove active filters on the server, type RMVTCPTBL *ALL (Remove TCP/IP Table) at the command line. This command also causes Virtual Private Networking (*VPN) tunnels to fail, so use caution when processing this command.

To find out whether filter rules are active on the destination server, call the network administrator at that location.

Verify system startup considerations for networking

Your network communications might be failing because the server and its associated subsystems and interfaces have not been started properly. You need to start the appropriate subsystems, servers, interfaces, and the TCP/IP stack in the correct order to ensure successful network communications. Follow this order when starting the subsystems, stack, interfaces, and servers. Click each item for more information:

1. Start subsystems.
2. Start the TCP/IP stack.
3. Start interfaces.
4. Start servers.

Depending on your unique hardware and software configuration, it is possible to encounter timing problems during IPL. See timing considerations for details on this potential problem and a solution.

Start subsystems

The following subsystems should be started before you start TCP/IP:

- QSYSWRK
- QUSRWRK
- QSERVER

QSYSWRK and the controlling subsystem are always started for you by the operating system. QUSRWRK and QSERVER are started by the IBM-supplied startup program, so unless you have changed the IBM-supplied startup program these subsystems should be started automatically for you.

If you are using any subsystems other than the IBM-supplied subsystems, you might also need to start these subsystems before you start TCP/IP.

See the Server table to understand how the servers map to the actual jobs and subsystems they represent.

Start TCP/IP

TCP/IP must be started before you can communicate over the network.

Note: The server automatically starts TCP/IP for you when you start the system. However, if you end TCP/IP due to problems so that you need to manually restart TCP/IP, read the following information.

Remember that your line descriptions, network server descriptions, and network interface descriptions should be configured to vary on with TCP/IP. This allows these configuration objects to start at the same time TCP/IP starts. See Vary on communication lines, controllers and devices for more information.

To start TCP/IP, select one of these interfaces:
* **Start TCP/IP from a character-based interface**
* **Start TCP/IP from iSeries Navigator**

Start TCP/IP using the character-based interface

To start TCP/IP, follow these steps:

1. At the command line, type STRTCP.
2. Verify that TCP/IP has started. If TCP/IP was already active when you entered STRTCP, you should receive the message TCP/IP currently active. If TCP/IP was not active and STRTCP started TCP/IP successfully, you should receive the message STRTCP completed successfully.

Start TCP/IP using iSeries Navigator

Note: You can use iSeries Navigator to stop TCP/IP. However, if you stop TCP/IP, you are likely to lose your iSeries Navigator connection to the server because iSeries Navigator requires TCP/IP for its own connection. Therefore, in most situations you should use some form of console to start and stop TCP/IP so that you do not lose the very connection you are working with. In this case and depending on your hardware configuration, you could use a Twinaxial console, Operations Console, or the Hardware Management Console (HMC) to start and stop TCP/IP because these consoles do not require TCP/IP to be started in OS/400.

To start TCP/IP, follow these steps:

1. In iSeries Navigator, select your **iSeries server —> Network**.
2. Right-click **TCP/IP Configuration**, and select **Start**.
3. Verify that TCP/IP has started. You should receive the message TCP/IP currently active.

Start interfaces

Your network communication might be failing because your interfaces have not been activated. Remember these tips to ensure your interfaces are functioning correctly.

* Verify that your interfaces are configured and activated by using Netstat. For those interfaces you always want active, you should specify AUTOSTART (*YES). They will automatically start when TCP/IP is started.
* If you are using profiles for remote access services, such as Point-to-Point Protocol (PPP) or Layer Two Tunneling Protocol (L2TP), you should verify that the profiles are active. To verify the status of the profiles, follow these steps:

  1. In iSeries Navigator, select your **iSeries server —> Network —> Remote Access Services**.
  2. Click **Originator Connection Profiles** or **Receiver Connection Profiles** depending on the type of profile you want to verify, and view the list of profiles in the right pane to verify the status. To start a profile, right-click the profile and select **Start**

If you want any of the remote access services profiles to automatically start when TCP/IP is started, you should specify AUTOSTART (*YES) for those profiles. It might be useful to set the profiles to automatically start with TCP/IP in these types of situations:

– You want to have a constant dialup connection to the ISP.

– You schedule an IPL at midnight and you want the profiles to automatically start during the IPL.

- Verify that the QTCPIP job is active. See Verify that necessary jobs exist for these instructions. The QTCPIP job must be active before you can start or end your interfaces.

- Be aware that your line descriptions, network server descriptions, and network interface descriptions should be configured to vary on with TCP/IP. This allows these configuration objects to start at the same time TCP/IP starts. See Vary on communication lines, controllers, and devices for more information.

Start servers

You might have trouble communicating over TCP/IP if you have not started the appropriate servers. The system is shipped with several servers configured to automatically start when TCP/IP starts. However, you can configure additional servers to automatically start when TCP/IP starts, or you can manually start the individual servers at any time.

Remember that most subsystems required by your servers must be active before the server starts. However, some servers start their own subsystems. See the server table to understand how the servers map to the actual jobs and subsystems they represent.

To start the servers, select one of the following interfaces:
Note: Servers that are required to run iSeries Navigator, such as the remote command server, signon server, server mapper, and database server, must be started from the character-based interface.

- **Start servers from a character-based interface**
- **Start servers from iSeries Navigator**

Start servers from a character-based interface

Configure a server to start when TCP/IP starts

To configure a server to start when TCP/IP starts, follow these steps:

1. At the command line, type CHG*xxx*A where *xxx* is the name of the server. For example, CHGFTPA to work with the attributes of the FTP server.

2. For the *Autostart servers* prompt, type *YES. This will start the number of servers you indicate in the *Number of initial servers* prompt.

3. Specify either the STRTCP (Start TCP/IP) command or the STRTCPSVR SERVER (*AUTOSTART) command to automatically start the server.

Start a server manually

This example shows how to start certain types of TCP servers. See the server table for a list of servers and the commands you can use to start them.

To manually start a server, follow these steps:

1. At the command line, type STRTCPSVR, and press F4 (Prompt).

2. For the *Server application* prompt, specify the servers you want to start, and press Enter.

Start servers from iSeries Navigator

Configure a server to start when TCP/IP starts

To configure a server to start when TCP/IP starts, follow these steps:

1. In iSeries Navigator, expand your **iSeries server —> Network**.

2. Right-click **TCP/IP Configuration** and select **Properties**.

3. On the **Servers to Start** page, select the servers you want to automatically start when TCP/IP starts.

Start a server manually

To manually start a server, follow these steps:

1. In iSeries Navigator, expand your **iSeries server —> Network —> Servers**.

2. Click **TCP/IP**, **iSeries Access**, **DNS**, or **User-Defined**, depending on the type of server you want to start.

3. In the right pane, right-click the server you want to start, and select **Start**.

Note: Some servers cannot be started from iSeries Navigator. Servers that are required to run iSeries Navigator, such as the remote command server, signon server, server mapper, and database server, must be started from the character-based interface.

Timing considerations

OS/400 has the capability to automatically start the necessary subsystems, the TCP/IP stack, lines, interfaces, and servers at the appropriate times during IPL. In most situations, your network communications will start smoothly using this automatic start-up process.

However, depending on your unique hardware and software configuration you might have problems starting the network communication due to timing problems during IPL. Timing problems can occur for several different reasons. For example:

- The processing speed and the number of input-output processors (IOPs) can affect the start-up of the network hardware resource. If your hardware resource is slow to start, it might not be ready when TCP/IP tries to start. Your network communications fail because the TCP/IP interfaces cannot be started.

- You might encounter timing problems if you have customized your server so that you are using subsystems other than the IBM-supplied subsystems. Many subsystems are typically started by the IPL start-up program. However, if you are using customized subsystems that are not recognized by the IPL start-up program, they will not be automatically started at IPL. Your network communications fail because these subsystems have not been started.

If these types of timing problems occur, you can automatically start the subsystems, the TCP/IP stack, interfaces, and servers in the correct order by creating a customized IPL start-up program. You might need to put delays in the start-up program to ensure that each step of the start-up process is initiated at the appropriate time. For example, the subsystems should be started before the TCP/IP stack, and the interfaces should be started after the communications resources are available.

To change from using the default IPL start-up program to using a customized start-up program, follow these steps:

1. Create a customized start-up program.

    Things to consider when creating a new start-up program:

    Note: These steps are defined to ensure that all required resources are active before the next step.

    - Start the subsystems.

    - Allow delays after the subsystems start.

    - Optional: Use the Retrieve Subsystem Information (QWDRSBSD) API to ensure that the subsystems are active. Although this API is not required, it can help you avoid timing problems.

    - Start TCP/IP specifying STRSVR *NO and STRIFC *NO.

    - Start the interfaces with STRTCPIFC *AUTOSTART. Remember that TCP/IP should vary on your communication lines, controllers, and devices.

- Allow delays to ensure the required interfaces are active.
- Start the TCP/IP point-to-point session jobs with STRTCPPTP *AUTOSTART.
- Start the servers with STRTCPSVR *AUTOSTART.
- Start any other servers that are not started with the STRTCPSVR command. Use STRHOSTSVR *ALL.

2. Test the customized start-up program by calling the program. To properly test the program you need to end TCP/IP and the subsystems. However, be aware this can terminate the connections that other users are using. Plan accordingly to test when the system is dedicated to the test.

3. Change the QSTRUPPGM system value to point to your customized start-up program. It is not recommended to directly change QSTRUP.

4. Change the IPL attribute to no longer start TCP/IP automatically when the system is started.

   To change the IPL attribute, follow these steps:

   a. At the command line, type CHGIPLA (Change IPL Attributes), and press F4.

   b. For the *Start TCP/IP* prompt, type *NO. This prevents TCP/IP from starting at IPL, letting your startup program control the startup

Vary on lines, controllers, and devices

Your line descriptions, network server descriptions, and network interface descriptions should be configured to vary on when TCP/IP starts. This allows these configuration objects to start at the same time TCP/IP starts.

To configure your configuration objects to vary on when TCP/IP starts, follow these steps:

1. At the command line, type WRKLIND for the line description, WRKNWSD for the network server description, or WRKNWID for the network interface description, depending on the type of configuration object you want to change.

2. Select option 2 (Change) in front of the object description you want to change, and press Enter.

3. For the *Online at IPL* prompt, type *NO, and press Enter.

Verify the logical partition (LPAR) configuration

If you are having problems communicating among partitions over a virtual Ethernet, you should verify that your logical partitions are configured correctly. The partitions must be configured to be able to communicate with one another. If the partition configuration is wrong, then your TCP/IP configuration will not work even if you configured TCP/IP correctly.

To work with LPAR, you must have *SERVICE special authority. See the chapter on user profiles in

iSeries Security Reference ![icon] for more information about this type of authority.

To verify the LPAR configuration, select one of these interfaces:
- **Verify LPAR from a character-based interface**
- **Verify LPAR from iSeries Navigator**

Verify the LPAR configuration from a character-based interface

To verify the LPAR configuration, follow these steps:

1. At the command line, type STRSST (Start System Service Tools).

2. Type your Service Tools user ID and password.

3. Select option 5 (Work with system partitions).

4. Select option 3 (Work with partition configuration).

5. Press F10 (Work with Virtual Ethernet Configuration).

6. Verify that all the partitions on the virtual Ethernet are configured to communicate with one another.

Verify the LPAR configuration from iSeries Navigator

To verify the LPAR configuration, follow these steps:

1. In iSeries Navigator, expand the primary partition of the system –> **Configuration and Service** –> **Logical Partitions**.
2. Type your Service Tools user ID and password, and click OK.
3. Right-click **Properties**, and select the **Virtual Ethernet** page.
4. Verify that all the partitions on the virtual Ethernet are configured to communicate with one another.

Troubleshoot IPv6–related problems

If you are using IPv6 for network connectivity, you can use several of the same troubleshooting tools as you do for IPv4. For example, tools such as trace route and Ping accept both the IPv4 and IPv6 address formats, so you can use them to test connections and routes for both types of networks. In addition, you can use the Netstat and communications trace functions for IPv6.

Remember these tips when troubleshooting problems that are specific to IPv6:

* Ensure that your IPv6 line is configured and active. This line can be either an Ethernet line or a configured tunnel line.

  To check the status of lines that are configured on the server, follow these steps:

  1. In iSeries Navigator, expand your **iSeries server** –> **Network** –> **TCP/IP Configuration** –> **Lines**.
  2. In the right pane, find the line that should be configured for IPv6 and check the Status column. If the line does not appear in the list, you must configure a line for IPv6 using the **IPv6 Configuration wizard**. See Configure IPv6 for instructions on configuring a line for IPv6.
  3. If the line appears in the list and shows a status of Not loaded, the line is configured but is not loaded into the IPv6 stack configuration. Use the Work with line descriptions (WRKLIND) command in the character-based interface to diagnose the problem on the line.

* If your Ping to an IPv6 address was unsuccessful, verify the address state of both interfaces. Both interfaces should have an address state of Preferred. If either the target or source interface is not in the preferred state, then either choose other interfaces for the test or change the interfaces being used to the correct status and address state.

  To verify or change the address state of the source interface, follow these steps:

  1. In iSeries Navigator, expand your **iSeries server** –> **Network**–> **TCP/IP Configuration** –> **IPv6** –> **Interfaces**.
  2. In the right pane, right-click the IP address associated with the interface, select **Properties**, and select the **Options** page. This dialog allows you to specify a preferred lifetime or valid lifetime for the interface. Repeat these steps to check the state of the target interface address.

Advanced troubleshooting tools

These advanced troubleshooting tools are typically used at the request of IBM service personnel. However, you should familiarize yourself with these tools, then work with an IBM service representative to maximize the benefits of these tools.

If you are reporting your TCP/IP problem to IBM service personnel, you might be asked to provide them with a copy of the configuration files used for TCP/IP processing or a copy of the Integrated File System (IFS) files. Use their instructions for sending the files to them.

> **Licensed Internal Code logs**
> Locate the Licensed Internal Code logs so that you can send the logs to IBM service personnel when requested.

Internal trace (TRCINT)
Use this command to collect data to debug problems associated with the internal operation of the Licensed Internal Code.

Product activity log
Locate the product activity log and work with IBM service personnel to determine why your IP packets are being discarded.

IOP dump
Dump an IOP when requested by IBM service personnel.

Process or task dump
Dump a process or task when requested by IBM service personnel.

Performance
Solve network problems by using the OS/400 performance tools.

Licensed Internal Code logs

This function is typically used at the request of IBM service personnel.

To work with the Licensed Internal Code logs, you must have *SERVICE special authority. See the

chapter on user profiles in iSeries Security Reference for more information about this type of authority.

To check the Licensed Internal Code logs, follow these steps:
1. At the command line, type STRSST (Start System Service Tools).
2. Type your Service Tools user ID and password.
3. Select option 1 (Start a service tool).
4. Select option 5 (Licensed Internal Code log).
5. Contact IBM support personnel for assistance.

Internal trace

This function is typically used at the request of IBM service personnel.

The Internal Trace (TRCINT) command is used to collect data about the internal operation of the Licensed Internal Code. Use TRCINT to debug a problem that you can re-create, but is not visible at the application level. For example, you can use TRCINT to debug Licensed Internal Code in the TCP/IP protocol stack and sockets.

To use the CL commands to perform the internal trace, you must have *SERVICE special authority, or be authorized to the service trace function of Operating System/400 through iSeries Navigator. See the

chapter on user profiles in iSeries Security Reference for more information about this type of authority.

See TRCINT (Trace Internal) command description for parameters and examples associated with this command.

Product activity log

This function is typically used at the request of IBM service personnel.

To work with the product activity log, you must have *SERVICE special authority. See the chapter on user profiles in iSeries Security Reference for more information about this type of authority.

Use the product activity log to view error log data. Whenever a TCP/IP datagram is discarded because of a protocol error, the TCP/IP Licensed Internal Code creates an entry in the product activity log.

You can view entries for discarded datagrams that are outbound or inbound:

- **Outbound datagrams**
  For outbound TCP/IP datagrams, an error is reported to the user and the outbound datagram is discarded. For example, you try to send a datagram over your X.25 connection, but the connection fails.
- **Inbound datagrams**
  Inbound datagrams cause an entry in the product activity log to be created when both of these conditions are met:
  – The Log protocol errors TCP/IP attribute is set to *YES.
  – The datagram has failed one of the TCP/IP protocol validity tests specified in RFC 1122, causing the system to discard it. (**Silently discarded** means the following: Discard the received datagram without reporting an error to the originating host device.) Examples of such datagrams are those with checksums or destination addresses that are not valid.

When a datagram is discarded as described above, the IP and TCP or UDP datagram headers are logged in the detailed data of the product activity log entry. The system reference code for these product activity log entries is 7004.

To display the Product Activity Log, follow these steps:

1. At the command line, start STRSST (Start System Service Tools), and press Enter.
2. Type your Service Tools user ID and password, and press Enter.
3. In the System Service Tools menu, select Option 1 (Start a Service Tool), and press Enter.
4. In the Start a Service Tool menu, select Option 1 (Product Activity Log), and press Enter.
5. Contact IBM support personnel for assistance.

IOP dump

This function is typically used at the request of IBM service personnel.

Process or task dump

These functions are typically used at the request of IBM service personnel.

To use the CL commands to perform a dump, you must have authority to one of these IBM-supplied user profiles:

- QPGMR
- QSYSOPR
- QSRV
- QSRVBAS

See the chapter on user profiles in iSeries Security Reference for more information about these types of authority.

You might be asked by IBM service personnel to perform one of these types of dumps. Click each dump for step-by-step instructions:

- Call stack dump
- Full job dump
- Task dump

Call stack dump

To perform a call stack dump, follow these steps:

1. At the command line, type `DMPJOB`, and press F4 (Prompt).
2. For the *Program* prompt, type `*NONE`.
3. For the *Job structure areas* prompt, type `*NONE`.
4. For the *Objects referenced by address* prompt, type `*NO`.
5. For the *Job threads* prompt, type `*THDSTK`, and press Enter.

Note: This particular set of values is used to get a dump of the call stacks for all threads in the process. This is most useful for multi-threaded jobs.

Full job dump

To perform a full job dump, follow these steps:

1. At the command line, type `DMPJOB`, and press F4 (Prompt).
2. For the *Program to dump, Program* prompt, type `*ALL`.
3. For the *Job structure areas* prompt, type `*ALL`.
4. For the *Objects referenced by address* prompt, type `*YES`.
5. For the *Job threads* prompt, type `*YES`.
6. For the *Thread ID to include* prompt, type `*ALL`.

Task dump

To perform a task dump, follow these steps:

1. At the command line, type `PRTINTDTA`, and press Enter.
2. For the *Type of data* prompt, type `*TASK`.
3. For the *Task name* prompt, specify the task name that your IBM service representative provides to you.
4. Continue this procedure under the guidance of the IBM service representative.

Chapter 4. Troubleshooting problems related to specific applications

If you have determined that your problem lies within a specific application that you're running on TCP/IP, then choose the application below for detailed troubleshooting information. Each link takes you out of the general TCP/IP troubleshooting topic and into a new topic for the application that you choose. If you do not find the application in the list, perform a search for the application you need. Then, use the troubleshooting information provided there.

Domain Name System server (DNS)
This topic provides a flow chart for problem analysis and guides you through debugging strategies for DNS problems.

File Transfer Protocol (FTP)
This topic suggests solutions to your FTP problems and demonstrates the server job log as a troubleshooting tool.

Point-to-Point Protocol (PPP)
This topic offers solutions to common PPP connection problems.

Post Office Protocol server (POP)
This topic helps troubleshoot the POP server and other e-mail applications.

Rexec
This topic provides a flow chart to help you identify your Rexec problem and find potential solutions.

Simple Mail Transfer Protocol (SMTP)
This topic provides several methods for solving problems with Simple Mail Transfer Protocol (SMTP) and other e-mail applications.

Telnet
This topic assists you with general Telnet problems as well as specific problems related to emulation type and SSL server. In addition, find out what information is necessary for reporting the problem.

Virtual Private Networking (VPN)
This topic guides you through several troubleshooting strategies for VPN problems related to connection, configuration errors, filter rules, and more.

Appendix. Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
500 Columbus Avenue
Thornwood, NY 10594-1785
U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

IBM World Trade Asia Corporation
Licensing
2-31 Roppongi 3-chome, Minato-ku
Tokyo 106, Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Corporation
Software Interoperability Coordinator, Department 49XA
3605 Highway 52 N
Rochester, MN 55901
U.S.A.

119

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this information and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement, or any equivalent agreement between us.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. You may copy, modify, and distribute these sample programs in any form without payment to IBM for the purposes of developing, using, marketing, or distributing application programs conforming to IBM's application programming interfaces.

Programming Interface Information

This TCP/IP troubleshooting topic documents intended Programming Interfaces that allow the customer to write programs to obtain the services of version 5, release 3, modification 0 of Operating System/400 (5722–SS1).

Trademarks

The following terms are trademarks of International Business Machines Corporation in the United States, other countries, or both:

CICS
DB2
Domino
DRDA
i5/OS
IBM
iSeries
Lotus
NetServer
Network Station
Notes
Operating System/400
OS/400
QuickPlace
WebSphere

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Other company, product, and service names may be trademarks or service marks of others.

Terms and conditions for downloading and printing publications

Permissions for the use of the publications you have selected for download are granted subject to the following terms and conditions and your indication of acceptance thereof.

Personal Use: You may reproduce these Publications for your personal, noncommercial use provided that all proprietary notices are preserved. You may not distribute, display or make derivative works of these Publications, or any portion thereof, without the express consent of IBM.

Commercial Use: You may reproduce, distribute and display these Publications solely within your enterprise provided that all proprietary notices are preserved. You may not make derivative works of these Publications, or reproduce, distribute or display these Publications or any portion thereof outside your enterprise, without the express consent of IBM.

Except as expressly granted in this permission, no other permissions, licenses or rights are granted, either express or implied, to the Publications or any information, data, software or other intellectual property contained therein.

IBM reserves the right to withdraw the permissions granted herein whenever, in its discretion, the use of the Publications is detrimental to its interest or, as determined by IBM, the above instructions are not being properly followed.

You may not download, export or re-export this information except in full compliance with all applicable laws and regulations, including all United States export laws and regulations. IBM MAKES NO GUARANTEE ABOUT THE CONTENT OF THESE PUBLICATIONS. THE PUBLICATIONS ARE PROVIDED "AS-IS" AND WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE

All material copyrighted by IBM Corporation.

By downloading or printing a publication from this site, you have indicated your agreement with these terms and conditions.

IBM ®

Printed in USA