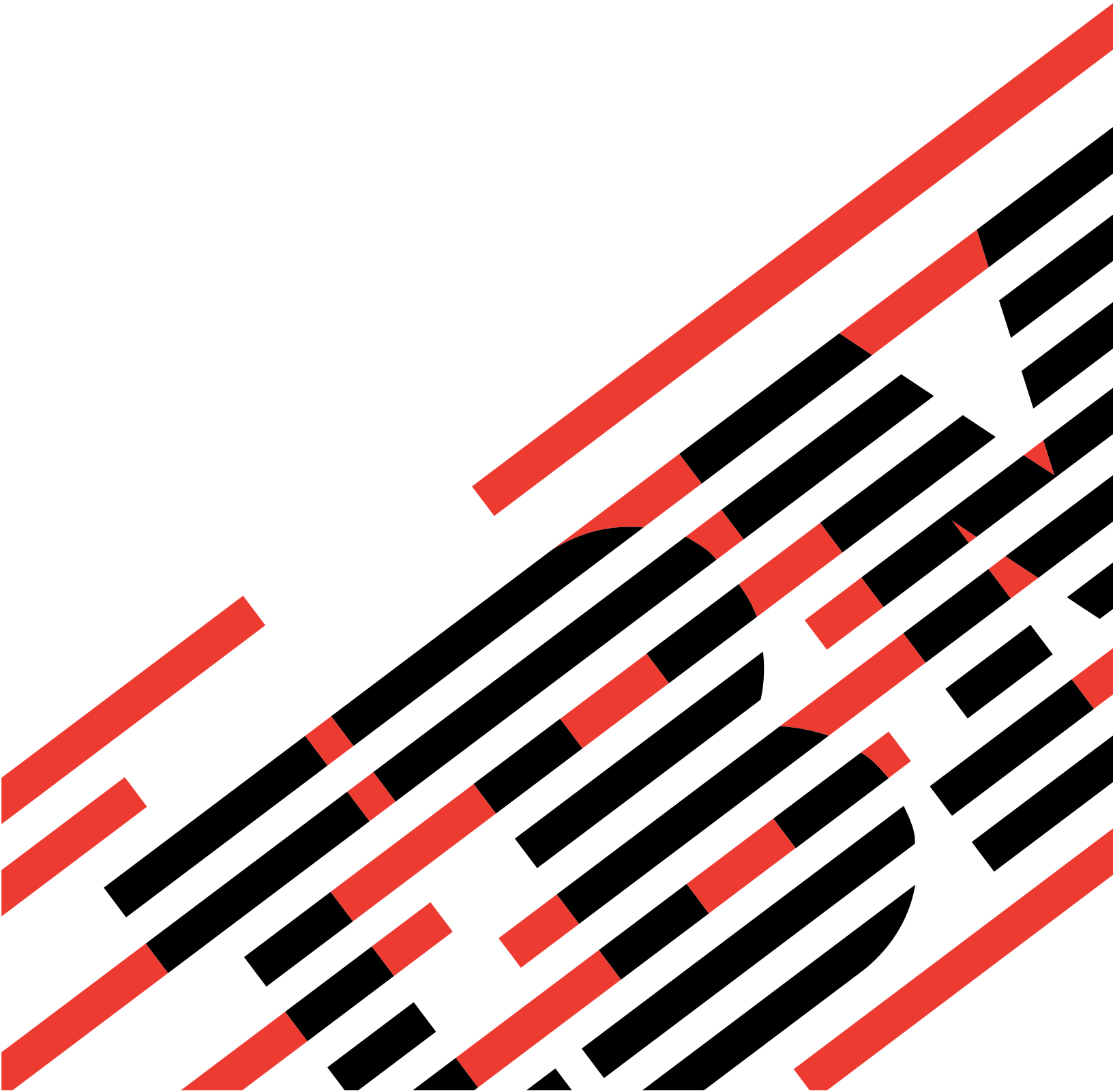
IBM Systems - iSeries

OptiConnect

Version 5 Release 4



IBM Systems - iSeries

OptiConnect

Version 5 Release 4

Note

Before using this document and the product it supports, be sure to read the information in “Notices,” on page 61.

First Edition (February 2006)

This edition applies to version 5, release 4, modification 0 of IBM i5/OS licensed program (product number 5722-SS1) and to all subsequent releases and modifications until otherwise indicated in new editions. This version does not run on all reduced instruction set computer (RISC) models nor does it run on CISC models.

Contents

Chapter 1. OptiConnect

OptiConnect is an iSeries™ system area network that provides high-speed interconnectivity between multiple iSeries servers in a local environment with WAN and LAN technologies.

Read the following information about OptiConnect

Chapter 2. What's new for V5R4

- OptiConnect for OS/400®, SC41–5414, has been obsoleted and the content has been moved into this Information Center topic.
- A new section on "OptiConnect and IP Forwarding" on page 40 has been added. IP forwarding and routing allows systems or partitions that are not connected to the same OptiConnect loop to communicate using TCP/IP.

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

Chapter 3. Printable PDF

To view or download the PDF version of this document, select OptiConnect (about 850 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**.

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Chapter 4. Concepts

OptiConnect refers to both software and hardware functions. OptiConnect software is a priced, optional feature of i5/OS™ and is required to use OptiConnect communications between servers. OptiConnect also refers to the hardware configuration over which OptiConnect software communicates. Not all OptiConnect hardware functions require a license for the OptiConnect software.

Follow these links to learn more about OptiConnect:

- "OptiConnect connectivity advantages"
  A discussion of important OptiConnect concepts such as Distributed Data Management (DDM), horizontal growth, and high availability.
- "OptiConnect and iSeries Clustering" on page 8
  Information about the clustering technologies that can be used with OptiConnect.
- "OptiConnect software capabilities" on page 8
  Read about the features that OptiConnect provides.
- "How OptiConnect works" on page 9
  A high-level overview of OptiConnect.
- "OptiConnect hardware" on page 9
  More information about the various OptiConnect technologies.
- "OptiConnect software" on page 14
  Read more about the software that powers OptiConnect.

OptiConnect connectivity advantages

The planning and managing of a computing system involves many decisions, such as where to place files, where to attach communications lines, and where to locate the most critical applications. Each of the servers involved limit these decisions. These limits include:

- Processing capacity limits
- Distribution of users and applications across servers
- Maximum amount of storage, or maximum number of communications lines that are attached to the server

OptiConnect provides solutions to many of these problems by enabling capacity growth through shared database clustering. The OptiConnect cluster not only will achieve **horizontal growth** and **high availability**, but will aid in data warehousing and database parallelism architectures.

Horizontal growth: By separating database operations from application workload, multiple servers can operate as a cluster to grow computing power beyond what a single server can provide. It is important to understand that not all applications are favorable to this type of workload distribution. The horizontal growth scalability is dependent on the database I/O intensity. The best implementation is the separation of the interactive application from the corresponding data while maintaining the batch application on the same server as the batch data. There are techniques available which transparently manage the batch job submission to the database server.

High availability: OptiConnect can be used to construct highly available solutions. Single-server high availability has an upper limit at the point of failure of that server. However, multiple servers connected together can be used to achieve levels that approach continuous availability. OptiConnect includes a set of application programming interfaces (APIs) that allow application programs access to the high-speed bus transport. These APIs are intended for use by iSeries Business Partners in the development of high availability solutions. For more information about these APIs, see the **Programming** topic in the iSeries Information Center. Applications providing database mirroring using the OptiConnect connections are available from iSeries Business Partners.

Another advantage is that all OptiConnect technologies allow iSeries applications to perform inter-server database accesses across a high-performance interface. The ability to efficiently read and update data on connected servers provides the following benefits:

- Multiple client systems can easily and efficiently access databases on a server by splitting the processor load for an application across client and server systems.

  The client system runs the non-database portion of an application, and the server runs the database activity. Multiple servers provide greater total processing capacity for database access than what a single server can achieve. OptiConnect allows this increased capacity by decreasing processor load and using high-speed connections.
- Customer environments with multiple databases (or databases which can be partitioned into multiple databases) can extend the client/server database model to have multiple servers. Applications can access all the databases across OptiConnect connections regardless of the database location.

  Ideally, applications and users are assigned to the server that has the data that they use most heavily. Less heavily used data can reside on any of the other servers. This allows you to spread applications to achieve the best balance and throughput.
- Duplication of databases can be eliminated to decrease response time.

  For example, if you currently maintain copies of data on several servers, you can connect the servers to achieve consistent response time. All applications can access and update one single database.
- OptiConnect functions can be used to duplicate copies of a database and update the duplicated data more efficiently.

OptiConnect and iSeries Clustering

An iSeries cluster is a collection of one or more servers or logical partitions that work together. Servers in a cluster, called cluster nodes, work cooperatively to provide a single computing solution. Communication between cluster nodes is based on TCP/IP protocols. OptiConnect software can be used to provide this communication between cluster nodes. The major cluster communication functions supported by OptiConnect include cluster heartbeat, application IP takeover, and device IP takeover. For more information, see the Clusters topic.

OptiConnect software capabilities

- Distributed Data Management (DDM)

  All Distributed Data Management (DDM) operations for supported object types can run across OptiConnect, including data files, data areas, and data queues.
- Distributed Relational Database Architecture™ (DRDA®)

  OptiConnect supports Structured Query Language (SQL) applications by using the Relational Database Directory to control access to databases on remote servers.
- DB2® Multisystem

  DB2 Multisystem with its DB2 UDB for iSeries support for multi-node files will run across OptiConnect, providing data warehouse functions of IBM® Query for iSeries support and two-phase commit.
- ObjectConnect

  ObjectConnect will operate over OptiConnect to provide high-speed, server-to-server Save/Restore. For more information, see the Backup and Recovery topic.
- Standard APPC Conversations

  Standard APPC Conversations are available over OptiConnect with an OptiConnect communication controller. For more information, see the APPC Programming book.
  - OptiConnect controller type *OPC support
  - Two-phase commit
  - Multiple mode support

- System Network Architecture Distribution Services (SNADS)
  This allows for SNADS, display station pass-through, network printer pass-through, and other functions across OptiConnect. See the SNA Distribution Services book for more information.
- Socket Support
  This function allows applications that utilize Transmission Control Protocol/Internet Protocol (TCP/IP) to communicate over OptiConnect when running in an iSeries multiple node network with HSL OptiConnect, virtual OptiConnect, or SPD OptiConnect environment.
- Products are available from iSeries Business Partners that provide efficient database mirroring for OptiConnect networks.

How OptiConnect works

The OptiConnect network connects multiple unique servers or partitions, using one of the three high-speed internal bus technologies available on the iSeries servers. The mechanism used by OptiConnect software to access database files on another server is modeled after the mechanism used by Distributed Data Management (DDM). DDM uses a DDM file and advanced program-to-program communications (APPC) to redirect file access operations to another server. Similarly, OptiConnect uses DDM files and a special transport service to redirect file access operations to another server in an OptiConnect network. Thus, OptiConnect can achieve transport efficiencies that are not possible with a more general purpose, wide-area communications protocol.

Two things differentiate OptiConnect from traditional communications based distributed operations. The first is a high-speed connection mechanism that takes advantage of the I/O bus or memory bus structure to connect multiple servers or partitions. The second is a device driver that is embedded in the operating system. This device driver streamlines the application access to data on a remote server. Once OptiConnect establishes server connections, much of the APPC protocol stack is bypassed. The OptiConnect fast-path connection for database transactions provides DDM access to databases anywhere in the OptiConnect network at a fraction of the standard communications code path. Data warehouse, Distributed Relational Database Architecture (DRDA), and data propagation functions (such as journaling) can use this technology.

OptiConnect hardware

For more information on the various types of OptiConnect technologies, see

- “HSL OptiConnect”
  A high speed physical OptiConnect connection using an HSL OptiConnect loop.
- “Virtual OptiConnect” on page 11
  A virtual connection between two logical partitions running on the same server.
- “SPD OptiConnect” on page 12
  A high speed physical OptiConnect connection using SPD bus technology.
- “Mixed technology environments” on page 13
  How to use HSL OptiConnect, Virtual OptiConnect, and SPD OptiConnect in the same system.

HSL OptiConnect

HSL OptiConnect is the term used to refer to the OptiConnect licensed software providing high speed server-to-server connectivity between two or three servers which are connected to each other through an HSL OptiConnect loop. It also refers to the HSL Loop technology used to connect two or three physical servers together on a single loop. Each server may have one or more LPAR partitions participating in the OptiConnect network.

While each HSL OptiConnect loop is limited to three servers, OptiConnect software will support multiple HSL OptiConnect loops between servers, providing loop redundancy in addition to the hardware

redundancy provided within each HSL loop. It should be noted that any LPAR partition on the server may be allowed to participate in the HSL OptiConnect loop functions without additional cost.

To activate Virtual OptiConnect communications between LPAR partitions, the OptiConnect licensed software must be installed on all of the partitions where you want to use Virtual OptiConnect and the OptiConnect subsystem must be started on each of these partitions.

On 5xx models, from the Hardware Management Console (HMC), select Server Management and then select the local partition profile properties. Under the OptiConnect tab select Use High Speed Link (HSL) OptiConnect. In order for the change to take effect, you must activate the partition from the HMC.

On 8xx models, use the dedicated service tools (DST) or system service tools (SST) to configure each LPAR partition into the HSL OptiConnect loop environment. From the primary partition set the communication option ″Connect to HSL OptiConnect″ to ″yes″ for each partition (in addition to the primary) that uses the OptiConnect function.

The following figure shows an example of two servers that are connected through an HSL OptiConnect loop. When OptiConnect software is installed and running, a high-speed server-to-server connection is maintained. Two servers can have more than one HSL loop that connects them together, providing the server model supports more than one HSL OptiConnect loop.

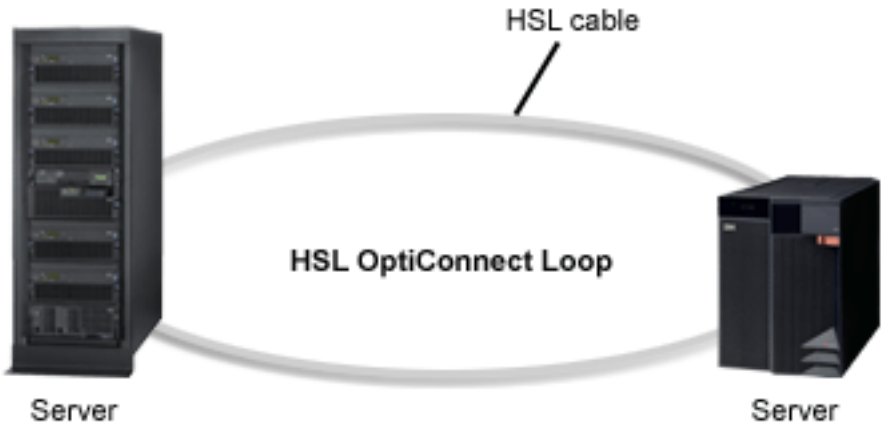

Figure 1. HSL OptiConnect

There are two HSL cabling types: HSL and HSL-2. Servers and expansion units may have HSL or HSL-2 cable ports, depending on the model. Both types are supported on an HSL OptiConnect loop by using an HSL to HSL-2 cable.

HSL OptiConnect loops also support the use of HSL fiber-optic cables. This technology is offered on some models. The entire HSL OptiConnect loop must use the fiber-optic cables.

The following figure shows an example of a three-server HSL OptiConnect loop. All servers in a three-server HSL OptiConnect loop must be at the minimum operating system release level of the most current hardware.

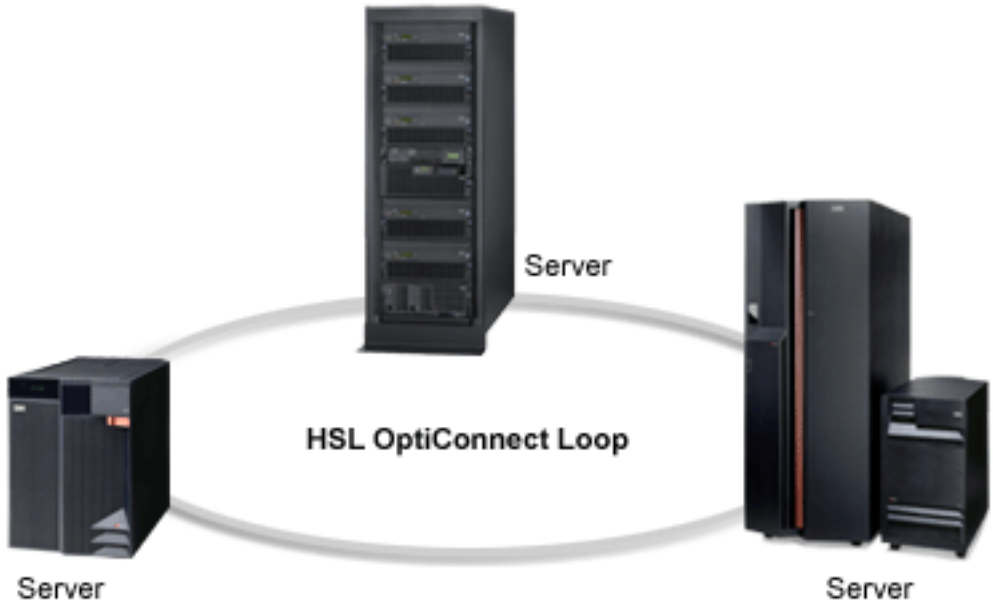

Figure 2. Three server HSL OptiConnect Loop

Additional information about HSL cabling can also be found on the High Availability and Clusters Web Site (www.ibm.com/servers/eserver/iseries/ha).

Virtual OptiConnect

Virtual OptiConnect is the term used to refer to OptiConnect licensed software providing high speed server-to-server connectivity between two or more LPAR partitions on a single server using memory-to-memory bus technology. There is no additional hardware required to support Virtual OptiConnect.

To activate Virtual OptiConnect communications between LPAR partitions, the OptiConnect licensed software must be installed on all of the partitions where you want to use Virtual OptiConnect and the OptiConnect subsystem must be started on each of these partitions.

On 5xx models, from the Hardware Management Console, select Server Management and then select the local partition profile properties. Under the OptiConnect tab select Use Virtual OptiConnect. In order for the change to take effect, you must activate the partition from the HMC.

On 8xx models, use the dedicated service tools (DST) or system service tools (SST) to configure each LPAR partition into the OptiConnect network. From the primary partition set the communication option ″Connect to Virtual OptiConnect″ to ″yes″ for each partition (in addition to the primary) that uses the OptiConnect function.

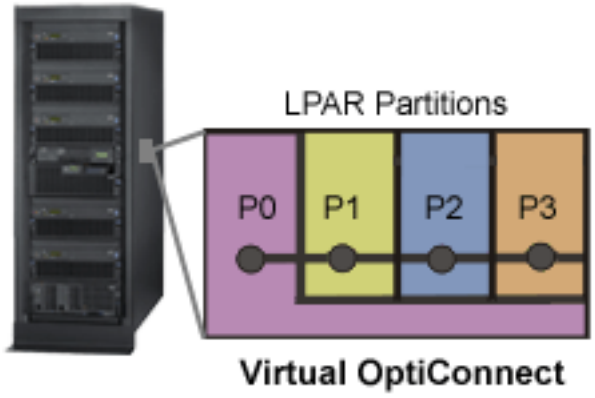

Figure 3. Virtual (inter-partition) OptiConnect

SPD OptiConnect

SPD OptiConnect is the term used to refer to OptiConnect licensed software providing high speed server-to-server connectivity between servers which are connected to each other through SPD bus technology. SPD OptiConnect requires a SPD bus which is available on earlier iSeries server models and supported through the 5077 SPD migration unit supported on some iSeries 8xx models. iSeries server models with HSL-2 ports do not support SPD OptiConnect.

The servers in a SPD OptiConnect network share a common external optical system bus that is located in a dedicated expansion unit or frame (also called a SPD OptiConnect hub unit). The server that provides this system bus is called the **hub** server. The hardware used to create a hub server for a SPD OptiConnect network consists of a dedicated system I/O expansion unit or frame. Each server that plugs into this bus with an OptiConnect Receiver card is called a **satellite** server. Each satellite server dedicates one of its external system buses to connect to the receiver card in the hub server's expansion unit or frame.

Redundancy is supported on SPD OptiConnect networks through SPD bus redundancy. Redundancy requires a second SPD OptiConnect Hub, an extra set of OptiConnect Receiver cards, and an extra I/O expansion unit or frame, along with another set of cables.

Note: Servers attached to the hub server do **not** use the hub server's CPU resources.

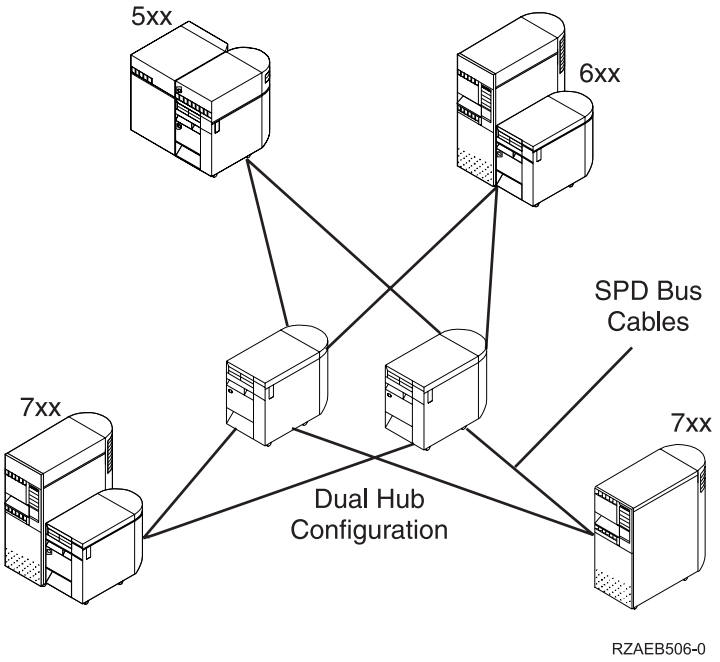

Figure 4. SPD OptiConnect

Figure 4 shows a dual bus configuration, providing full redundancy in the SPD OptiConnect system area network. If one of the hub servers fail, the SPD OptiConnect network remains up, and all communications activity is run through the other hub. When both hubs are operating, the communications traffic is shared between both. This increases the bandwidth with two paths available for use.

An SPD OptiConnect network can consist of up to 14 servers (one hub and 13 satellites) with full server-to-server connectivity. A satellite server can communicate with both hub servers and all satellite servers on the same shared bus. Interoperability between operating system versions is maintained so that servers at different release levels can be connected in the same SPD OptiConnect network. With additional hubs, up to 32 servers can be supported.

iSeries models 840, 830, and 270 can participate in an SPD OptiConnect environment by using a migration unit.

For more information about SPD OptiConnect (including information about supported models) see the High Availability and Clusters Web Site (www.ibm.com/servers/eserver/iseries/ha).

Mixed technology environments

OptiConnect supports all three bus technologies within a single OptiConnect network. OptiConnect will always configure Virtual OptiConnect when possible. If there is more than one possible connection between any two servers it will configure both HSL OptiConnect and SPD OptiConnect and alternate between them.

Figure 5 on page 14 shows an example of a mixed technology environment. In this figure, the iSeries 830 and 840 model servers can participate as OptiConnect nodes in both SPD and HSL OptiConnect environments. A migration unit is required to allow some 8xx model servers to participate in an SPD OptiConnect network. Servers with the current HSL-2 port technology do not support the attachment of migration units. There is no seamless upgrade path for an SPD based 7xx model server in an SPD OptiConnect network to a current model iSeries server in an HSL OptiConnect network.

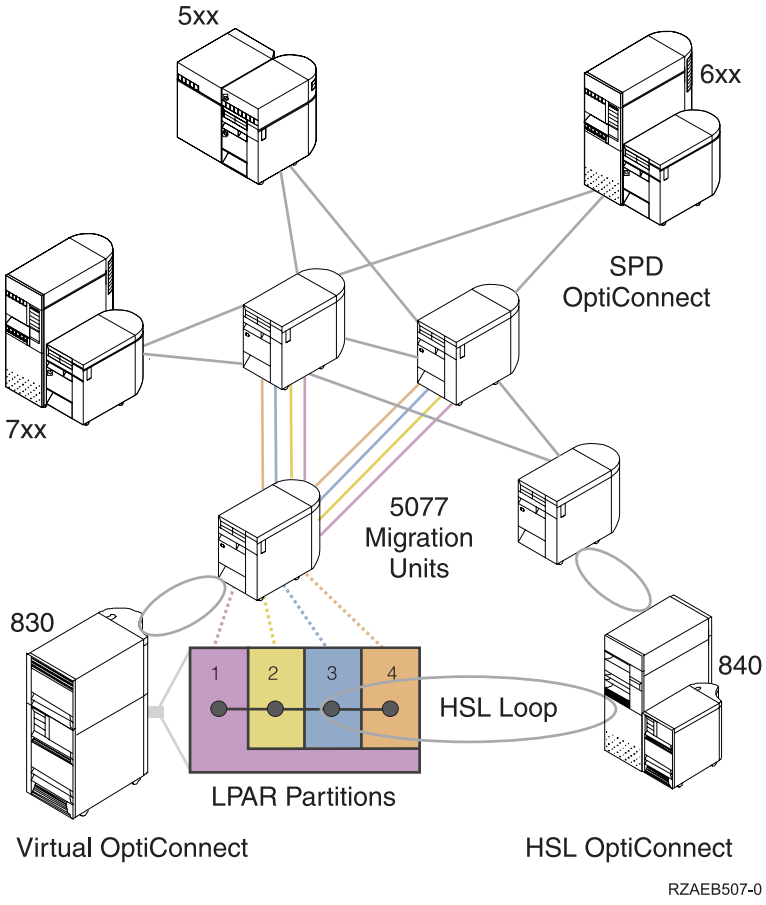

Figure 5. OptiConnect interoperability

OptiConnect software

A discussion of the software which powers OptiConnect.

Application structure

An OptiConnect cluster will usually have a database system and one or more application systems. The system where the database resides is the **database** system, and the systems that contain the applications are called **application** systems. The OptiConnect software allows a program on the application system to make database changes or database queries on the database system. Central Processing Unit (CPU) work load ratios of under 30% database and 70% application will benefit the most by distributing work loads between systems in the OptiConnect network. Figure 6 on page 15 illustrates an example of this type of setup.

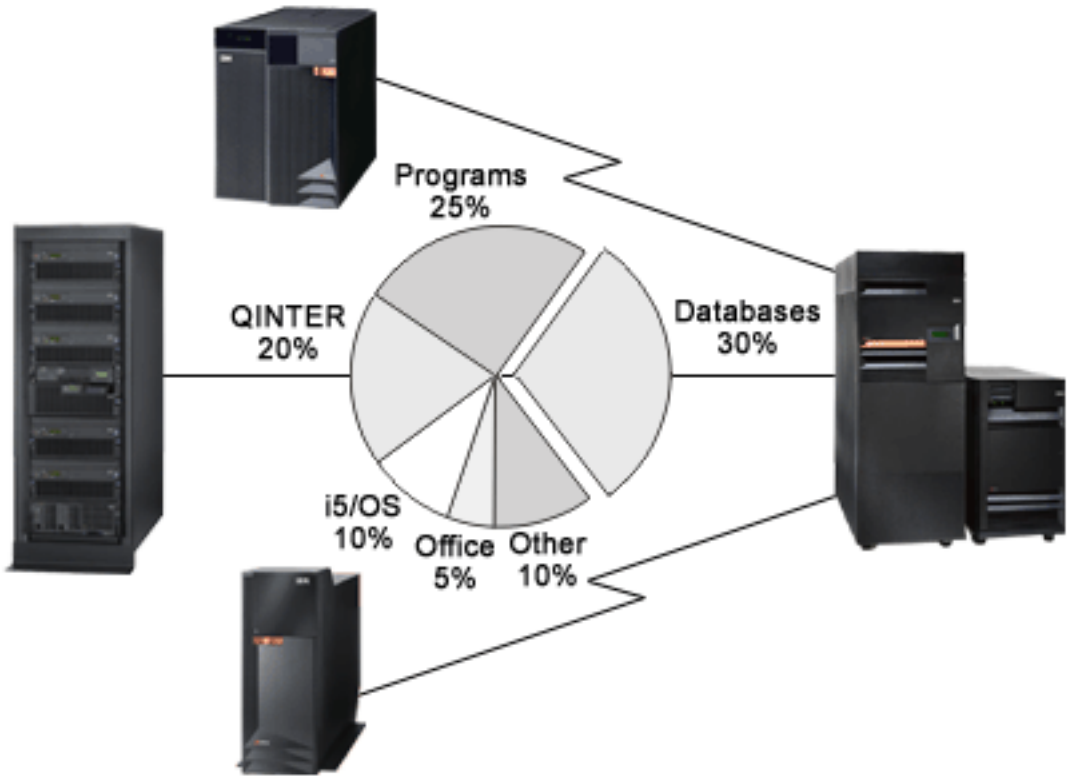

Figure 6. CPU Utilization by OptiConnect

Another important consideration is whether the application is batch or interactive. This clustering technology is optimal for interactive workloads. Batch workloads require special considerations and may not be appropriate for use in an OptiConnect environment. However, solutions can be designed to effectively handle a mixture of batch and interactive workloads, as well as multiple database and application methods. Applications with heavy database activity and large numbers of file open and close operations may not realize the full potential of the OptiConnect technology.

When a program opens a database file, the associated DDM file or RDB entry identifies the database system name. The OptiConnect Connection Manager on the application system sends the database request to the database system by using a fast *device driver*. The OptiConnect communication link provides access at a fraction of the DDM system overhead because its communications protocol operates only in a specific shared bus environment. The OptiConnect Connection Manager connects the request with an agent job on the database system. Agent jobs work with the database code to issue the request and route the result back to the application system.

OptiConnect components

The following list outlines the basic required components of OptiConnect. They should not be deleted for any reason.

Library

The QSOC library holds all the objects that are used by OptiConnect:

- Programs
- Files
- Classes
- Commands

- Data areas
- Panel groups
- Subsystem Description
- Product loads
- Job Queue
- Job descriptions

Subsystem
The OptiConnect connection manager jobs and agent jobs run in the QSOC subsystem unless a mode table has been configured to run under a different subsystem. See “Use of mode tables” on page 33.

Jobs
OptiConnect has two kinds of jobs: The OptiConnect Connection Manager job (SOCMGR) and the agent jobs (SOCA*nnnnnn*). The SOCMGR job manages OptiConnect resources. There is one SOCMGR job per system. The SOCA*nnnnnn* job (agent) interfaces with the database on behalf of the application system. Each of the agent jobs is a data access job that works to get data to and from the remote system.

Job Descriptions
There are three job descriptions for OptiConnect: QYYCMGR, QYYCDTSU, and QYYCSRA. QYYCMGR is the job description for the SOCMGR job. QYYCDTSU is the job description for all SOCA*nnnnnn* jobs. QYYCSRA is the job description for the ObjectConnect Save/Restore agent jobs. These job descriptions are shipped as part of OptiConnect.

Job Queue
The QSOC job queue is used to submit OptiConnect jobs to the QSOC subsystem.

Autostart job
The SOCMGR job is automatically started when the QSOC subsystem is started.

User Profile
The OptiConnect Connection Manager job runs under the QSOC user profile. The OptiConnect agent jobs run under QUSER user profile and can be changed through the QYYCDTSU job description. The agent job’s authority and library list can also be changed through the job description QYYCDTSU. See “Customize OptiConnect” on page 26.

Routing Entries
The routing entries used in starting subsystem jobs have compare values of QYYCDTSU, QYYCMGR, QYYCSRA, and QZDMAGNT.

Commands
OptiConnect commands are:

- WRKOPCACT (Work with OptiConnect Activity): Displays information on the number of transactions and number of bytes that are read and written for both application and database systems. It also provides information about the connection status to other systems.
- DSPOPCLNK (Display OptiConnect Link Status): Shows pertinent link information about multiple systems that are connected using the fiber-optic bus or HSL environment.
- VFYOPCCNN (Verify OptiConnect Connection): Runs the OptiConnect Installation Verification process. See “Verify installation” on page 20.

QSOC subsystem

The OptiConnect system jobs, as delivered by IBM, are set up to run in the QSOC subsystem. You can find a description of the QSOC subsystem in the QSOC library. To view the description, enter the following Display Subsystem Description (DSPSBSD) command:

```
DSPSBSD (QSOC/QSOC)
```

The subsystem description contains information on many items. The following information pertains specifically to the OptiConnect operating environment:

- **Autostart job entries**

  Autostart job entries list jobs that are initiated when the subsystem is started. An autostart job is defined for the QSOC subsystem and runs when the subsystem is started. This job initiates the OptiConnect Connection Manager job, SOCMGR.

  When you choose option 3 on the Display Subsystem Description display, you receive a display that lists the autostart entries. Figure 7 shows an example of the Display Autostart Job Entries screen.

```
                      Display Autostart Job Entries
                                                          System: SYSTEMA
Subsystem description:   QSOC           Status:  Active

Job            Job Description     Library
SOCMGR           QYYCMGR           QSOC
```

Figure 7. Display Autostart Job Entries

- **Job queue entries**

  You can display the job queue entries by choosing option 6 on the Subsystem Description display. The Display Job Queue Entries display shows the queues from which jobs are taken when a given subsystem is run. Figure 8 shows an example of the job queue entries that are defined in the QSOC subsystem.

```
                      Display Job Queue Entries
                                                          System: SYSTEMA
Subsystem description:   QSOC           Status:  Active

Seq   Job                   Max  ---------Max by Priority----------
Nbr   Queue      Library   Active  1   2   3   4   5   6   7   8   9
 10   QSOC       QSOC      *NOMAX  *   *   *   *   *   *   *   *   *
```

Figure 8. Display Job Queue Entries

- **Routing entries**

  You can display the routing entries detail by choosing option 7 on the Subsystem Description display. Figure 9 on page 18 is an example of a Display Routing Entry Detail display which shows a compare value of QYYCDTSU. This value is matched against the routing data field in the job description that is placed in the job queue for this subsystem. When the job is pulled off the job queue, the routing data is compared to all of the routing entries in the subsystem. When a match is found, the program that is listed for the routing entry is run. The program is run using the class that is specified for that job.

```
                      Display Routing Entry Detail
                                                              System:  SYSTEMA
Subsystem description:   QSOC           Status:    Active

Routing entry sequence number . . . . . :   10
Program . . . . . . . . . . . . . . . . :   QYYCDTSU
  Library . . . . . . . . . . . . . . . :     QSOC
Class . . . . . . . . . . . . . . . . . :   QYYCAGNT
  Library . . . . . . . . . . . . . . . :     QSOC
Maximum active routing steps  . . . . . :   *NOMAX
Pool identifier . . . . . . . . . . . . :   1
Compare value . . . . . . . . . . . . . :   'QYYCDTSU'

Compare start position  . . . . . . . . :   1




                                                                      Bottom
Press Enter to continue.

F3=Exit     F12=Cancel    F14=Display previous entry
```

Figure 9. Display Routing Entry Detail

Each entry on this display is described in detail in the OS/400 Work Management V4R4 (SC41-5306-03) book.

OptiConnect job descriptions

The job descriptions for the SOCMGR and SOCA*nnnnnn* jobs are already defined in the QSOC library when you install OptiConnect. SOCMGR job uses QYYCMGR job description, and the SOCA*nnnnnn* jobs use QYYCDTSU job description. These job descriptions may be altered to fit the customer environment.

The Connection Manager job, SOCMGR, maintains the agent jobs through the request data in the job description, QYYCMGR. To change this, see “QYYCMGR job description” on page 29.

The default value for OptiConnect agent jobs, SOCA*nnnnnn*, runs under the **QUSER** user profile. See “Change QUSER access authority” on page 27 for more information.

Chapter 5. Install OptiConnect

This information describes the requirements needed for software and hardware, and how to verify server-to-server connections.

For additional information about hardware and software requirements, see the High Availability and Clusters Web Site (www.ibm.com/servers/eserver/iseries/ha).

Note: You can either install the hardware or software first, depending on what is most convenient for you.

Follow these steps to install OptiConnect

1. “Software requirements”
2. “Hardware requirements”
3. “Install OptiConnect” on page 20
4. “Verify installation” on page 20

Software requirements

You need to install OptiConnect (5722–SS1 Option 23 - OptiConnect) on your iSeries server. OptiConnect software is a priced feature of i5/OS.

Note: If you have a three-system HSL OptiConnect loop, all systems must be at V5R2 or later.

Hardware requirements

OptiConnect hardware requirements are dependent on the technology used:

- **HSL OptiConnect:** On models supporting the High Speed Link, there is no additional hardware required other than standard HSL or HSL-2 cables to connect the system into the HSL Loop.

  For information on HSL cabling, see the HSL cabling information under the “Plan for hardware and software” topic in the iSeries Information Center. Additional information about HSL cabling can also be found on the High Availability and Clusters Web Site (www.ibm.com/servers/eserver/iseries/ha).
- **Virtual OptiConnect:** In a logical partitioning environment, there is no additional hardware required since the connectivity between logical partitions is internal to the server. The hardware communication option HSL OptiConnect must be activated for each LPAR using the HSL OptiConnect function. The hardware communication option virtual OptiConnect must be activated for each LPAR using the virtual OptiConnect function.
- **SPD OptiConnect:** On models supporting the SPD system bus, OptiConnect Receiver cards are installed in a dedicated I/O expansion unit hub, each connecting to a satellite server using standard system bus SPD fibre-optic cables.

  The table below shows SPD OptiConnect hardware and Feature Codes.

Table 1. Hardware required for SPD OptiConnect server

Type	Feature Code	Description
1063Mbps OptiConnect Receiver card	2685	This card is placed in the Hub server dedicated I/O expansion unit, and connects to a satellite server.
266Mbps OptiConnect Receiver card	2683	This card is placed in the Hub server dedicated I/O expansion unit, and connects to a satellite server.
Optical Link (1063Mbps) card	2688	This card connects a Satellite server to a 1063Mbps OptiConnect Receiver card, type 2685.

Table 1. Hardware required for SPD OptiConnect server (continued)

Type	Feature Code	Description
2686: Optical Link (266 Mbps) card	2686	This card connects a Satellite server to a 266Mbps OptiConnect Receiver card, type 2683.

Install OptiConnect

To install OptiConnect:

1. Sign on to the system as the security officer (QSECOFR).
2. Enter:

   ```
   GO LICPGM
   ```

   Press the Enter key.
3. Select option 11 (Install licensed programs) from the Work with Licensed Program display and press the Enter key. The Install Licensed Programs display is shown.
4. Type a 1 next to product option 23 for OptiConnect. Then, press Enter.

When you install OptiConnect, library QSOC is installed on theiSeries server. For more information on this library, see “QSOC subsystem” on page 16.

Optional features of i5/OS that you may install are considered to be additional licensed programs. For more information on this installation procedure, see the information on installing additional licensed programs in the Install, upgrade, or delete i5/OS and related software topic.

If you need to remove OptiConnect from your system, use the Delete Licensed Program (DLTLICPGM) command. You can back up the licensed program by using the Save Licensed Program (SAVLICPGM) command.

To find out how to save a copy of your system, see the Backup and Recovery topic.

Verify installation

To ensure that the OptiConnect code and objects have been installed correctly, run the Check Product Option (CHKPRDOPT) command.

To verify a successful installation, follow these steps:

1. Start the OptiConnect subsystem. Enter the following command on all systems:

   ```
   STRSBS QSOC/QSOC
   ```
2. Check the operator messages for the messages that were issued when QSOC subsystem was started. Enter the following command on all systems:

   ```
   DSPMSG *SYSOPR
   ```

   The following messages should appear after a successful initiation of the OptiConnect Connection Manager:

   ```
   Subsystem QSOC in library QSOC starting.
   Subsystem QSOC started.
   OptiConnect connection manager started at mm/dd/yy hh:mm:ss.
   OptiConnect connected to SYSTEMA using SOC01 at mm/dd/yy hh:mm:ss.
   OptiConnect connected to SYSTEMB using SOC02 at mm/dd/yy hh:mm:ss.
   ```

   The number of messages (and adapter types within the messages) you see depend on the following:
   - Your hardware configuration
   - The systems to which you are connected

- The systems that have started the OptiConnect subsystem

3. Enter the command VFYOPCCNN from the command line

   This begins the installation verification. It ensures system-to-system connection within the cluster. Check your joblog for the completion message.

   ```
   OptiConnect verification test completed with no errors.
   ```

4. Use the Work with OptiConnect Activity (WRKOPCACT) command to check the OptiConnect activity on the systems in the cluster. Enter:

   ```
   QSOC/WRKOPCACT
   ```

   You should see activity as a result of the Verify OptiConnect Connection (VFYOPCCNN) procedure. VFYOPCCNN causes the system to act as a *client* to each of the other systems in the network. See “Work with OptiConnect activity (WRKOPCACT)” on page 45 for more information on how to use this command.

5. To confirm that the hardware connections are operational and show the operational status of the bus receiver cards, enter:

   ```
   WRKHDWRSC TYPE(*CSA)
   ```

   The Work with Hardware Resources (WRKHDWRSC) command TYPE(*CSA) displays a resource for each remote system that had, at some point, an operational connection to the system on which you are entering the command. See “Work with hardware resources (WRKHDWRSC)” on page 52.

Chapter 6. Configure OptiConnect

Any iSeries server application that was written to use Distributed Data Management (DDM) can use OptiConnect. This is true for existing applications as well as new applications. Many applications that use an iSeries server database can transparently use DDM without changes to the application. OptiConnect uses the same mechanism as traditional DDM, where the DDM file controls access to a database. Applications that access a database by using OptiConnect DDM can also use traditional APPC DDM to access another database at the same time.

There are two ways to route data requests through OptiConnect. The first is the **Fastpath OptiConnect** method and involves specifying a special keyword in the DDM file. The second method involves setting up **Extended Function Path OptiConnect**. If you are using the Fastpath method, OptiConnect agent jobs start in the OptiConnect Connection Manager and run in the QSOC subsystem. These jobs follow the OptiConnect job naming convention. Fastpath OptiConnect is the faster means of communication due to shorter code path, but two-phase commit protocols are not supported.

If the Extended Function Path method is used, OptiConnect agent jobs are started by the advanced program-to-program communications (APPC) attach manager and run in QCMN subsystem. The agent job names follow the standard DDM naming conventions for communication jobs. Two-phase commit protocols are supported.

The following information discusses the various ways you can configure OptiConnect:

Configure fastpath OptiConnect routing

Fastpath OptiConnect utilizes a special device description of QYCTSOC. When an APPC conversation is directed at this device, the OptiConnect device driver redirects the conversation through the OptiConnect bus. This will bypass most of the standard DDM, DRDA, and APPC code.

Note: The QYCTSOC device description will be created during the software installation, but will always remain varied off. This device description is necessary and should not be deleted.

To route data requests over OptiConnect by using the Fastpath method, you need to specify the **QYCTSOC** keyword in the device description parameter of the DDM file. You can use either the Create Distributed Data Management File (CRTDDMF) command, or the Change Distributed Data Management File (CHGDDMF) command to add this information.

When you create a new DDM file, do the following:

- For the Remote Location parameter, specify the system name of the target system where the request will be performed. (Display Network Attributes (DSPNETA) for the system name)
- When you have entered the rest of the information, press F10 (Additional parameters), page down (F8), and enter QYCTSOC for the device description.

  OptiConnect does not specifically use the other parameters on the CRTDDMF command. However, make sure that you have specified a valid selection (either *NO or *YES) for the Share Open Data Path parameter.

  Note: When you specify QYCTSOC for the device, the remote location parameter is limited to a valid iSeries server name.

When you change an existing DDM file, do the following:

- Enter the name of the DDM file and the library. Press Enter.
- For the Remote Location parameter, specify the name of the target system where the request will be performed. Press F10 (Additional parameters).
- On the Additional Parameters display, page down (F8), and enter QYCTSOC for the device description.

  OptiConnect does not specifically use the other parameters on the CHGDDMF command. However, make sure that you have specified a valid selection for the Share Open Data Path parameter.

OptiConnect, by default, will accept any value in the **mode** parameter of a DDM file. However, if you want OptiConnect Agent jobs to start with the USRPRF specified in the QYYCDTSU job description, then you must use QYCTSOC in the mode parameter. Any other value in the mode parameter will result in the OptiConnect Agent job starting with the USRPRF, and the job description that initiated the DDM conversation. For more information, see “Use of mode tables” on page 33.

Configure extended function path routing

Extended function path OptiConnect requires the configuration of an APPC device and controller. The controller description will have a type of *OPC, indicating to the device driver layer to use the bus. However, you cannot bypass some of the communication layers, as with the Fastpath method. This method is necessary for certain functions like two-phase commit, and some Lotus® Domino® Applications (LS:DO) that use LS:DO to access remote data. This is known as Extended Function Path OptiConnect.

To route data requests through OptiConnect without using the special device keyword, you create OptiConnect controllers and devices of type *OPC. The *OPC controller needs to be link type of *OPC. The remote system name must be the name of the target system.

Use the following commands to configure the *OPC controller:

1. Create the controller description.

   ```
   CRTCTLAPPC CTLD(name) LINKTYPE(*OPC) RMTSYSNAME(sysname)
   ROLE(*PRI or *SEC) DSAP(##)
   ```

   You must create a pair of *OPC controllers (one on each of the two systems that uses OptiConnect to communicate). The Data Link Role of one system must be *PRI (primary), and the other must be *SEC (secondary). Setting the destination service access point (DSAP) value will set both the source service access point (SSAP), and DSAP parameters. The DSAP value must be valid and identical for both controllers on both systems in the pair. Valid values are 04, 08, 0C, 10, 14, ...78, 7C.

   The following is an example of creating an *OPC controller on two systems: SYSTEMA and SYSTEMB. To create a controller on SYSTEMA to connect to SYSTEMB, enter the Create Controller Description (CRTCTLAPPC) command. The joblog now shows:

   ```
   > CRTCTLAPPC CTLD(SYSBCTL) LINKTYPE(*OPC) RMTSYSNAME(SYSTEMB)
                        ROLE(*PRI) DSAP(44)
      Description for controller SYSBCTL created.
   ```

2. Create a device description for each controller on each system.

   ```
   CRTDEVAPPC DEVD(SYSBDEV) RMTLOCNAME(SYSB) ONLINE(*NO)  LCLLOCNAME(SYSA)
   CTL(SYSBCTL) APPN(*NO)
   ```

   The *OPC controller will only accept devices that are created with APPN(*NO). The RMTLOCNAME and LCLLOCNAME need to be mirror images of the RMTLOCNAME and LCLLOCNAME on the other system in the ’pair.’ Parameter ONLINE at IPL should be *NO since you cannot vary on OptiConnect controllers and attached devices until the QSOC subsystem has started.

   The following are examples for creating an *OPC device description to attach to the controller. To create a device description on SYSTEMA to attach to controller SYSBCTL, enter the Create Device Description (CRTDEVAPPC) command.

   The joblog now shows:

```
> CRTDEVAPPC DEVD(SYSBDEV) RMTLOCNAME(SYSB) ONLINE(*NO)
   LCLLOCNAME(SYSA) CTL(SYSBCTL) APPN(*NO)
   Description for device SYSBDEV created.
```

3. On the other system in the 'pair,' create a controller and device description that will point to the previously created descriptions. On SYSTEMB enter the CRTCTLAPPC command to connect to SYSTEMA.

   The joblog now shows:

```
> CRTCTLAPPC CTLD(SYSACTL) LINKTYPE(*OPC)
                 RMTSYSNAME(SYSTEMA) ROLE(*SEC) DSAP(44)
     Description for controller SYSACTL created.
```

4. Create a device description on SYSTEMB to attach to controller SYSACTL. Enter the CRTDEVAPPC command.

   The joblog now shows:

```
> CRTDEVAPPC DEVD(SYSADEV) RMTLOCNAME(SYSA) ONLINE(*NO)
          LCLLOCNAME(SYSB) CTL(SYSACTL) APPN(*NO)
     Description for device SYSADEV created.
```

5. Repeat steps 1 and 2 for all the system pairs in the OptiConnect network.
6. Vary on all *OPC controllers and devices to enable requests over OptiConnect.

   When the first of a pair of *OPC controllers is varied on, the status of the controller changes to ACTIVE/CNN PENDING or VARYON/CNN PENDING. That is, if the device is not varied on. This indicates that the OptiConnect path is not yet completely established. After the second of the *OPC pair is varied on, both controllers change to ACTIVE status, and the OptiConnect connection is available for data transfer.

   Note: You must start the QSOC subsystem on both systems prior to varying on the *OPC controller and its associated devices. If the QSOC subsystem is ended on any system, the controllers on that system, and all connected systems, change to a status of ACTIVE/CNN PENDING or VARYON/CNN PENDING. After the QSOC subsystem has restarted, there cannot be any activity through these controllers until they are varied off, and then back on.

   The following are examples to vary on controllers and devices. Use the VRYCFG command on SYSTEMA to vary on controller SYSBCTL.

   The joblog now shows:

```
> VRYCFG CFGOBJ(SYSBCTL) CFGTYPE(*CTL) STATUS(*ON)
     Vary on completed for controller SYSBCTL.
     Vary on completed for device SYSBDEV.
```

   Use the VRYCFG command on SYSTEMB to vary on controller SYSACTL.

   The joblog now shows:

```
> VRYCFG CFGOBJ(SYSACTL) CFGTYPE(*CTL) STATUS(*ON)
     Vary on completed for controller SYSACTL.
     Vary on completed for device SYSADEV.
```

7. Setup DDM files:

   Use the same locations for the Remote and Local location parameters that were previously specified in the APPC device description. Use *LOC for the device description parameter. Remote and Local Locations that are defined in the devices attached to the *OPC controllers can also be used in Structured Query Language (SQL) relational database directories. For more information, see "SQL over OptiConnect" on page 31.

Although varying on the *OPC controllers and devices enables traffic over OptiConnect, varying off these devices and controllers does not necessarily block that traffic. To make certain that OptiConnect activity is stopped, use the vary option of the WRKOPCACT command, or end the QSOC subsystem.

The *OPC controllers can be used to provide APPC communication capability across the OptiConnect bus. An application program using the ICF file interface, the CPI communication call interface, or the CICS® file interface can communicate with an application running on a remote system using OptiConnect. It is not restricted to previous OptiConnect applications such as DDM and SQL.

The default QYCTSOC APPC device description has *PUBLIC authority *CHANGE so any user can use OptiConnect. To keep the public from using OptiConnect, issue the command Revoke Object Authority (RVKOBJAUT). Then, grant access to the *DEVD for specific users with the Grant Object Authority (GRTOBJAUT) command.

Note: The APPC device description does not describe a device, but is used to control authority and access to the OptiConnect path.

Customize OptiConnect

Learn how to Customize OptiConnect:

Route SNADS over OptiConnect

SNADS (SNA Distribution Services) communication can use the OptiConnect link to distribute data between systems through the fiber-optic cable. When configuring SNADS over OptiConnect, the system uses the *APPC controller and device descriptions previously created in "Configure extended function path routing" on page 24. You will need to configure a directory entry, a routing table entry, and distribution queue in the following way:

1. Add a directory entry:

```
ADDDIRE USRID(xxx/*ANY)   (xxx is the address of remote system)
        USRD(xxx)         (xxx is the description
        SYSNAME(xxx)      (xxx is the name of the remote system)
```

   Add a directory entry to point a user or several users (*ANY) to the remote system.

2. Create a distribution queue:

```
ADDDSTQ DSTQ(xxx)         (xxx is the name of the queue)
        RMTLOCNAME(xxx)    (same as specified in the APPC DEVD)
        DSTQTYPE(*SNADS)
        MODE(*NETATR)      (or specify a mode)
        RMTNETID(*NETATR)
        LCLLOCNAME(xxx)    (same as specified in the APPC DEVD)
```

   The values in the distribution queue for the RMTLOCNAME and LCLLOCNAME allow SNADS to select the correct APPC device description that points to the target system.

3. Create a routing table:

```
ADDDSTRTE SYSNAME(xxx)    (xxx is the name of the remote system)
          FAST(xxx)       (xxx is the name of the remote system)
          STATUS(xxx)     (xxx is the name of the remote system)
          DATAHIGH(xxx)   (xxx is the name of the remote system)
          DATALOW(xxx)    (xxx is the name of the remote system)
```

   Note: Create a routing table that points to the distribution queue.

4. Verify that QSOC and QSNADS subsystem are active on both systems.

Initial library list

The library list of a SOC Agent will default to the system and user library list system values. This will be sufficient to run standard DDM functions like DDM files, DDM data areas, and DDM data queues. This is because these objects require users to library qualify the target object at creation time. Other functions do not require the object to be qualified, such as:

- Distributed Relational Database Architecture (DRDA)
- Lotus Domino scripts with LS:DO and @Commands
- DB2 Triggers

Note: Changing the system value of the user or system library list can also do this.
See "QYYCDTSU job description."

You can control the library list of the remote jobs by changing the SOCA*nnnnnn* job description, QYYCDTSU, to include the necessary libraries. For DRDA and Domino you can either add the necessary library into the initial library list, or library qualify your SQL/ODBC statements. For triggers, you must include the library in the initial library list.

Note: If the SOCA*nnnnnn* jobs were started, you need to ENDSBS QSOC, and restart it so the agent jobs will start with the new initial library list.

Change QUSER access authority

The OptiConnect Agent jobs runs under the **QUSER** user profile when using the Fastpath OptiConnect method, by default. You may want to change these agent jobs to a more appropriate user profile. This will give the OptiConnect Agent jobs the appropriate access authority to files you will be using on the database system. Enter:

```
CHGJOBD QSOC/QYYCDTSU
```

Press F4 and then press F10.

For the User parameter, change the default value QUSER to an appropriate user profile name. Specifically, one that controls the agent job authority.

See the following sections for information on the OptiConnect Job descriptions.

QYYCDTSU job description

Figure 10 shows the QYYCDTSU job description for the SOCA*nnnnnn* jobs.

```
                          Display Job Description
                                                          System:   SYSTEMA
Job description:   QYYCDTSU       Library:   QSOC

User profile . . . . . . . . . . . . . . . . . . . :    QUSER
CL syntax check  . . . . . . . . . . . . . . . . . :   *NOCHK
Hold on job queue  . . . . . . . . . . . . . . . . :   *NO
End severity . . . . . . . . . . . . . . . . . . . :   30
Job date . . . . . . . . . . . . . . . . . . . . . :   *SYSVAL
Job switches . . . . . . . . . . . . . . . . . . . :   00000000
Inquiry message reply  . . . . . . . . . . . . . . :   *RQD
Job Priority (on job queue)  . . . . . . . . . . . :   5
Job queue  . . . . . . . . . . . . . . . . . . . . :   QSOC
  Library  . . . . . . . . . . . . . . . . . . . . :     QSOC
Output priority (on output queue)  . . . . . . . . :   5
Printer device . . . . . . . . . . . . . . . . . . :   *USRPRF
Output queue . . . . . . . . . . . . . . . . . . . :   *USRPRF
  Library  . . . . . . . . . . . . . . . . . . . . :

                                                                       More...
Press Enter to continue.

F3=Exit   F12=Cancel
```

Figure 10. Display Job Description - QYYCDTSU Job (Part 1 of 3)

```
                          Display Job Description
                                                          System:   SYSTEMA
Job description:   QYYCDTSU       Library:   QSOC

Message logging:
  Level  . . . . . . . . . . . . . . . . . . . . . :   4
  Severity . . . . . . . . . . . . . . . . . . . . :   0
  Text . . . . . . . . . . . . . . . . . . . . . . :   *NOLIST
Log CL program commands  . . . . . . . . . . . . . :   *NO
Accounting code  . . . . . . . . . . . . . . . . . :   *USRPRF
Print text . . . . . . . . . . . . . . . . . . . . :   *SYSVAL

Routing data . . . . . . . . . . . . . . . . . . . :   QYYCDTSU

Request data . . . . . . . . . . . . . . . . . . . :   *NONE


Device recovery action . . . . . . . . . . . . . . :   *SYSVAL
                                                                       More...
Press Enter to continue.

F3=Exit   F12=Cancel
```

Figure 10. Display Job Description - QYYCDTSU Job (Part 2 of 3)

```
                          Display Job Description
                                                              System:   SYSTEMA

Job description:   QYYCDTSU       Library:   QSOC

Time slice end pool  . . . . . . . . . . . . . . . :   *SYSVAL
Job message queue maximum size . . . . . . . . . . :   *SYSVAL
Job message queue full action  . . . . . . . . . . :   *SYSVAL
Allow multiple threads . . . . . . . . . . . . . . :   *NO
Text . . . . . . . . . . . . . . . . . . . . . . . :   SOC Agent Job Description

Initial library list:
  *SYSVAL









                                                                          Bottom
Press Enter to continue.

F3=Exit   F12=Cancel
```

Figure 10. Display Job Description - QYYCDTSU Job (Part 3 of 3)

QYYCMGR job description

The Connection Manager job, SOCMGR, maintains the agent jobs through the request data in the job description, QYYCMGR. Figure 11 shows QYYCMGR job description for the SOCMGR job.

```
                          Display Job Description
                                                              System:   SYSTEMA
Job description:   QYYCMGR        Library:   QSOC

User Profile . . . . . . . . . . . . . . . . . . . :       QSOC
CL syntax check  . . . . . . . . . . . . . . . . . :   *NOCHK
Hold on job queue  . . . . . . . . . . . . . . . . :   *NO
End severity . . . . . . . . . . . . . . . . . . . :   30
Job date . . . . . . . . . . . . . . . . . . . . . :   *SYSVAL
Job switches . . . . . . . . . . . . . . . . . . . :   00000000
Inquiry message reply  . . . . . . . . . . . . . . :   *RQD
Job priority(on job queue) . . . . . . . . . . . . :   3
Job queue  . . . . . . . . . . . . . . . . . . . . :   QSOC
  Library  . . . . . . . . . . . . . . . . . . . . :      QSOC
Output priority (on output queue)  . . . . . . . . :   5
Printer device . . . . . . . . . . . . . . . . . . :   *USRPRF
Output queue . . . . . . . . . . . . . . . . . . . :   *USRPRF
  Library  . . . . . . . . . . . . . . . . . . . . :

                                                                          More...
Press Enter to continue.

F3=Exit   F12=Cancel
```

Figure 11. Display Job Description - QYYCMGR (Part 1 of 3)

```
                          Display Job Description
                                                          System:   SYSTEMA
Job description:   QYYCMGR        Library:   QSOC

Message logging:
  Level  . . . . . . . . . . . . . . . . . . . . :   4
  Severity . . . . . . . . . . . . . . . . . . . :   0
  Text   . . . . . . . . . . . . . . . . . . . . :   *NOLIST
Log CL program commands  . . . . . . . . . . . . :   *NO
Accounting code  . . . . . . . . . . . . . . . . :   *USRPRF
Print text . . . . . . . . . . . . . . . . . . . :   *SYSVAL

Routing data . . . . . . . . . . . . . . . . . . :   QYYCMGR

Request date . . . . . . . . . . . . . . . . . . :   CALL PGM(QSOC/QYYCMGR)
PARM(0 0 0)

Device recovery action . . . . . . . . . . . . . :   *SYSVAL
                                                                      More...
Press Enter to continue.

F3=Exit   F12=Cancel
```

Figure 11. Display Job Description - QYYCMGR (Part 2 of 3)

```
                          Display Job Description
                                                          System:   SYSTEMA
Job description:   QYYCMGR        Library:   QSOC

Time slice end pool  . . . . . . . . . . . . . . :   *SYSVAL
Job message queue maximum size . . . . . . . . . :   *SYSVAL
Job message queue full action  . . . . . . . . . :   *SYSVAL
Allow multiple threads . . . . . . . . . . . . . :   *NO
Text . . . . . . . . . . . . . . . . . . . . . . :   SOC Connection Manager Job
Description
Initial library list:
  *SYSVAL









                                                                      Bottom
Press Enter to continue.

F3=Exit   F12=Cancel
```

Figure 11. Display Job Description - QYYCMGR (Part 3 of 3)

The job description in Figure 11 on page 29 shows routing data for QYYCMGR. This should be listed as one of the routing entries in the QSOC subsystem description. The request data (*CALL PGM(QSOC/QYYCMGR) PARM(0 0 0)*) is the actual program call that initiates OptiConnect. The parameters describe the pool of agents that are maintained on the application system and are passed to the OptiConnect Connection Manager. You can change these parameters to tune the system's performance. The first number is the initial number of agents in the system (0). The second number is the minimum number of agents that are allowed in the pool (0). The third number is ignored (0). For more information, see "OptiConnect performance factors" on page 31.

OptiConnect performance factors

Several factors can affect the performance of OptiConnect:

- Storage Pool

  OptiConnect is initially installed to use the *BASE storage pool. You should determine if this storage pool, and the amount of storage that is allocated in the pool, is appropriate for each system in the cluster. Specify at least 16 MB per application system on the database system for OptiConnect.

- Job Class and Priority

  The OptiConnect agents run under the QYYCAGNT class in the QSOC library. The agent job class is shipped to run at priority 20; however, the job will automatically run at the same priority as its corresponding source job.

- SOCMGR Job Description, QYYCMGR

  As part of the job description for the SOCMGR, the request data calls the QYYCMGR program in the QSOC library. The parameters that are passed to the program are:

  – The first number is the initial number of agent jobs that are started in the agent job pool. This number includes both active and available agent jobs. Active agents connect to a source DDM user job. Available agents are those that are not currently connected to a user job, but are waiting to be used. As active jobs end, the connection manager submits jobs to maintain the number of jobs in the agent job pool. This parameter is similar to the prestart jobs parameter that is used when starting a subsystem. When the subsystem starts, jobs are available.

  – The second is the minimum number of available agents that are maintained in the agent job pool. As available agents become active agents, the Connection Manager submits jobs to maintain the number of available agent jobs. This number should always be less than 50.

  – The third parameter value is ignored. Enter 0.

  The default parameters are (0 0 0).

  You can adjust these values to prestart a predetermined number of agent jobs. When a work request comes in, it gets sent directly to an agent job that is already running or prestarted. The number of agents should be adjusted according to the requirements of individual installations.

  To prestart agent jobs, change the defaults for QYYCMGR job description. To change these values,

  1. Enter:

     ```
     CHGJOBD QSOC/QYYCMGR
     ```

  2. Press F4, then press F10

  For the request data, change the default PARM value (0 0 0) to the desired values.

  Note: Prestart agent jobs can only be used by applications whose DDM files have QYCTSOC as the device. If the *OPC controller method is used, DDM prestart jobs must be configured.

Advanced OptiConnect customization

Learn more advanced ways to customize OptiConnect:

SQL over OptiConnect

You can route Static and Dynamic Structured Query Language (SQL) over OptiConnect through the use of Distributed Relational Database Architecture (DRDA). This can be done using either the Fastpath

OptiConnect method, or the Extended Function Path OptiConnect method. The Fastpath OptiConnect method is easier to begin using, but you cannot use commitment control, or Distributed Unit of Work (*DUW) for the connect method. If commitment control or *DUW is needed, you will need to route SQL over OptiConnect by using the Extended Function Path method.

OptiConnect supports the use of static Structured Query Language (SQL) with both Dynamic, and Extended Dynamic SQL. You can also route Extended Dynamic SQL statements over OptiConnect by using the QXDA set of APIs. For more information, see the Backup and Recovery topic.

Routing SQL using the fastpath OptiConnect method

To route SQL requests over OptiConnect using the Fastpath OptiConnect method, you need to specify special keywords in the relational database (RDB) directory. The database system must have an RDB entry that matches the relational database name specified on the application systems with *LOCAL for the remote location parameter. On the application systems, the remote location parameter must point to the system where the database resides. Each relational database name must be unique within the distributed network. Each entry identifies the method of accessing the relational database as well as other parameters.

To add an entry to the relational database directory:

1. Enter the Add Relational Database Directory Entry (ADDRDBDIRE) command
2. Press F4=Prompt
3. Press F9=Show all parameters
1. Enter a name for the *Relational database* parameter.

   The name on the application system **must** match the name on the database system.
2. Enter the *Remote location* parameter.

   On each application system, specify the name of the target system. On the database system, specify *LOCAL.
3. Enter QYCTSOC for the *APPC device description*.
4. Enter *LOC for *Local location*.

After creating the relational database directory entry, you will need to recompile the SQL program to point to the RDB entry. When recompiling specify:

1. Commitment Control *NONE
2. RDB connect method *RUW

Note: The relational database parameter has to match the relational database parameter in the RDB entry.

Route SQL using the Extended Function Path Method

To route SQL requests over OptiConnect using the Extended Function Path method, you need to specify the Remote location and Local location in the relational database (RDB) directory. Ensure that these match the Extended Function Path descriptions (previously created in “Configure extended function path routing” on page 24).

Recompiling the SQL program pulls the target system name from the RDB entry, creates an SQL package, and runs the program on the target system.

Remote journal function

Remote Journal function can be routed over OptiConnect through the relational database (RDB) directory entry. This identifies the remote location name and other necessary information. Remote Journal function can use either the Fastpath OptiConnect method, or the Extended Function Path method. See the Backup and Recovery  book for more information.

Use of mode tables

Modes describe session characteristics between the local and remote locations. The use of modes over OptiConnect provides greater flexibility than standard mode support over APPC. Modes over OptiConnect are invoked through a **mode table**. The mode table, QMTABLE, is not shipped with OptiConnect and needs to be created if additional customization is required.

When subsystem QSOC is started, the QSOC library is checked to see if QMTABLE exists. If QMTABLE does exist, the parameters will be used to start any OptiConnect Agents. Otherwise, a default set of values are placed in storage.

To create the OptiConnect Mode table, type the following:

```
CALL QSOC/QYYCMUTL CREATE
```

This creates the DDS source file QSOCDDS, with member QSOCDDS, and a sample mode table QMSAMPLE in the QSOC library. The mode table QMTABLE can be created by copying this sample table, or by using the DDS source file. QMTABLE is a physical file and needs to reside in the QSOC library. You can use data file utility (DFU) to alter this table, adding one entry for each mode or location required.

For the Fastpath OptiConnect method, add the following entry:

Note: The ROUTING (entry) must always be QYYCDTSU to use the OptiConnect agents that are supplied with QSOC. No entry is required in the mode table for ObjectConnect.

The mode table is searched each time an agent job is started (DDM target) for a match against the keyed values. There are three keyed fields in QMTABLE: **LCLLOC, RMTLOC**, and **MODE.** The following priority scheme determines which table entry will be used. The table is searched for the following:

1. Target system name extracted from network attributes (matched against LCLLOC)
2. Source system name that was sent to the target system (matched against RMTLOC)
3. Mode which was also sent to the target system (matched against the MODE field)

A specific value for the above three fields can be matched in the table or '*ANY.' A specific value is always taken over '*ANY,' regardless of the order of the entries in the table.

1. A specific LCLLOC match is taken over a specific RMTLOC or a specific MODE.
2. A specific RMTLOC match is taken over a specific MODE.

Note: The Fields column in the mode table is case sensitive and all entries need to be in uppercase. Table 2 shows the fields and associated descriptions.

Table 2. Fields in the Mode table

Field	Description
RMTLOC	Remote location (from the server point of view)
LCLLOC	Local location (from the server point of view)
MODE	Mode description from DDM file
JOBD	Job description for the Agent job
JOBDLIB	Library for Agent job description

Table 2. Fields in the Mode table (continued)

Field	Description
JOBQ	OptiConnect agent job queue (*JOBD for value from job description)
JOBQLIB	Library for OptiConnect Agent job queue
DFTUSER 1, 2	Default user profile for OptiConnect agent job • *NONE means run under same user profile as client job 1 • *JOBD means use user profile from job description
RCLRSC	*RCLRSC for disable reclaim resource (default) • *DDMCONV for disable reclaim DDM conversation • *BOTH for disable reclaim resource and reclaim DDM conversation • *NONE to enable both reclaim resource and reclaim DDM conversation **Note:** Disable means that OptiConnect conversations will not be reclaimed.
JOBPRIOR	*DYNAMIC for change agent job priority when client job priority is changed (default) • *STATIC for change agent job priority when the agent job is started • *NONE for do not change agent job priority
INIJOB 3	This is the minimum number of agent jobs that are maintained in the agent job pool. This number includes both active and available agent jobs.
MINJOB 3	This is the minimum number of available agents that are maintained in the agent job pool. As available agents become active agents, the connection manager submits jobs to maintain the number of available agent jobs.
USREXIT 4	Program name - name of exit program if present • *OBJAUT for object authority checking only job priority is changed (default) • *REJECT to reject all connections agent job is started • *NETATR use DDM EXIT value from network attributes
USREXITLIB	Library for user exit program
CONJRNL	Name of journal for connection journaling • *NONE for none.
CONJRNLLIB	Library for connection journaling
ROUTING	Routing Data for Job
JOBSTDLY	This value controls the rate at which prestart jobs are started in milliseconds
JOBENDDLY	Allows the OptiConnect connection manager to shutdown before all idle jobs have ended. This allows the customer to continue with other operations; for example, backups. The remaining idle agents will end at a rate of 1 per JOBENDDLY milliseconds.

1. The QSOC user profile must have *CHANGE authority to the user profile with which the agent job is submitted. If this authority does not exist, the agent job will not submit, and the client job will hang for two minutes until it times out.
2. The DFTUSER field replaces the APPC attribute SECURELOC from standard DDM security. This provides greater flexibility than standard DDM as the required security can be set individually for each DDM file.
3. Prestart agents cannot be started, and minimum agents cannot be maintained, if DFTUSER is set to *NONE.
4. The USREXIT field overrides the network attribute field DDMACC.

OptiConnect mode table reload

The OptiConnect mode table can be changed and reloaded by the OptiConnect Connection Manager without ending and restarting the QSOC subsystem. You can do this by running the following command:

```
CALL QSOC/QYYCMUTL RELOAD
```

There are several restrictions to this:

- A default user of *NONE cannot be changed to any other value. A default user of any other value cannot be changed to *NONE.
- If a job prestarts or available agent counts are decreased, available jobs will not be ended. However, the job counts will come down as the jobs are used up by new DDM connections.
- If the new table has an incorrect entry that prevents jobs from starting, and INIJOB and MINJOB are both zero, then do the following:
  1. Fix the error in the table. Change the INIJOB value to a non-zero value and reload the table.
  2. Change the INIJOB back to zero and reload the table again (this will not work if DFTUSER = *NONE as no prestart jobs can start).

Note: This will allow you to avoid ending QSOC and restarting it.

Journal OptiConnect transactions

If journaling transactions across the OptiConnect link is required, the connection transactions can be journaled. The journal name comes from the *connection journal* field of the OptiConnect **mode table**. All DDM connections made with remote systems are logged in this journal.

To log connection transactions, specify the journal name in the OptiConnect mode table, then create the journal. The field names in the journal are as follows:

1. Source fully qualified job name
2. Source system name
3. Target fully qualified job name
4. Target system name
5. Mode description
6. Time stamp

The SOCA*nnnnnn* job on the target system logs this information.

Remote job submission

OptiConnect allows jobs to be submitted on the local system and started as a batch job on the target system transparently. These jobs must be created using the Submit Job (SBMJOB) or Submit Database Jobs (SBMDBJOB) command. This transparency is achieved by replacing QCMD routing entry in a subsystem description (SBSD) with an entry that will route the submitted job to the remote system. The following is an example of how to configure job submission:

1. Create a routing entry that calls QYYCROUT with two input parameters.

   Note: Routing entries do not allow program parameters. You will need to create a program to call QYYCROUT and pass the parameters. It should look like the following CL program example 'ROUTEPGM':

   ```
   PGM
   CALL PGM(QSOC/QYYCROUT) PARM(ddmfile libname)
   ENDPGM
   ```

2. Add a routing entry to a subsystem description (SBSD) and specify 'ROUTEPGM' as the 'Program to Call'.

3. Create or change a job description to specify the routing data that is to be the compare value for the routing entry just added.

   Note: All jobs submitted with this job description will run on the remote system by the QYYCROUT program.
4. When the job is submitted, QYYCROUT is started. QYYCROUT then extracts information from the DDM file passed in. This DDM file is not used after this. The parameter for the DDM file should be:
   - Device = QYCTSOC
   - Mode = BATCHJOB
   - LCLLOCNAME = *LOC
   - REMOTE SYSTEM = target system name
5. QYYCROUT creates a data queue and a DDM file in library QTEMP. It starts a SOCA*nnnnnn* job and creates a data queue on the target system.
6. QYYCROUT then retrieves job attributes, cancel severity, and local data area (LDA). The job and local data area information get sent to the remote data queue on the target system. The target system runs a program to receive this information and changes the target job's attributes to match the source job.
7. QYYCROUT will extract information about inline data files and copy them to QTEMP in the target job.

The job queue on the source system receives request data one command at a time and runs each request on the target. After each command is run, the target job returns an indication of whether or not cancel severity has been exceeded. This allows QYYCROUT to decide if the job should be terminated. Since commands are run one at a time, holding the job on the source system will end command execution on the target system until released.

After all the requests have been received and run, and if message logging is set to something other than *NOLIST, the target joblog is retrieved and written to QPJOBLOG. The user data field is set to the target system name.

To route the spooled file back to the source system:

1. Create a Remote Output queue by using the CRTOUTQ command.
2. Specify the system name that you will be routing files to in the Remote System parameter. This will allow you to supply information to the remaining parameters.
3. For the Remote Print Queue (RMTPRTQ) parameter, specify the output queue to which the remote writer sends the spooled file.
4. Issue the Start Remote Writer (STRRMTWTR) command on the target system. See Figure 12 on page 37 and Figure 13 on page 38.

Remote Job Submission Source System

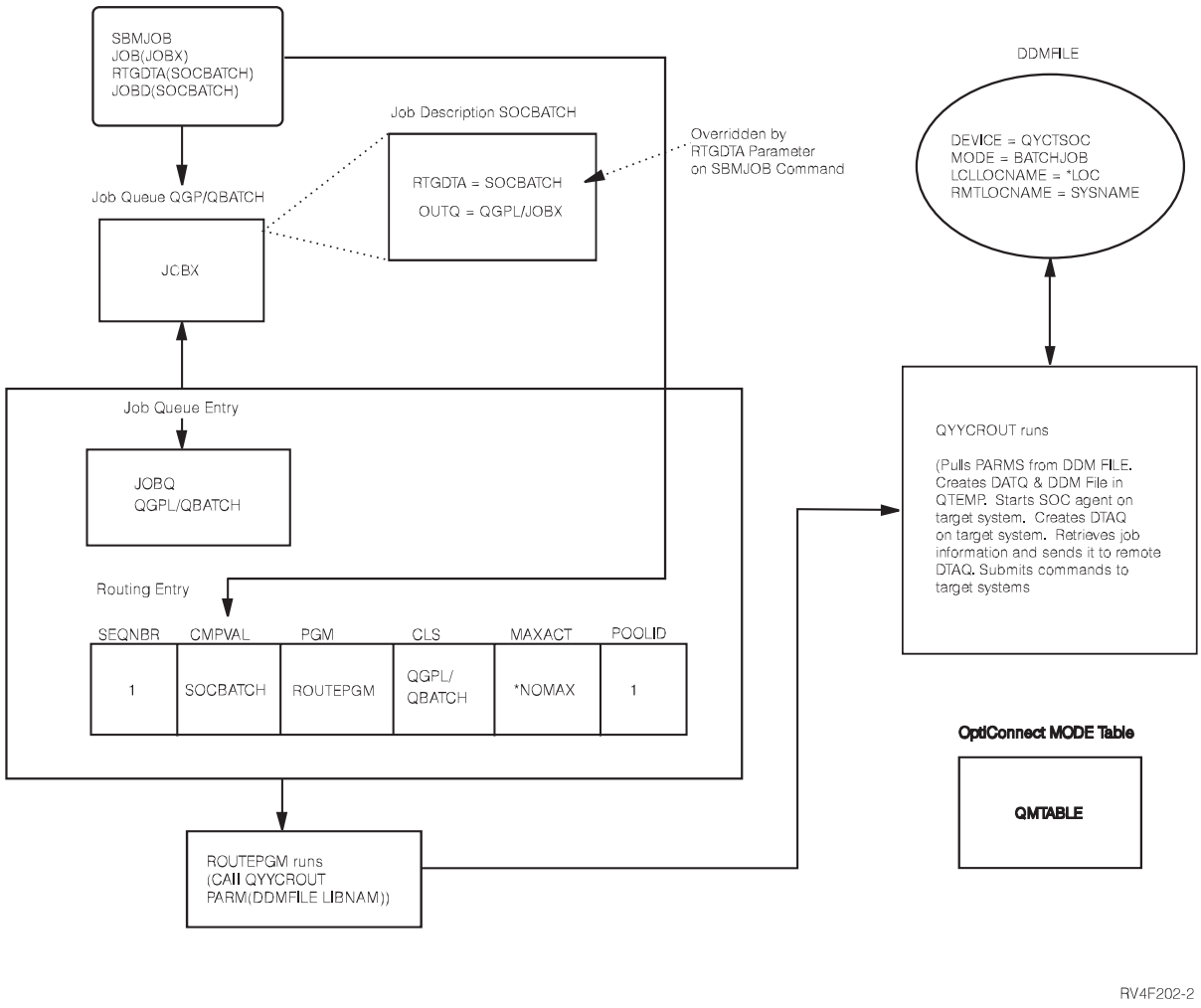

Figure 12. Remote Job Submission Source System

Remote Job Submission Target System

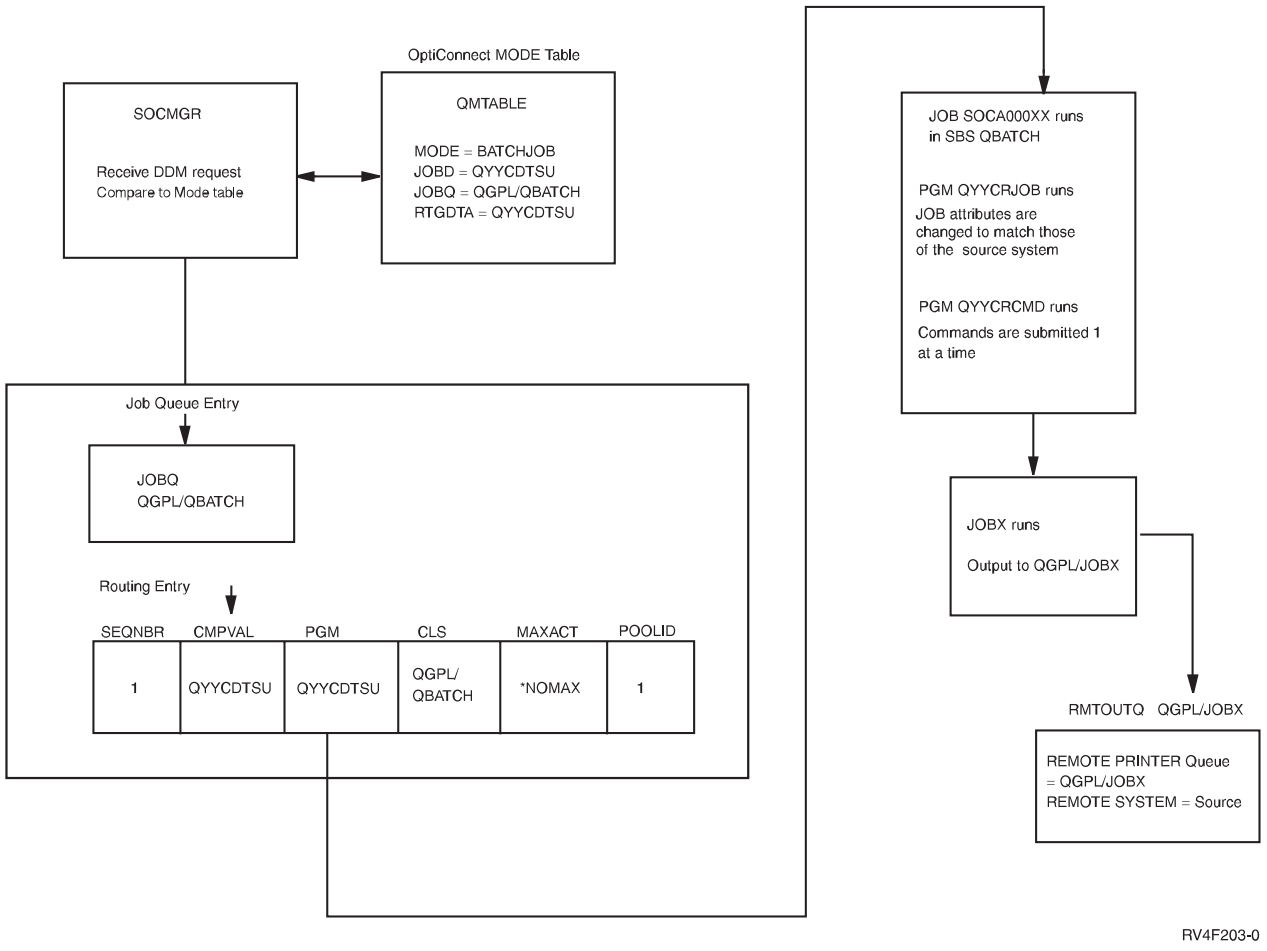

Figure 13. Remote Job Submission Target System

TCP/IP over OptiConnect

This function allows applications that utilize Transmission Control Protocol/Internet Protocol (TCP/IP) to communicate over OptiConnect. This can be accomplished when running in an iSeries cluster with the OptiConnect SPD, HSL, or virtual (LPAR) environment. Applications that are distributed across multiple servers can take advantage of the high bandwidth and low latency of OptiConnect.

Read the following information about TCP/IP over OptiConnect

Features

The function's main purpose is to provide a standard IP interface. This allows existing applications and services to work unchanged by simply defining a TCP/IP interface that uses OptiConnect. After an interface is configured and started, normal IP routing will be used to send packets over OptiConnect.

TCP/IP over OptiConnect:

- Allows the configuration of TCP/IP interfaces across the OptiConnect link using standard methods (Configure TCP/IP (CFGTCP) or iSeries Navigator).

  Note: Up to eight IP interfaces, each one on a separate subnet, can be configured to OptiConnect.
- Operates with standard functions (start, end, display).
- Allows support of IP packets. That is, all protocols that use Internet Protocol (IP), including Transmission Control Protocol (TCP), User Datagram Protocol (UDP), and so forth.
- Allows direct communication to other systems on the shared bus, or buses, which have configured an IP interface with the same subnet.
- Supports broadcast and multicast.

Define the OptiConnect TCP/IP interface

Use the Add TCP/IP Interface (ADDTCPIFC) command to define a new interface to the Transmission Control Protocol/Internet Protocol (TCP/IP) configuration. The interfaces defined by the ADDTCPIFC command are logical interfaces.

Required parameters

- INTNETADR: Specifies an internet address that the local system responds to on this interface. An interface associates with a line description. The internet address is specified in the form nnn.nnn.nnn.nnn, where nnn is a decimal number ranging form 0 through 255. An internet address is not valid if it has all binary ones, or all zeros for the network identifier (ID) portion of the address. If you enter the internet address from a command line, enclose the address in apostrophes.
- LIND: The commands Add TCP/IP Interface (ADDTCPIFC) and Change TCP/IP Interface (CHGTCPIFC) have changed to allow a new special value of *OPC for the Line Description (LIND) parameter. This special value will be used to connect this TCP/IP interface with the OptiConnect transport layer.
- SUBNETMASK: Specifies the subnet mask, which is a bit mask that defines which portion of the internet address is treated as the (sub)network address and which portion is treated as a host address, on the given subnet.

Optional parameter

- LCLIFC: The local IP interface is an optional parameter with which the internet address, previously defined in INTNETADR, will be associated. Defining an interface with an associated local IP address means that the associated local IP address will be used as the source IP address in packets originating from the interface. If no associated local IP address is specified, the source IP address on outbound packets will merely be the INTNETADR IP address of the interface. Any local LAN (token ring, ethernet, or FDDI) or *VIRTUALIP interface may be used for LCLIFC.
  - *NONE: no associated local interface used.
  - *local-interface*: Specify an associated local interface for the interface to be added.

    Note: The specified associated local interface must already exist.

Use the TCP/IP interfaces for OptiConnect

You can configure the TCP/IP interfaces for OptiConnect in either of two ways. In the first configuration, the OptiConnect bus is viewed similar to a LAN, and has a single subnet address. Each *OPC interface is assigned a unique IP address within the subnet, thus defining the host's connection to that subnet. An example of this configuration is:

```
System A:
 ADDTCPIFC INTNETADR('10.1.1.1') LIND(*OPC) SUBNETMASK('255.255.255.0')
System B:
 ADDTCPIFC INTNETADR('10.1.1.2') LIND(*OPC) SUBNETMASK('255.255.255.0')
System C:
 ADDTCPIFC INTNETADR('10.1.1.3') LIND(*OPC) SUBNETMASK('255.255.255.0')
```

In the second configuration, you can use the associated local interface parameter (*local-interface*). Using this method, you can configure the OptiConnect interfaces as part of existing local subnets to which the iSeries server is attached via other local interfaces (for example, token ring or ethernet interfaces). Each OptiConnect interface would define an endpoint of a point-to-point OptiConnect connection between two iSeries servers. The existing local interface would then be specified as the associated local interface for the OptiConnect interface. An example of this configuration is:

```
System A:
 ADDTCPIFC INTNETADR('9.1.1.1') LIND(TRNLINE) SUBNETMASK('255.255.255.0')
 ADDTCPIFC INTNETADR('9.1.1.2') LIND(*OPC) SUBNETMASK('255.255.255.255') LCLIFC(9.1.1.1)
 ADDTCPIFC INTNETADR('9.1.1.3') LIND(*OPC) SUBNETMASK('255.255.255.255') LCLIFC(9.1.1.1)
System B:
 ADDTCPIFC INTNETADR('9.1.1.2') LIND(TRNLINE) SUBNETMASK('255.255.255.0')
 ADDTCPIFC INTNETADR('9.1.1.1') LIND(*OPC) SUBNETMASK('255.255.255.255') LCLIFC(9.1.1.2)
 ADDTCPIFC INTNETADR('9.1.1.3') LIND(*OPC) SUBNETMASK('255.255.255.255') LCLIFC(9.1.1.2)
System C:
 ADDTCPIFC INTNETADR('9.1.1.3') LIND(TRNLINE) SUBNETMASK('255.255.255.0')
 ADDTCPIFC INTNETADR('9.1.1.1') LIND(*OPC)  SUBNETMASK('255.255.255.255') LCLIFC(9.1.1.3)
 ADDTCPIFC INTNETADR('9.1.1.2') LIND(*OPC)  SUBNETMASK('255.255.255.255') LCLIFC(9.1.1.3)
```

To use the associated local interface, you must configure an interface on each system, and both must be active. Using the example above, the following two lines represent a point-to-point configuration from System B to System C.

```
ADDTCPIFC INTNETADR('9.1.1.3') LIND(*OPC) SUBNETMASK('255.255.255.255') LCLIFC(9.1.1.2)
ADDTCPIFC INTNETADR('9.1.1.2') LIND(*OPC) SUBNETMASK('255.255.255.255') LCLIFC(9.1.1.3)
```

The advantage of the associated local interface technique is that there is no need to define new subnets for the OptiConnect bus. Subsequently, no external route tables need to be updated to provide connectivity between the OptiConnect interfaces and the rest of the TCP/IP network. Moreover, if one of the OptiConnect paths goes inactive, packets will automatically be routed over the backup interface. In the case of the second example above, the TRNLINE. One disadvantage of this type of configuration is that an interface must be defined for every destination on the OptiConnect bus.

OptiConnect and IP Forwarding

IP forwarding and routing allows systems or partitions that are not connected to the same OptiConnect loop to communicate using TCP/IP.

This is accomplished by configuring a unique subnet for each loop, enabling IP forwarding, and routing packets from one subnet to another.

First, use the Change TCP/IP Attributes (CHGTCPA) command to turn on IP forwarding. This will enable forwarding of all packets, not just OptiConnect. Then define routes with the appropriate next hops to allow packets to flow to the desired destinations.

The following example shows how to turn on IP forwarding on System B to allow System A to communicate with System C and System D:

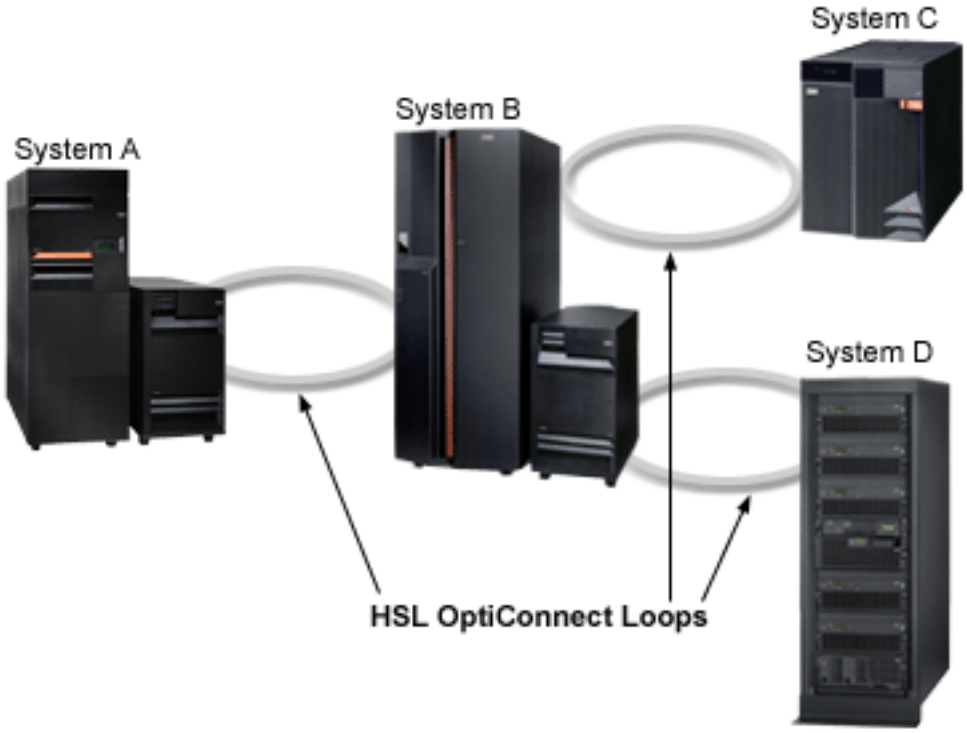

Figure 14. IP forwarding

1. Define a route to destination 10.0.1.0 with a mask of 255.255.0 and specify 10.0.0.2 as the next hop.

```
System A (10.0.0.1):
ADDTCPIFC INTNETADR('10.0.0.1') LIND(*OPC) SUBNETMASK('255.255.255.0')
ADDTCPRTE RTEDEST('10.0.1.0') SUBNETMASK('255.255.255.0') NEXTHOP('10.0.0.2')
```

2. Turn on IP forwarding on System B.

```
System B (10.0.0.2 and 10.0.1.2):
CHGTCPA IPDTGFWD(*YES)
ADDTCPIFC INTNETADR('10.0.0.2') LIND(*OPC) SUBNETMASK('255.255.255.0')
ADDTCPIFC INTNETADR('10.0.1.2') LIND(*OPC) SUBNETMASK('255.255.255.0')
```

3. On System C and System D, define a route to destination 10.0.0.0 with a mask of 255.255.255.0 and specify 10.0.1.2 as the next hop.

```
System C (10.0.1.3):
ADDTCPIFC INTNETADR('10.0.1.3') LIND(*OPC) SUBNETMASK('255.255.255.0')
ADDTCPRTE RTEDEST('10.0.0.0') SUBNETMASK('255.255.255.0') NEXTHOP('10.0.1.2')

System D (10.0.1.4):
ADDTCPIFC INTNETADR('10.0.1.4') LIND(*OPC) SUBNETMASK('255.255.255.0')
ADDTCPRTE RTEDEST('10.0.0.0') SUBNETMASK('255.255.255.0') NEXTHOP('10.0.1.2')
```

Proxy ARP with OptiConnect

Proxy address resolution protocol (ARP) allows physically distinct networks to appear as if they are a single, logical network. This technique provides connectivity between these physically separate networks, without creating any new logical networks and without updating any route tables.

Proxy ARP allows systems that are not connected to the LAN to appear as if they are. When a system on the LAN wants to send data to one of the remote systems, it will do an ARP request to request the MAC (medium access control) address of the target system. When the iSeries server sees this request, it will

reply to the request with the remote system's MAC address. Conversely, the system that requested the ARP will send it's MAC address to the iSeries server. The server will then forward the data to the remote system only if IP Forwarding is set to *YES.

If you apply the above scenario in terms of OptiConnect, consider the following scenario:

- Two physically distinct networks: a LAN and one consisting of an OptiConnect bus need to communicate. In the above point-to-point configuration example, we assume that all systems are connected to the same OptiConnect bus and token-ring line. Suppose SYSTEM A has a token-ring connection and all access to SYSTEM B and SYSTEM C has to go through it. Proxy ARP provides the necessary connectivity to these physically distinct networks.

Start the OptiConnect IP interface

To begin using the OptiConnect over TCP/IP, use the **Start TCP/IP Interface (STRTCPIFC)** command. This command starts a Transmission Control Protocol/Internet Protocol (TCP/IP) interface. This command can be used to do the following:

- Start interfaces that have been specified with the AUTOSTART(*NO) value on the Add TCP/IP Interface (ADDTCPIFC) and Change TCP/IP Interface (CHGTCPIFC) commands.
- Start an interface that was previously ended by the End TCP/IP Interface (ENDTCPIFC) command.

End the OptiConnect IP interface

The **End TCP/IP Interface (ENDTCPIFC)** command is used to end a Transmission Control Protocol/Internet Protocol (TCP/IP) interface. When an interface is ended with this command, datagrams addressed to the IP addresses that are associated with this interface will no longer be accepted.

This command can be used to end an interface that was previously started by the Start TCP/IP Interface (STRTCPIFC), or Start TCP/IP (STRTCP) command.

Notes:

1. Regular and associated interfaces can be started and ended independently from starting and ending OptiConnect (when OptiConnect has ended, the interface is inoperative).
2. Once the interface has been started using the STRTCPIFC command, the status will show 'Active' if OptiConnect is up, but only 'Starting' if OptiConnect is down.
3. If the interface was active at one point, and the OptiConnect subsystem has ended, the status will show 'RCYPND' for recovery pending. Once OptiConnect is started, the interface should automatically go back to 'Active'.
4. For an associated interface, status will indicate 'Starting' even if OptiConnect is up. In order for the associated interface to be completely active, the other side must also be started with OptiConnect up.

For a detailed description of these and other TCP/IP commands, refer to the TCP/IP Configuration and Reference  book.

Chapter 7. Manage OptiConnect

Read this information on how to manage OptiConnect:

- “Start OptiConnect”
- “Stop OptiConnect”
- “Tips: How to start and stop your system with OptiConnect”
- “Get information about OptiConnect activity” on page 44

Start OptiConnect

Starting OptiConnect is initiated by starting the QSOC subsystem. When you start the QSOC subsystem, the OptiConnect Connection Manager, SOCMGR, starts as an autostart job. If prestart agent jobs (SOCA*nnnnnn*) are defined, they will also start automatically when QSOC subsystem starts.

To start the QSOC subsystem, you must enter the Start Subsystem (STRSBS) command on each system.

```
STRSBS QSOC/QSOC
```

Stop OptiConnect

Because OptiConnect runs under the QSOC subsystem, you can end OptiConnect by shutting down QSOC. Before you end the OptiConnect subsystem on a particular system, you should make sure that there are no OptiConnect application programs that use the connection. See “Tips: How to start and stop your system with OptiConnect.”

If you are using remote journaling over OptiConnect on this system, end it before ending the QSOC subsystem. Remote journal jobs do not get displayed with the Work with Active Jobs (WRKACTJOB) command.

To end OptiConnect, enter the following command:

```
ENDSBS QSOC *IMMED
```

After the ENDSBS command is issued, the time required to end the OptiConnect manager varies with the number of agent jobs to end in the subsystem. See “Tips: How to start and stop your system with OptiConnect” for more information on starting and stopping agent jobs. During this time, the QSOC subsystem cannot be restarted.

Note: Ending OptiConnect on one system does not affect OptiConnect activity between other systems on the same bus.

Tips: How to start and stop your system with OptiConnect

When you stop OptiConnect, you are also stopping any prestarted agent jobs. The more agent jobs, the longer it takes to end QSOC subsystem. Similarly, when starting OptiConnect, the larger the initial number of agent jobs you specified, the longer the subsystem takes to start.

Balancing the number of prestarted agent jobs, and the time the subsystem takes to start or stop, is important. Prestarted agent jobs use resources as the jobs start or end. You must consider how many prestarted agent jobs you may need.

For example, if there are many short transactions, as when retail stores process credit card authorizations, increasing the number of prestarted jobs may be beneficial. Increasing the number of prestarted jobs also increases the time the subsystem QSOC takes to start. However, prestarted jobs allow you to quickly process the credit card authorizations.

On the other hand, you may have longer or less numerous transactions. For example, when a teller at a bank signs on for the day. In this type of environment, you may decide that less prestarted jobs and a shorter system startup is beneficial.

For more information on how to alter the number of prestarted jobs, see “OptiConnect performance factors” on page 31.

Prior to ending the QSOC subsystems, you should vary off the *OPC controllers and the corresponding controllers on the other system. The ENDSBS QSOC command leaves the controllers in an unusable state that requires the user to vary them off, then on, to activate. If the user varies the controllers off manually, then less processing takes place while ending the subsystem.

Get information about OptiConnect activity

Use the following commands to determine if OptiConnect is active and to obtain information about its resources and components. The commands are illustrated with examples from a four-system, dual-hub configuration. The screens are from SYSTEM A which is one of the hubs or bus-owning systems.

- “Work with active jobs (WRKACTJOB)”
- “Work with OptiConnect activity (WRKOPCACT)” on page 45
- “Display OptiConnect link status (DSPOPCLNK)” on page 49
- “Work with hardware resources (WRKHDWRSC)” on page 52
- “Display hardware resources (DSPHDWRSC)” on page 53

Work with active jobs (WRKACTJOB)

You can see a list of active jobs in the QSOC subsystem and monitor OptiConnect activity by using the Work with Active Jobs (WRKACTJOB) command. This can be helpful in determining the start up parameters that are passed to the OptiConnect Connection Manager. To see the active jobs in the QSOC subsystem, enter:

```
WRKACTJOB SBS(QSOC)
```

If the QSOC subsystem is running, you will see a SOCMGR job. If an agent job has been started, you will see one or more agent jobs (SOCA*nnnnnn* jobs) on the target system. Figure 15 on page 45 shows a sample of the Work with Active Jobs display. As you can see, the (*SOCMGR*) job is running, as well as one agent job (*SOCA000001*).

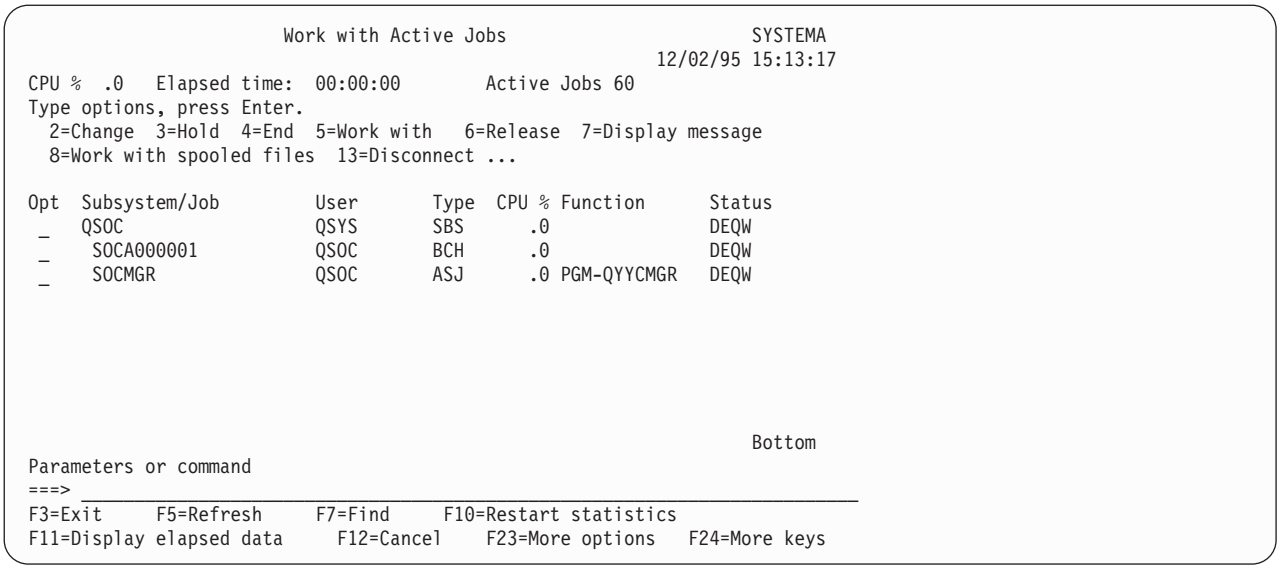

Figure 15. Work with Active Jobs

To determine if agents are active or inactive (prestarted), enter number 5 (Work with) to the left of the job name. Then, choose the option that allows you to view the call stack or view open files. INACTIVE agents are SOCA*nnnnnn* with no open files.

Active agents are often present until one of the following occurs:

- The source system job ends, or the user logs off
- The source system job ends, or the user uses the Reclaim Resources (RCLRSC) command
- The source system job ends, or the user uses the Reclaim DDM Conversations (RCLDDMCNV) command

Work with OptiConnect activity (WRKOPCACT)

The Work with OptiConnect Activity (WRKOPCACT) command, allows you to view information about database transactions, fiber-optic bus activity, and connection status for client and server systems. When running this command, three views of the WRKOPCACT display are available. To display the Work with OptiConnect Activity display, enter:

```
WRKOPCACT
```

```
                      Work with OptiConnect Activity
                                                              System:   SYSTEMA
Collection Start Time  . . . . . . . . . :   15:03:46
Collection End Time  . . . . . . . . . . :   15:54:56
Collection Elapsed Time  . . . . . . . . :   00:51:10

Type options, press Enter.
  1=Vary on   2=Vary off

     System            Total  Trans      Data  Data   %    Connection
Opt     Resource       Trans   /Sec     Count  Rate  Used   Status
     SYSTEMB              8      0         4     1     0   Varied on
        SOC13                              2     1     0   Active
        SOC02                              2     0     0   Active
     SYSTEMC              0      0         1     0     0   Active
        SOC08                              1     0     0   Varied on
        SOC10                              0     0     0   Active
     SYSTEMD              3      0         3     0     0   Varied on
        SOC07                              1     0     0   Active
        SOC04                              2     0     0   Active

     Totals              11      0         8     1     0
                                                                  Bottom
F3=Exit     F5=Refresh   F13=Reset   F11=Client Statistics View   F12=Cancel
F14=Jobs and Tasks
```

Figure 16. Work with OptiConnect Activity Display

Figure 16 shows an example of the Work with OptiConnect Activity display from the perspective of an *application* system. The screen shows information about the Connection Status and Total Transactions between the system issuing the command, and other systems in the OptiConnect network.

The activity is broken down by individual OptiConnect adapter cards for each system and defined over the collection period. The collection period is shown at the top of the display. To reset the collection data on this display, press F13 (Reset). Using the options listed, you can vary on or vary off the systems or resources shown on this display.

The next display shows this systems activity as a *client*. It can be accessed by pressing the

```
F11=Client Statistics View
```

function key.

The next display shows this system's activity as a *server.* It can be accessed by pressing the

```
F11=Server Statistics View
```

function key.

OptiConnect jobs and tasks

The Work with OptiConnect Jobs function, accessible from the F14=Jobs and Tasks function key, allows the user to view a list of OptiConnect jobs and tasks. OptiConnect jobs and tasks have one or more OptiConnect conversations attached. The initial prompt panel, shown in Figure 17 on page 47, allows for the division of jobs and systems into subsets. If any of the input character strings are ended with an '*', then that '*' will be treated as a wildcard.

```
                        Work with OptiConnect Jobs                  SYSTEMA
                                                                 00/00/00  00:00:00
Type choices, press Enter.

  Job name  . . . . . . . . . . . .   *ALL             Name, generic*, *ALL
    Job user  . . . . . . . . . . .     *ALL           Name, generic*, *ALL

  Remote job name . . . . . . . . .   *ALL             Name, generic*, *ALL
    Remote job user . . . . . . . .     *ALL           Name, generic*, *ALL

  Remote system . . . . . . . . . .   *ALL             System, generic*,
                                                         *ALL

F12=Cancel
```

Figure 17. Work with OptiConnect Jobs Display

After the selection information has been entered, the Work with OptiConnect Jobs and Tasks screen is displayed and shows the following information:

- Local Job

  The name of the job or task that exists on the system where WRKOPCACT is run.
- Local User

  The user of the local job. This field is blank if the entry is a task.
- Remote Job

  The name of the job or task that exists on the remote system.
- Remote User

  The user of the remote job.
- Remote Number

  The job number of the remote job.
- Remote System

  The system where the remote job or task exists.

To select an option, type the option number in the **Opt** column and press Enter. The function associated with the selected option will be performed for each of the selected jobs. For more information about the options available, move the cursor to the **Opt** column and press Help. The options are not available for tasks.

Note: You may type an option next to one or more job.

You can select the following options:

- 5=Work with Job

  Use this option to display the Work with Job (WRKJOB) menu. WRKJOB may be used to end the local job, and consequently, the remote job as well. While the jobs are ending, the path status shows close pending (CLSPND). If F13=Reset is pressed after both jobs have ended, the job entry disappears from the list.
- 9=End Remote Job

  Use this option to run the End Job (ENDJOB) command on the remote system. When the remote job is ended, the path status shows close pending, CLSPND. Local and remote job names remain in the job list entry until the local job either ends, or Distributed Data Management (DDM) conversations are reclaimed. You can reclaim these conversations using the Reclaim DDM Conversations (RCLDDMCNV) command. If RCLDDMCNV is used, the local job will not end, but will be removed from the list once it is refreshed. At this point, it is no longer considered to be an OptiConnect job, although it is still available for other work.

If you press the
`F11=Display Statistics View`

function key, Figure 18, *Work with OptiConnect Jobs and Tasks* appears.

```
                    Work with OptiConnect Jobs and Tasks             SYSTEMA
                                                          09/16/98  16:54:26
Type options, press Enter.
  5=Work with Job   9=End Remote Job
     Local       Local       Path    Transaction  Response     Data
Opt  Job         User        Status     Count       Time      Count
     USRRESTART  QTMHHTTP    IDLE            12     12.00        12
     USRRESTART  QTMHHTTP    IDLE            14     14.00        14
     USRRESTART  QTMHHTTP    BUSY            16     15.00        15
     WEBDY020    QTMHHTTP    IDLE             8      8.00         8
     WEBDY020    QTMHHTTP    BUSY            10      9.00         9
     WEBDY020    QTMHHTTP    IDLE            10     10.00        10
     WEBDY020    QTMHHTTP    BUSY            14     13.00        13
     WEBDY020    QTMHHTTP    IDLE             8      8.00         8
     WEBDY020    QTMHHTTP    BUSY            10      9.00         9
     WEBDY020    QTMHHTTP    IDLE            10     10.00        10
     WEBDY020    QTMHHTTP    BUSY            14     13.00        13
     WEBDY020    QTMHHTTP    IDLE             8      8.00         8
     WEBDY020    QTMHHTTP    BUSY            10      9.00         9
     WEBDY020    QTMHHTTP    IDLE            10     10.00        10
                                                                 More...
F3=Exit     F4=Prompt   F5=Refresh   F11=Display Remote View   F12=Cancel
F13=Reset   F14=Display Jobs Only    F15=Display Tasks Only   F16=Resequence
```

Figure 18. Work with OptiConnect Jobs and Tasks (View 2)

The display above shows the following information:

- Path Status

  Busy: the job or task has at least one outstanding OptiConnect transaction that has not completed.

  Idle: there is no outstanding OptiConnect transactions and the job, or task, is not doing any OptiConnect communications work at this time.

  CLSPND: an OptiConnect close path is pending and the path, or conversation, is in the process of closing down.

  LBUSY: at least one transaction has not completed and it has been outstanding for 1 second or more.
- Transaction Count

  The total number of OptiConnect requests that have been initiated since the last WRKOPCACT restart. The transactions count is expressed in individual transactions and is accumulative since either the last time OptiConnect started, or the job and task data collection were reset.
- Response Time

  The total time, in seconds, waiting for OptiConnect transactions to complete, divided by the completed transaction count. The completed transaction count is the previously defined transaction count if idle, or the transaction count minus one, if busy. Response time is an average that is measured since the last time OptiConnect started, or the job and task data collection were reset.
- Data Count

  The data that is transferred by the job or task in Kilobytes. This figure is accumulative since either the last time OptiConnect started, or the job and task data collection were reset.

Note: When one or more remote jobs have been requested to end and F4=Prompt is pressed, then the End Remote OptiConnect Job (OPCJRCF) screen will be displayed for each job. Otherwise, Confirm End of Remote OptiConnect Jobs (OPCECNF) is displayed for a single confirmation.

Display OptiConnect link status (DSPOPCLNK)

To display the connection status information of the links between systems in the HSL or fiber-optic networks, use the Display OptiConnect Link Status (DSPOPCLNK) command. The *Display OptiConnect Link Status* screen will vary depending on your hardware configuration. If your hardware configuration includes HSL OptiConnect, the following screen will appear:

```
                      Display OptiConnect Link Status
                                                              System:   SYSTEMA
Type options, press Enter
  5=Display Loop Details   6=Display Connections Details

Opt     Loop Number     Resource       HSL OptiConnect Status
 5         256          SB01            Active
           257          SB02            Active
           259          SB03            Active

                                                                        Bottom
F3=Exit   F5=Refresh   F6=Display Optical Links   F12=Cancel
```

Figure 19. Display OptiConnect Link Status, Part 1

Note: If your hardware configuration includes HSL OptiConnect, you can still access information relating to fiber-optic links by pressing the

```
F6=Display Optical Links
```

function key on the *Display OptiConnect Link Status* screen.

The *Display Loop Details* screen shows the status of a specific High Speed Link ring. It provides information on the bus adapter/port on each side of a system connection. To access this screen, type option 5:

```
5=Display Loop Details
```

in the **Opt** field.

```
                          Display Loop Details
                                                              System:   SYSTEMA
Loop Number . :   256

--------From--------     ---------To---------
Resource Name   Port     Resource Name   Port     Hardware Status
BC02            C00      BC01            A01      Operational
BC01            A00      BC02            C01      Operational

                                                                      Bottom
F3=Exit   F5=Refresh   F6=Display Connection Details   F12=Cancel
```

Figure 20. Display Loop Details

You can also obtain information on the status of an HSL OptiConnect connection from the issuing system to another system by accessing the *Display Connection Details* screen. To view this screen, press the

`F6=Display Connection Details`

function key.

If your hardware configuration does not include HSL OptiConnect, the following screen will appear:

```
                      Display OptiConnect Link Status
                                                          System:   SYSTEMA
                  ------Remote Optical Links-------
  System           Top         Bottom     Redundant        Remote    Connection
 Resource          Link        Link       Link             Bus           Status

  SYSTEMB
    SOC13          Active      Ready       Ready             4           Active
    SOC02          Ready       Active      Ready             5           Active
  SYSTEMC
    SOC08          Active      Ready       Down              2           Active
    SOC10          Unknown     Unknown     Unknown                       Failed
  SYSTEMD
    SOC07          Active      Ready       Ready             6           Active
    SOC04          Ready       Active      Ready             7           Active
                                                                      Bottom
 F3=Exit   F5=Refresh data   F11=Display local links   F12=Cancel
```

Figure 21. Display OptiConnect Link Status

This Display OptiConnect Link Status screen above shows information related to remote optical links. Information can also be obtained on local optical links. To access this screen, press the:

`F11=Display Local Links`

function key.

```
                      Display OptiConnect Link Status
                                                          System:   SYSTEMA
                   ------Local Optical Links-------
 System              Top         Bottom     Redundant       Remote     Connection
Resource             Link        Link       Link            Bus           Status

 SYSTEMB
   SOC13           Active      Ready       Ready             6           Active
   SOC02           Ready       Active      Ready             7           Active
 SYSTEMC
   SOC08           Active      Ready       Down              6           Active
   SOC10           Unknown     Unknown     Unknown                       Failed
 SYSTEMD
   SOC07           Active      Ready       Ready             6           Active
   SOC04           Ready       Active      Ready             7           Active


                                                                       Bottom
F3=Exit   F5=Refresh data   F11=Display bus owner   F12=Cancel
```

Figure 22. Display OptiConnect Link Status

Information can also be obtained to indicate the bus owner. To access this Display OptiConnect Link Status, press the

`F11=Display bus owner`

function key.

The Display OptiConnect Link Status screens show the following:

- The local system/resource and the associated local bus number
- Remote resource
- Remote bus number
- Bus owner: the system that owns the shared bus
- Link status
  - Active: Cable in use for logical path SOCxx
  - Ready: Cable available for use
  - Down: Failure in cable, or optical hardware or remote system is down
  - Unknown: Remote system could not be contacted
- Connection status
  - Vary on pending: Remote system could not be contacted
  - Varied on: Normal status
  - Varyon/degraded: Normal status; redundancy lost
  - Active: Normal status; currently in use
  - Active/degraded: Same as *Active* with redundancy lost
  - Failed: Failed

You may receive a connection status message indicating some troubleshooting is required. Review the following to help with potential problems:

- Any status for a Link or Connection of *Active*, *Ready*, or *Varied on* indicates that OptiConnect is operating correctly.
- If a system shows a Link Status of *Down*, then either a hub system is down or a cable/OptiConnect card has failed. The same is true for a Connection Status of *Varyon/degraded*, or *Active/degraded*. To solve this problem:

1. Check that all systems are operational
2. If a hub system is down, wait for it to be powered up and try the command again
3. If all hubs are operational, call your IBM Service Representative

Note: This does not apply to customers with 500 or 510 systems in an OptiConnect cluster.

- If a link status is *Unknown* or Connection Status is *Vary on pending*, check that the remote system is operational, and that the QSOC subsystem has been started.
- If the DSPOPCLNK screen is blank, then QSOC subsystem has not started on the system that you are signed on.

To print the entire Display OptiConnect Link Status screen use the Display OptiConnect Link Status DSPOPCLNK OUTPUT(*PRINT) command.

Work with hardware resources (WRKHDWRSC)

The Work with Hardware Resources (WRKHDWRSC) command is used to display information on OptiConnect adapters. The adapters represent systems that are linked to this system through the shared bus or HSL environment. An adapter that is associated with this system is **NOT** shown.

To display the OptiConnect adapters, use the Work with Hardware Resources command. Enter the following:

```
WRKHDWRSC TYPE(*CSA)
```

WRKHDWRSC TYPE(*CSA) displays a resource for each remote system that had, at some point, an operational connection to the system on which you are entering the command.

The examples in the following sections demonstrate a four-system, dual-path configuration that shows SYSTEMA as the bus-owning system (Hub).

```
                        Work with Coupled Resources
                                                              System:   SYSTEMA
Type options, press Enter.
   7=Display resource detail
 Opt  Resource      Type-Model  Status               System     Text
      LB06                     Operational                    Host Bus
  7     SOC13        2685-000   Operational          SYSTEMB   Shared Bus Adapter
        SOC08        2683-000   Operational          SYSTEMC   Shared Bus Adap
        SOC07        2685-000   Operational          SYSTEMD   Shared Bus Adap
      LB07                     Operational                    Nonhost Bus
        SOC04        2682-000   Operational          SYSTEMD   Bus Adapter
        SOC02        2685-000   Operational          SYSTEMB   Shared Bus Adap
        SOC10        2683-000   Inoperative          SYSTEMC   Shared Bus Adap


                                                                        Bottom
      F3=Exit   F5=Refresh   F6=Print   F12=Cancel
```

Figure 23. Work with Coupled Resources

Communication between two systems uses a pair of adapters: a source adapter, and a target adapter. The source adapter is the adapter to which a system is connected with optical cables. The target adapters are any remaining adapters on the shared bus that are connected to other systems. The WRKHDWRSC command does **not** display the source adapters to which you are optically connected. It displays the target adapters for *other* system adapters on the shared bus. These, in turn, represent systems to which you can communicate.

Note: Virtual SPD adapters might also display on the *Work with Coupled Resources* screen. They will have an adapter type of 268B and a text description of Virtual Bus Adapter. HSL adapters will an adapter type of 268A and a text description of Nonhost Bus.

Some resources may have a status that is “Not detected”. This is caused by:

- A change in your configuration.
- A remote system that was not powered up when the OptiConnect system was started.

  If a remote system was not powered up when the OptiConnect system was started, then power on the system. The resource should become operational as soon as the IPL on that system completes. The connection will still be displayed even though the subsystem on the remote system is not operational.

Next, select option 7 to display resource details such as physical location and logical address. Fields are blank for cards that physically reside in a bus on another system. Serial numbers appear as zeros for these cards.

```
                          Display Resource Detail
                                                          System:   SYSTEMA
Resource name  . . . . . :   SOC13
Text . . . . . :   Shared Bus Adapter
Type-Model . . . . . :   2685-000
Serial Number  . . . . . :   00-00000
Part Number  . . . . . :

Physical location:
 Frame ID
 Card position
Logical address:
 SPD bus:
  System bus                    6
  System board                  0
  System card                   1




                                                                  Bottom
Press Enter to continue.

F3=Exit   F5=Refresh   F6=Print   F12=Cancel
```

Figure 24. Displaying Resource Details

Display hardware resources (DSPHDWRSC)

Use the Display Hardware Resource (DSPHDWRSC) command to display, print, or direct to an output file, OptiConnect adapter information. This information consists of resource name, status, location, resource description, and the remote systems that are connected to the OptiConnect adapters. The following example prints the information:

```
DSPHDWRSC TYPE(*CSA) OUTPUT(*PRINT)
```

You see the same type of information that is shown in Figure 23 on page 52 and Figure 24.

Chapter 8. Troubleshoot

The following information will help you troubleshoot problems with OptiConnect.

Basic troubleshooting procedure

If you encounter problems when using OptiConnect, follow this procedure to find out why you are having difficulties. In general, it may be helpful to try the same DDM transaction over a communication link (LAN, for example). If no error occurs, follow the steps below to determine where OptiConnect is failing. If the error still occurs, the problem is not likely to be OptiConnect.

If all OptiConnect DDM accesses are failing, check the following:

1. Check to ensure that the system-to-system connections are operational by using the Work with Hardware Resources (WRKHDWRSC) command. Enter:

   ```
   WRKHDWRSC TYPE(*CSA)
   ```

   For more information on this command, see “Work with hardware resources (WRKHDWRSC)” on page 52.
2. Check to ensure the cables are operational using:

   ```
   DSPOPCLNK
   ```
3. Verify that QSOC subsystem is running on both the application systems and the database system by entering the following command on both:

   ```
   WRKACTJOB SBS(QSOC)
   ```
4. Verify that the SOCMGR job is running in the QSOC subsystem. If the QSOC subsystem is not running, start it. If the subsystem is running, but there is no SOCMGR job, either the SOCMGR job has been ended, or a software failure has occurred. Locate the job log that is associated with the SOCMGR job by entering:

   ```
   WRKJOB QSOC
   ```

   Display the log to determine why the SOCMGR job ended. Report software failures by contacting your service provider.
5. Verify that the OptiConnect Connection Manager has established communications between the source and target systems. Each time a connection is opened or closed, a message is sent to the system operator message queue. Connections are closed when the QSOC subsystem has ended, the SOCMGR job has ended, a system is powered off, or a failure occurs. To display the system operator messages, enter:

   ```
   DSPMSG MSGQ(*SYSOPR)
   ```

   Otherwise, use the following command to select a particular time period:

   ```
   DSPLOG LOG(QHST)
   ```

   Note: To see only QSOC messages, use `DSPMSG QSOC`.
6. Check to ensure that the QSOC job queue is not held. Enter:

   ```
   WRKJOBQ JOBQ(QSOC/QSOC)
   ```
7. Verify that the correct remote location name, device, and mode are defined in the DDM file used for OptiConnect. See Chapter 6, “Configure OptiConnect,” on page 23.

Follow these steps if you suspect a problem with a particular application:

1. Locate the failing job or job log on the source system.
2. Display the job log information and find this message:

   ```
   DDM JOB STARTED ON REMOTE SYSTEM
   ```
3. Use F1 to display the detailed message text. The detailed message text shows the OptiConnect agent job name.
4. Locate the agent job on the target system.
5. Inspect the job log information for both the application and agent jobs to locate any unexpected errors.
6. If MSGCPF9167 is encountered, see “OptiConnect error messages” for more information on communications messages.

Re-establish system connections when OptiConnect is installed

You should always use the Power Down System (PWRDWNSYS) command when you power down a system that is connected with OptiConnect. If you do not use the PWRDWNSYS command, you could experience difficulties with system-to-system connections.

Certain conditions can cause system-to-system connections to become inoperative. Performing an IPL on one of the systems is the only way to reestablish these connections.

You can avoid these conditions by using the PWRDWNSYS command. However, some conditions, such as abnormal operations, or loss of power on one system in the OptiConnect network, may make it necessary to perform an IPL. Additional examples are:

- Emergency power off (EPO)
- Utility or uninterruptible power supply failure
- Hardware failures
- Interrupted IPLs or failure of an IPL

If you suspect one of these conditions has occurred, check the status of the bus expansion adapter by using the Work with Hardware Resources (WRKHDWRSC) command. For more information on using this command, see “Work with hardware resources (WRKHDWRSC)” on page 52. Report hardware failures by contacting your IBM Service Representative.

Note: Problems can occur if the odd bus on the Optical Link card was used to connect to a non-OptiConnect expansion unit. See“SPD OptiConnect” on page 12 for more information on OptiConnect configurations.

OptiConnect error messages

OptiConnect provides messages that are kept in the QCPFMSG message file in QSYS library. You can display and print these messages by using the Work with Message File (WRKMSGF) command as follows:

```
WRKMSGF MSGF(QCPFMSG)
```

Or, you can use:

```
WRKMSGD CPDADA1
```

Detailed information can be displayed by selecting option 5 (Display details). You can also print from this display by using option 6 (Print).

When you are using OptiConnect, you may also see system messages that can be displayed as described above. These messages are also in the QCPFMSG message file in the QSYS library.

The list below describes the major/minor codes for message CPDADA0. There are two pieces of information in the MSGCPDADA0 secondary text. The first is the 'yyxx'X data. This information includes an error code followed by a function code. The second, which the message identifies as a major/minor return code, is a code point that identifies (to the OptiConnect developer) where the operation failed.

The MSGCPDADA0 msg 'yyxx'X data in the second level text can be interpreted as follows:

- yy = Error Code (what failure was detected)
- xx = Function Code (what function was being run)

Error Codes:

- 01xx - Coupling Environment not open (for example, QSOC SBS and SOCMGR not up).
- 02xx - System name not found (results in CPF9162 - cannot establish DDM connection with remote system).
- 03xx - Source/Agent connection id invalid (for example, source or target job ended the OptiConnect conversation without a clean disconnect).
- 0403 - Source/target conversation startup error. This is typically due to timeout, but can happen due to other errors during startup.
- 05xx - Bad conversation state. Received the wrong message type when waiting for a request, response, or control message (for example, waiting for a request and received a control message or any other combination of request/response/control). Typically this happens when a ″Close-Path″ (conversation) is received due to unexpected error on the other job (look at target joblog if 05xx on source and vice versa).
- 06xx - Communication error - error from IPCF/transport layer. In a dual bus setup this typically means the operation could not be done on either adapter. Most operations will be automatically retried on the alternate connection if available. Errors returned from HMC I/O typically cause this error.
- 07xx - Transaction ended, this error is almost always 070B: Terminate waiting for response. Indicates an inflight request was ended without any response. This typically means the associated target (or source) job failed and ended OptiConnect conversation without sending a response. However, this can also occur if communication between source and target systems was lost while a request was outstanding. The 06xx error occurs only if the communication is lost during request/response transport, while 07xx results because of failure during wait for response.
- 90xx - Internal Error. An unexpected or unhandled condition was detected by the OptiConnect device driver. A VLIC log with major or minor of 0700/0DDD is logged when this occurs. This may indicate a code problem or incorrect data (900B has been due to bad data in messages that are sent over the bus).

  Note: There are also some known cases in the device driver where this error is due to loss of communication during certain states. That is, errors which should probably be 06xx sometimes show up as 90xx. A 90xx error, which happens at the same time as a SOC*nnnnnn* OptiConnect connection closed message, is probably one which should have been 06xx.

Function Codes which may appear in MSGCPDADA0:

- yy01 - Open-stream (connects job with OptiConnect device driver, should only fail if Coupling Environment not open = 0101)
- yy03 - Open-conversation (namely, Open-path; connects source and agent job through SOCMGR on the target system)
- yy05 - Close-conversation (namely, Close-path; disconnects source and agent job)
- yy07 - Send-request (send a request message; requests may be originated by either source or agent job)
- yy08 - Receive-request (receive a request message)
- yy0A - Send-response (send a response message; associated with a previous request message)
- yy0B - Receive-response

OptiConnect cluster diagnostics

The following system bus and OptiConnect informational SRCs are the most common OptiConnect network-related messages that are posted in the Product Activity Logs of systems in a cluster.

B600 69A8 Link Operational

This informational SRC indicates that a fiber-optic link has become operational again. The satellite system will post the message. This is normally seen after reconnecting the redundant link cable.

B600 69C1 Loss of Contact With the Remote System

This informational SRC indicates that a remote system in an OptiConnect network has been brought down, or has crashed. To prevent this SRC during normal shutdown of a system in the cluster, run an ENDSBS QSOC *IMMED before bringing the system down.

B600 69D8 Link Non-operational

This informational SRC indicates that the fiber-optic link between two systems has become non-operational. Pulling a fiber-optic cable will result in this SRC. Since the OptiConnect hardware provides for redundant links, the hardware will switch over to the other fiber-optic link and continue to operate both buses on the one remaining cable.

During a Hub system power up, this SRC may occur during initial program load prior to completion and can be ignored.

Chapter 9. Related information for OptiConnect

Listed below are the iSeries manuals and Web sites that relate to the OptiConnect topic.

Manuals

- Backup and Recovery (6305 KB)
- APPC Programming (1497 KB)
  Describes advanced program-to-program communications (APPC) support for application programmers and includes configuration requirements and commands, problem management for APPC, and general networking considerations.
- SNA Distribution Services (2259 KB)
  Network configuration using Systems Network Architecture Distribution Services (SNADS) and the Virtual Machine/Multiple Virtual Storage (VM/MVS) bridge. Object distribution functions, document library services, system distribution directory services, and shadowing are discussed.
- TCP/IP Configuration and Reference (591 KB)
  Configuration and use of the Transmission Control Protocol/Internet Protocol (TCP/IP) and programming using the TCP/IP application interface.

Web sites

- OptiConnect
  (www.ibm.com/servers/eserver/iseries/ha/opticonnect)
  Information about OptiConnect, updated frequently.

Other information

- Install, upgrade, or delete i5/OS and related software
- Work Management
  Performance tuning, system values, collecting performance data, gathering system use data, using work entries, and scheduling batch jobs.

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) .

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