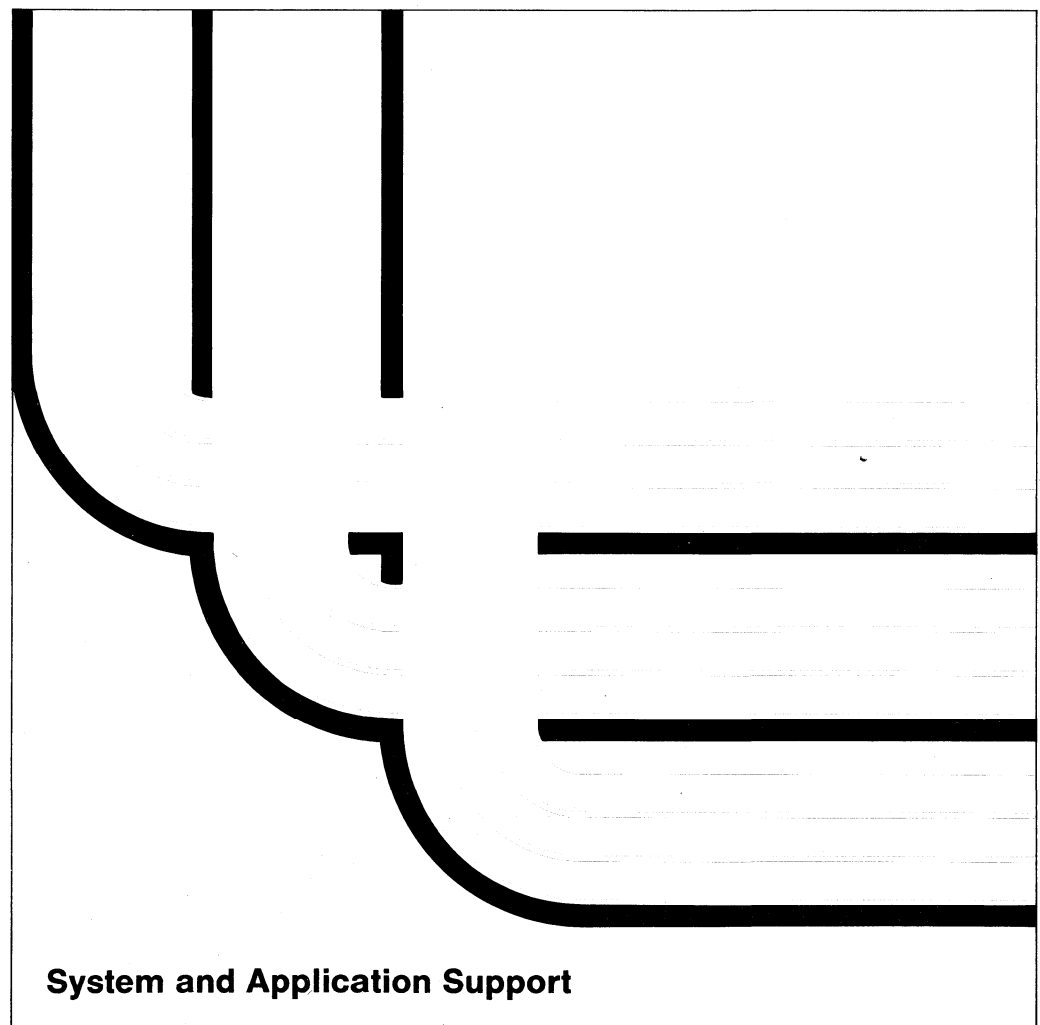


**Communications:
Remote Work Station Guide**

Version 2





Application System/400

SC41-0002-02

**Communications:
Remote Work Station Guide**

Version 2

Take Note!

Before using this information and the product it supports, be sure to read the general information under "Notices" on page xi.

Third Edition (November 1993)

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Refer to the "Summary of Changes" on page xv for a summary of changes made to the IBM Operating System/400 licensed program and how they are described in this publication.

This publication contains small programs that are furnished by IBM as simple examples to provide an illustration. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. All programs contained herein are provided to you "AS IS". THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED.

Programming Interface Information

This guide is intended to help you configure and use remote work stations to access the AS/400 system. This guide documents General-Use Programming Interface and Associated Guidance Information provided by IBM Operating System/400.

General-Use programming interfaces allow you to write programs that obtain the services of IBM Operating System/400.

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| ES/9000 | System/370 |
| IBM | System/390 |
| Intelligent Printer Data Stream | VTAM |
| IPDS | 400 |

About This Guide

You can greatly expand the capabilities of the AS/400* system by using work stations, devices, and controllers that are locally or remotely attached to the system. Using remote work stations can enable you to access other facilities and functions that are not available on the system on which you are currently working.

This guide provides information to configure and use remote work stations to access an AS/400 system. The sections in this guide contain information about:

- Configuring and using the 5250 display station pass-through function (see “Part 1. Display Station Pass-Through”).
- Configuring 5294, 5394, and 5494 controllers (see “Part 2. Configuring for 5250 Remote Control Units”).
- Configuring an AS/400 system for using 3270 remote attachment support and the SNA pass-through support (see “Part 3. Configuring for 3270 Remote Work Station Controllers”).
- Configuring X.21 short hold mode (SHM) (see “Part 4. Configuring for X.21 Short Hold Mode”).
- Configuring and using the distributed host command facility (DHCF), the network routing facility (NRF), and SNA Primary LU2 Support (SPLS) (see “Part 5. Distributed Host Command Facility, Network Routing Facility, and SNA Primary LU2 Support”).

Included in this guide are examples that can be used as models when creating applications on your system. For more information about configuring remote facilities, see the *Communications: Operating System/400* Communications Configuration Reference*, SC41-0001.

Before using this guide, you must be familiar with the use of the AS/400 system. A knowledge of configuration concepts and networking is helpful.

You may need to refer to other IBM* manuals for more specific information about a particular topic. The *Publications Guide*, GC41-9678, provides information on all the manuals in the AS/400 library. For a list of publications related to this guide, see the “Bibliography.”

Any mention of the 5394 Support as a type 2.1 node is a reference to Request for Price Quotation (RPQ) 8Q0775 on the AS/400 system.

Who Should Use This Guide

This publication is intended for use by system users who want to configure the following communications support:

- Display station pass-through in a network environment
- Distributed host command facility (DHCF)
- Network routing facility (NRF)
- SNA Primary LU2 Support (SPLS)
- 3270 and 5250 remote work station communications
- SNA pass-through

This guide is also intended for system users who want to use the following communications support:

- Display station pass-through
- 3270 remote attachment
- DHCF
- NRF
- SPLS
- SNA pass-through

You should be familiar with the general communications concepts and communications configuration on the AS/400 system. For more information on general communications concepts, refer to the Discover/Education* Introduction to Data Communications course (course code DE004).

Summary of Changes

The following changes have been made for this release:

- **Display Station Pass-Through Enhancement**

Chapter 4 has been added to explain enhancements to the display station pass-through support.

- **5494 Support Enhancement**

New information has been added to Chapter 10 to describe enhancements to the 5494 Remote Control Unit support.

- **SNA Primary LU2 Support**

Chapter 17 has been added to describe SNA Primary LU2 Support.

- **Miscellaneous Changes**

Miscellaneous technical and editorial changes have been made throughout this book.

Part 1. Display Station Pass-Through

"Part 1. Display Station Pass-Through" describes how to set up and use the 5250 display station pass-through function to access other systems. The pass-through function allows you to *pass through* your system and sign on to another system without having to sign off your system.

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Chapter 1. Pass-Through Instructions for the End User

This chapter has instructions for an end user who is beginning to use the display station pass-through function. These instructions assume the configuration is complete. If your AS/400 system is not already configured for display station pass-through, contact your system administrator or see Chapter 2 for information on configuration.

Display Station Pass-Through Environment

Display station pass-through allows a user with a display station signed on to one system to sign on to another system. The **source system** sends the request to establish communications with the target system. The **target system** receives the request to establish communications with the source system.

Figure 1-1 shows a typical pass-through environment. The AS/400 system user working at Display Station 1 uses the display station pass-through function to access System B through System A.

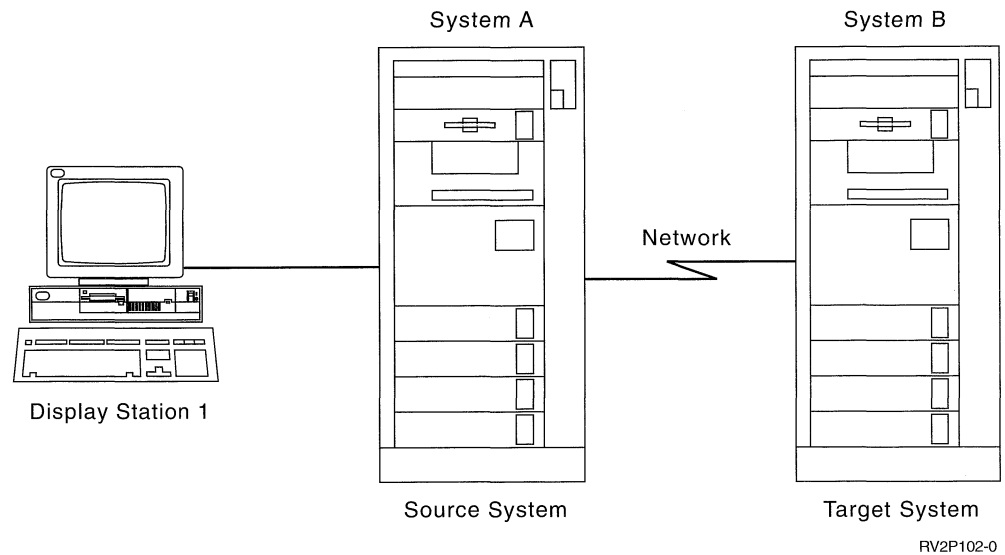


Figure 1-1. Pass-Through Environment

Your display station is attached, either locally or remotely, to the source system (System A). You pass through the source system to the target system (System B).

Choosing the Target System

You can specify a target system for the pass-through session in one of the following ways, depending on the configuration of your system. For all of the following, you specify the target system as part of the Start Pass-Through (STRPASTHR) command.

- Specify a remote location name for the remote location (RMTLOCNAME) parameter. This means pass-through uses the Advanced Peer-to-Peer Networking* (APPN*) capability to determine the entire route through the network to the target system.

The remote location name is the name of a location defined at the target system to which you want to pass through. The RMTLOCNAME parameter is the only parameter you need to specify if all the following conditions are met:

- The entire route from the source system to the target system consists of systems using APPN support.
- Both the target and source systems are located in the same APPN network.

If the target and source systems are located in different APPN networks, the target system network ID must be indicated in the remote network identifier (RMTNETID) parameter.

- Specify a list of nonnetworking advanced program-to-program communications (APPC) devices that describe some or all of the route to the target system.
- Specify a remote location name and a list of nonnetworking APPC devices. Pass-through uses APPN support to find a route to the system containing the specified remote location name. That system is then used as the first system to do pass-through routing. The list of nonnetworking devices specifies the remaining route to the target system.

The method you choose depends on how communications descriptions are defined on your system. For more information on these methods, see “Choosing the Target System” on page 3-1. To learn more about the capabilities and configuration of APPN functions, see the *APPN Guide*.

Using Display Station Pass-Through Commands

The display station pass-through function uses the Start Pass-Through (STRPASTHR), Transfer Pass-Through (TFRPASTHR), End Pass-Through (ENDPASTHR), and Sign off (SIGNOFF) commands.

To start the display station pass-through function, type STRPASTHR on the command line and press F4 (Prompt) to reach the Start Pass-Through prompt display, or type GO CMDPASTHR and then press the Enter key to reach the Command Pass-Through display, where you can choose the option to start a pass-through session.

If you need to specify additional parameters on the STRPASTHR command or want to see more information on using this command, see Chapter 3 or the *CL Reference* manual.

After the STRPASTHR command, sign on the target system and use that system as if your work station were directly attached to the target system.

You can return to the source system by using the Transfer Pass-Through (TFRPASTHR) command or the End Pass-Through (ENDPASTHR) command. The TFRPASTHR command does not end the pass-through session; therefore, you can return to the target system. Use the ENDPASTHR command to end your pass-through session.

Starting Pass-Through (STRPASTHR Command)

The Start Pass-Through (STRPASTHR) command allows you to connect your display station to another system in your network. Using Figure 1-1 on page 1-1 as an example, System A must have information about your display station (Display Station 1) and the target system (System B) in this example. This information allows you to sign on the target system (System B) and use that system.

To start a pass-through session, type STRPASTHR on any command line and press F4 (Prompt). The following display appears:

```

Start Pass-Through (STRPASTHR)

Type choices, press Enter.

Remote location . . . . . _____ Name, *CNNDEV

                                                                 Bottom
F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

|
|
|
|
|

You need to identify the remote location on the target system (System B in this example). The following topics explain what to specify for the remote location, which depends on whether or not you are using APPN support.

Starting Display Station Pass-Through with APPN Support

If you are using APPN support, specify the remote location name and then press the Enter key. The following display appears:

```

Start Pass-Through (STRPASTHR)

Type choices, press Enter.

Remote location . . . . . > SYSTEMB      Name, *CNNDEV
Virtual controller . . . . . *NONE        Name, *NONE
Virtual display device . . . . . *NONE     Name, *NONE
                               + for more values
Mode . . . . . *NETATR                   Name, *NETATR
Local location . . . . . *LOC             Name, *LOC, *NETATR
Remote network identifier . . . . . *LOC   Name, *LOC, *NETATR, *NONE
System request program . . . . . *SRQMNU   Name, *SRQMNU
Library . . . . . _____             Name, *LIBL, *CURLIB

                                                                 Bottom
F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

|

Specify any other values you want and then press the Enter key.

Starting Display Station Pass-Through without APPN Support

If you are not using APPN support, specify *CNNDEV in the *Remote location* field and then press the Enter key. The following display appears:

```

                                Start Pass-Through (STRPASTHR)

Type choices, press Enter.

Remote location . . . . . > *CNNDEV      Name, *CNNDEV
APPC device . . . . . *LOC              Name, *LOC
      + for more values
Virtual controller . . . . . *NONE      Name, *NONE
Virtual display device . . . . . *NONE   Name, *NONE
      + for more values
System request program . . . . . *SRQMNU Name, *SRQMNU
Library . . . . .                Name, *LIBL, *CURLIB
```

Specify the APPC devices and any other values you want. Press the Enter key. For more information about the *APPC device* field, see “Specifying Connection Device” on page 3-4.

For more information about the *System request program* field, see “Using the System Request Program (SRQ10PGM) Parameter” on page 4-6. For more information about all the other fields, see Chapter 3.

Going Back and Forth between Systems

You can use the following methods to go back and forth between systems.

- Start Pass-Through (STRPASTHR) command
- Transfer Pass-Through (TFRPASTHR) command
- End Pass-Through (ENDPASTHR) command
- Sign Off (SIGNOFF) command
- System Request menu

For more information about going back and forth between systems, see Chapter 4.

In control language programs, use the TFRPASTHR command to suspend a job on one system and go back to a job on another system. For details, see “Using the Transfer Pass-Through (TFRPASTHR) Command” on page 4-4.

If you prefer using a menu, use the System Request menu to go back and forth between systems. For details, see “Using System Request Options” on page 4-5.

Ending Pass-Through (ENDPASTHR Command)

You can return to the source system by using the End Pass-Through (ENDPASTHR) command. Use this command when you are through working with the job on the target system and want to return to the source system.

The End Pass-Through (ENDPASTHR) command runs on the target system. This command signs you off the target job, and ends the pass-through session.

The only parameter on the ENDPASTHR command that you can specify is the LOG parameter. If you specify LOG(*NOLIST), a job log is not produced. If you specify LOG(*LIST), a job log is created at the target system.

The ENDPASTHR command fails if there is a secondary (alternate) job still running. When you pass through to a System/38 or an AS/400 system, selecting option 1 (Display sign on for alternative job) on the System Request menu allows you to sign on to a new job called the *secondary* or *alternate* job. If the first job that you signed on to and the secondary job are both running, the ENDPASTHR command does not end the pass-through session. To

end the session, sign off one of the sessions or use the ENDJOB command to end one of the jobs.

Note: The ENDPASTHR command uses the SIGNOFF command as part of its process. If your system has a SIGNOFF command appearing in the library list before QSYS/SIGNOFF, your SIGNOFF command is used by ENDPASTHR.

The TFRPASTHR command and System Request options 10, 11, 13, 14, 15, and 80 do not end the pass-through session.

Signing Off (SIGNOFF Command)

If you are using the automatic sign-on function to sign on to the target system, the SIGNOFF command ends the pass-through session and returns you to the original session on the source system. If you are manually signed on to the target system, the SIGNOFF command ends the current target job and you are returned to the sign-on display of the target system.

End Connection Parameter

You can use the end connection (ENDCNN) parameter of the SIGNOFF command to sign off the target system and end the pass-through session. For example, entering SIGNOFF ENDCNN(*YES) returns you to your original job on the source system. This works the same way whether or not you are using the automatic sign-on function.

Chapter 2. Configuring Display Station Pass-Through

This chapter provides information for configuring your AS/400 system, virtual controllers, and attached devices for use in the display station pass-through function.

Before you can use display station pass-through, you must configure and activate advanced program-to-program communications (APPC). You must configure and activate APPC between the local, remote, and intermediate systems in the network. **APPC** is data communications support that allows programs on an AS/400 system to communicate with programs on other systems with compatible communications support.

The display station used for the pass-through session can be locally or remotely attached to an AS/400 system. The user can sign on to a remote System/36, System/38, or AS/400 system using the AS/400 APPC, with or without the Advanced Peer-to-Peer Networking (APPN) extensions, in an interactive environment. **APPN** support routes data in a network between two or more APPC systems that do not need to be adjacent.

Both the target system and the source system contain information describing a display station. However, the display station information contained in the target system describes a display station directly attached to the source system, not the target system.

The network joining the source system and the target system can consist of many objects and configurations. Users can tailor their network to use the objects and configurations that best suit their application.

Configuring Virtual Controllers and Devices

Virtual devices are used by the target system to direct output to devices on the source system. The virtual devices are attached to **virtual controllers**. You can allow the system to automatically configure these devices and controllers for you, you can configure them yourself, or you can do both.

Automatic Configuration

When the source system requests pass-through support to automatically configure a device, the target system examines each of the virtual devices on the virtual controller named QPACTL nn . If a device is available, the target system program configures that device to match your physical device. If the target pass-through program cannot find an available virtual device, it checks the QAUTOVRT system value. If creating another device makes the number of devices attached to the QPACTL nn virtual controllers greater than the QAUTOVRT system value, another device is not created. Instead, the program ends the pass-through session. If creating another device keeps the number of devices less than or equal to the QAUTOVRT value, a device is created.

To allow automatic configuration, use the Change System Value (CHGSYSVAL) command to set the QAUTOVRT system value to the maximum number of devices that can be automatically configured by the program. Use a value less than the maximum allowed value of 9999 to avoid performance problems. To allow the normal activity of your users to determine the best value for QAUTOVRT, set QAUTOVRT to 9999 temporarily, then decrease the value after creating the appropriate number of devices.

For example, if you have never allowed automatic configuration of virtual devices on your system, the QAUTOVRT value is specified as 0. An automatic configuration attempt fails because the display station pass-through function will not create more than the specified QAUTOVRT (0) devices. If you change the QAUTOVRT value to 10, the next pass-through attempt that requests automatic configuration causes pass-through to create a virtual device. This virtual device is created because the number of virtual devices on the controller (0) is less than the number specified in the QAUTOVRT (10). Even if you change the system value to 0 again, the next user attempting pass-through succeeds if a virtual device exists

that is not being used. If a free virtual device does not exist, pass-through will not create a new device because the number of devices currently existing is greater than or equal to the specified QAUTOVRT value.

Note: The creation of virtual devices for the work station function of PC Support/400 is not limited by the QAUTOVRT system value. Virtual devices for the work station function are created as needed regardless of the value of QAUTOVRT or the number of virtual devices already created.

Automatic Configuration Considerations

Consider the following when using automatic configuration of virtual devices by pass-through:

- Virtual devices that are automatically configured are owned by the user profile running the pass-through programs on the target system. Therefore, when automatic sign-on is used, the virtual devices that are created are owned by the user specified in the RMTUSER parameter of the STRPASTHR command.
- Pass-through does not delete virtual devices, even if the number of these devices attached to automatically configured virtual controllers exceeds the QAUTOVRT limit.
If you specify a QAUTOVRT value less than the number of devices attached to QPACTL nn controllers and want the extra devices deleted, delete them manually.
- Pass-through allows a maximum value of 250 virtual devices on a QPACTL nn controller before it creates another QPACTL nn controller. For example, pass-through allows 250 virtual devices on the QPACTL01 controller before it creates QPACTL02. If you delete devices to enforce a smaller QAUTOVRT value, begin by deleting the devices from the controller with the highest QPACTL nn value.

If you do not specify a virtual controller or a list of virtual devices when you issue the STRPASTHR command, the pass-through function uses the special virtual controller named QPACTL00 to request automatic configuration support from the target system.

- If the target system does not support automatic configuration, a user requesting automatic configuration can still pass through. However, the target system operator must create a virtual controller named QPACTL00 on the target system, and the QPACTL00 controller must have an appropriate virtual device attached.
- You can also request automatic configuration on a target AS/400 system that does not support automatic configuration by specifying QPACTL00 on the virtual controller parameter. This is useful if your source system is a System/38 or using Operating System/400* (OS/400*) Version 1 Release 1.0.
- System/36 users do not need to enter a virtual controller name when passing through to an AS/400 system if automatic configuration of virtual devices is enabled.

Note: If you are using OS/400 Version 1 Release 2.0 or later, do not create a controller named QPACTL00 because the automatic configuration of virtual devices fails if QPACTL00 is specified on the virtual controller parameter.

If a virtual controller named QPACTL00 does exist on a system, users requesting automatic configuration to that system by specifying QPACTL00 in the virtual controller parameter cannot use automatic configuration. Instead, these users must work with virtual devices attached to the QPACTL00 virtual controller.

Manual Configuration

Even if you prefer pass-through to configure virtual devices, you may still want to configure virtual controllers and devices manually. For example, you may want to create a virtual controller with enough virtual devices for your security officer and yourself to assure that you always get a virtual device, even if the number of active, automatically configured virtual devices has reached its limit. You may also want more control over who passes through to your system.

If you manually configure virtual controllers and devices, remember that virtual controllers are only a method of grouping virtual devices. You can create one virtual controller for each

virtual device, one for each department of users, or for whatever type of grouping that suits your system needs. Each virtual device can be associated with only one session.

You can configure a maximum of 255 virtual display stations for each virtual controller.

Use the Create Controller Description (Virtual Work Station) (CRTCTLVWS) command to configure virtual controllers. Each virtual controller can have a maximum of 255 associated virtual devices. In the following example, a virtual controller named PASSCTL1 is created. One virtual work station (VDSP1) is added to the virtual controller when the controller is created. VDSP1 must have already been created.

```
CRTCTLVWS  CTLD(PASSCTL1)
           DEV(VDSP1)
           TEXT('Virtual controller for pass-through use')
```

Note: For virtual controller configuration on a System/38, use the Create Control Unit Description (CRTCLUD) command. For more information about configuring for a System/38, see the *System/38 Environment Programmer's Guide/Reference*.

The following must be considered during configuration:

- When the virtual controller and associated virtual devices are varied on, the devices go to a vary on pending state.
- Remotely attached 3270 controllers and devices are supported by display station pass-through. They must be configured as remote 3270 displays at the source system and as virtual 5251 displays at the target system.

Matching Display Stations for Source and Target Systems

The virtual display stations of the target system should match the type and model parameters with the physical display stations of the pass-through source system. Table 2-1 shows how the virtual display stations of the target system are matched to the physical display stations of the source system. One of the alternative virtual display stations may be selected if the following are both true:

- The virtual controller (VRTCTL) parameter or virtual display device (VRTDEV) parameter was specified on the STRPASTHR command.
- A virtual display station with the appropriate type and model is not available.

If neither the VRTCTL parameter nor the VRTDEV parameter was specified on the STRPASTHR command, pass-through chooses a device description that is not in use. Then, pass-through changes the free device description to match the physical device.

Table 2-1 (Page 1 of 2). Physical and Virtual Display Stations of Source and Target Systems

| Physical Display Stations at Source System | Virtual Display Stations at Target System | Alternative Virtual Display Stations at Target System |
|---|---|---|
| 3179 Model 2; 3197 Models C1, C2; 5292 Model 1; 3476 Model EC | 3179 Model 2; 3197 Models C1, C2; 5292 Model 1; 3476 Model EC | 5251 Model 11 ¹ |
| 3180 Model 2; 3197 Models D1, D2, W1, W2 | 3180 Model 2; 3197 Models D1, D2, W1, W2 | 5251 Model 11 ² |
| 3196 Models A1, A2, B1, B2; 3476 Model EA | 3196 Models A1, A2, B1, B2; 3476 Model EA | 5251 Model 11 |
| 3277, 3278, or 3279 | 3277, 3278, or 3279 | 5251 Model 11 |
| 3477 Models FA, FD, FE, FG, FW | 3477 Models FA, FD, FE, FG, FW | 3180 Model 2 or equivalent |
| 3477 Model FC | 3477 Model FC | 3477 Model FA or equivalent ¹ |
| 3486 Model BA | 3486 Model BA | 3196 Model A1 or equivalent ³ |
| 3487 Models HA, HG, HW | 3487 Models HA, HG, HW | 5251 Model 11 |
| 3487 Model HC | 3487 Model HC | 3487 Model HA or equivalent ¹ |
| 5251 Model 11 | 5251 Model 11 | NA |
| 5291 Model 1, 2 | 5291 Model 1, 2 | 5251 Model 11 |

Table 2-1 (Page 2 of 2). Physical and Virtual Display Stations of Source and Target Systems

| Physical Display Stations at Source System | Virtual Display Stations at Target System | Alternative Virtual Display Stations at Target System |
|--|---|--|
| 5292 Model 2 | 5292 Model 2 | 5251 Model 11 ⁴ |
| 5555 Models B01, E01 | 5555 Models B01, E01 | NA |
| 5555 Model C01, F01 | 5555 Model C01, F01 | 5555 Model B01 ⁵ or equivalent ¹ |
| 5555 Model G01 | 5555 Model G01 | 5555 Model B01 or equivalent ⁶ |
| 5555 Model G02 | 5555 Model G02 | 5555 Model G01 or equivalent ¹ |
| <p>1 If this alternative virtual display station is used at the target system, the display station user has no color capability during the pass-through session.</p> <p>2 If this alternative virtual display station is used at the target system, the display station user has no wide screen capability during the pass-through session.</p> <p>3 If this alternative virtual display station is used at the target system, the display station user has no extended character buffer or extended 5250 data stream during the pass-through session.</p> <p>4 If this alternative virtual display station is used at the target system, the display station user has no color or graphics capabilities during the pass-through session.</p> <p>5 If the 5555 Model C01 is using software from Version 1 Release 3, Modification 0 or earlier, the Model C01 will be viewed as a Model B01.</p> <p>6 If this alternative virtual display station is used at the target system, the display station user has no graphics capabilities during the pass-through session.</p> | | |

Using Personal Computers for Display Stations

Personal computers that function as display stations on AS/400 systems also have virtual device descriptions. These device descriptions specify the type and model of the physical device being emulated by the personal computers. Use the Display Device Description (DSPDEV) command to view these descriptions.

Note: Virtual printer device descriptions are supported on the AS/400 system, but the device description is only used for supporting the printer session of the work station function for PC Support/400.

Using Utilities during Pass-Through

To use certain utilities (such as 3270 device emulation) during pass-through, the keyboard language type (KBDTYPE) parameters at the source and target systems must match. The KBDTYPE parameter is part of the display device description.

The United States basic keyboard type KBDTYPE(USB) is used in the following examples.

If you have a 5251 Display Station Model 11 attached to your source system, use the following command at the target system to configure an appropriate virtual work station:

```
CRTDEV DSP DEVD(VIRTDSP1) DEVCLS(*VRT) TYPE(5251) MODEL(0011)
      ONLINE(*YES) CTL(PASSCTL1) KBDTYPE(USB)
      TEXT('Example virtual display station')
```

If you have a 5292 Color Graphics Display Station Model 2 attached to your source system, you can also use the following command from the target system:

```
CRTDEV DSP DEVD(VIRTDSP2) DEVCLS(*VRT) TYPE(5292) MODEL(0002)
      ONLINE(*YES) CTL(PASSCTL1) KBDTYPE(USB)
      TEXT('Example virtual display station')
```

Determine the number of physical display stations that will be active at the same time with the same target system. This is the number of virtual display stations of each type that you must configure at the target system. For example, if two 5251 Display Station Model 11s will do pass-through to a single target system, then the target system must have two virtual display stations configured as 5251 Model 11. These virtual display stations must have different names in the DEVD parameter.

Note: For virtual display configuration on a System/38, use the Create Device Description (CRTDEVD) command.

TELNET Automatic Configuration

The AS/400 system supports the TELNET Transmission Control Protocol/Internet Protocol (TCP/IP) application. **TCP/IP** is a set of vendor-independent communications protocols that support peer-to-peer connectivity functions for both local and wide area networks. TELNET is similar to pass-through but runs on a TCP/IP network rather than an APPC network. TELNET uses virtual devices to direct output to the local devices just as pass-through does.

When using TELNET, the AS/400 system creates virtual devices automatically in the same way that it does for pass-through unless you use network virtual terminals. Therefore, the QAUTOVRT system value controls the number of automatically configured virtual devices for both TELNET and pass-through.

With the QAUTOVRT system value, you can attach the source AS/400 system to a target AS/400 system using pass-through or TELNET.

For more information about TELNET, see the *TCP/IP Guide*.

Security Considerations for Virtual Controllers and Devices

If you allow automatic configuration of virtual devices, it is easier for users to attempt to break in by using pass-through. Without automatic configuration, a user attempting to break in has a limited number of attempts to sign on at each virtual device. This limit is defined by the security officer using the QMAXSIGN system value and by the number of devices available. With automatic configuration active, the actual limit increases because the system limit for sign-on operations that are not valid is multiplied by the number of virtual devices that can be created by the automatic configuration support defined by the QAUTOVRT system value. For information about what you can do to restrict remote sign-on capability, see "Controlling Remote Sessions from Other Systems" on page 5-1.

Creating User Profiles

At the target system, create one or more user profiles for pass-through users from other systems. These user profiles should only have authority appropriate to the function being performed by each user. The following is an example user profile:

```
CRTUSRPRF  USRPRF(CLERK1)  PASSWORD(unique-password)
           JOB(CLERKLIB/CLERK1)
           TEXT('User profile for one group of clerks')
```

Note: You must create the user profiles of all System/36 users who pass through to your AS/400 system if your AS/400 system is the target system in a System/36 pass-through operation, and if you specify SECURELOC(*YES) in your APPC device description or SECURELOC (*YES) in the APPN remote location list entry. The System/36 Pass-Through (PASSTHRU) procedure fails if you try to pass through from a System/36 using a user profile name that is not created on the AS/400 system and if your AS/400 devices and locations are specified as SECURELOC(*YES).

For more information about APPC and APPN security, see the *OS/400* Communications Configuration Reference* manual and the *APPC Programmer's Guide*.

When the AS/400 system is shipped, a subsystem called QBASE is provided that contains all the work station entries, job descriptions, default user profiles, communications entries, and **routing entries** (entries in a subsystem descriptions that specify the program to be called to control a routing step) necessary for pass-through. Another subsystem called QCMN contains only the communications entries and routing entries necessary for pass-through.

! To use pass-through, the subsystem (either QBASE or QCMN) that owns the work station
! entries used by pass-through must be active.

If you want to configure how your subsystems are accessed by pass-through, follow the steps shown in the *Work Management Guide*. These steps are not necessary if you do not change your subsystems on your AS/400 system.

Chapter 3. Starting a Display Station Pass-Through Session

This chapter discusses the details about starting and using a pass-through session.

Choosing the Target System

You can specify a target system for the pass-through session in one of the following ways, depending on the configuration of your system. For all of the following, you specify the target system as part of the Start Pass-Through (STRPASTHR) command.

- Specify a remote location name for the remote location (RMTLOCNAME) parameter. This means pass-through uses APPN support to determine the entire route through the network to the target system.
- Specify a list of nonnetworking APPC devices that describe some or all of the route to the target system.
- Specify a remote location name and a list of nonnetworking APPC devices. Pass-through uses APPN support to find a route to the system containing the specified remote location name. That system is then used as the first system to do pass-through routing. The list of nonnetworking devices specifies the remaining route to the target system.

The method you choose depends on how your system's communications descriptions are defined. To learn more about the capabilities and configuration of APPN functions, see the *APPN Guide*.

Specifying the Remote Location Name

The remote location name is the name of a location defined at the target system of the pass-through session. The remote location name could be defined on the target system in one of the following places:

- APPN configuration list (local location list)
- Default local location name
- Local control point name

Use the Work with Configuration List (WRKCFGL) and the Display Network Attributes (DSPNETA) commands while on the target system to determine which location names are defined on that system.

You can also determine the local location names defined on the target system by issuing the following command on the target system:

```
DSPAPPNINF *LCLNODE
```

APPN support chooses an appropriate route for your pass-through session if the following conditions are met:

- The specified remote location name is defined in the network.
- An APPN route exists from the source system to the target system that contains the location name.

For example, you can use the RMTLOCNAME parameter to pass through to a system directly connected to your AS/400 system without intermediate systems in the route. If you specify a location name that is the remote location name in one of the devices associated with the line, pass-through can establish a session using that line, even if the line connecting your AS/400 system to the target system is configured with a controller and devices that are specified as APPN(*NO).

RMTLOCNAME is a required parameter. If the entire route from the source system to the target system consists of systems using APPN support, RMTLOCNAME is the only necessary parameter.

RMTLOCNAME values are:

location-name

A location on the target system.

***CNNDEV** Use the APPC device (CNNDEV) parameter to specify APPC devices if any system en route to the target system requires pass-through to select the route. APPN routing procedures are not used for this. If you specify RMTLOCNAME(*CNNDEV), the system uses the first mode name specified for each APPC device on the CNNDEV parameter. For more information about the CNNDEV parameter, see “Specifying Connection Device” on page 3-4.

Figure 3-1 shows how the RMTLOCNAME parameter is used. All five systems shown in the network have the following assumed characteristics:

- All are configured as APPN network nodes.
- All determine the route between any two locations in the network by using the current network configuration.
- All define one or more local locations that are represented by the smaller boxes inside the system boxes. These location names can be used to specify the target system in the RMTLOCNAME parameter.

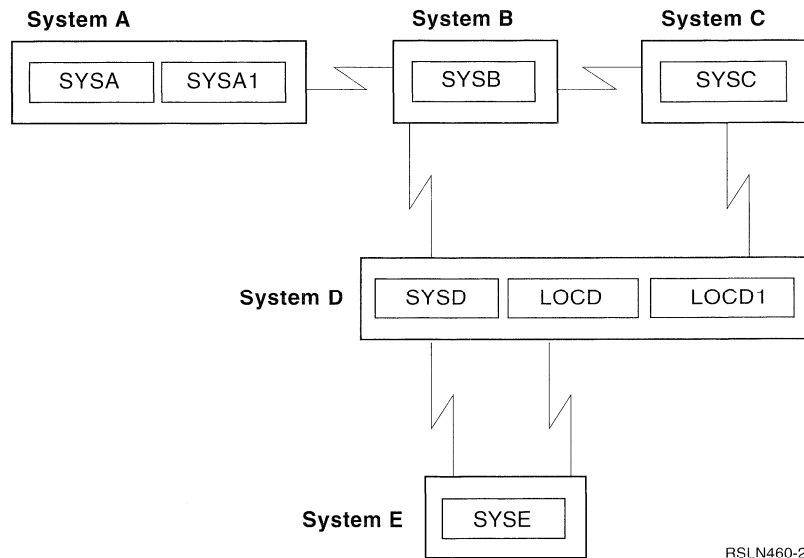


Figure 3-1. Networking Example for Location Names

If you are signed on to System A in Figure 3-1 and you want to use pass-through to sign on to System B, you must specify STRPASTHR RMTLOCNAME(SYSB) because the only location on System B is SYSB. In this example, only one route is available from System A to System B. If this route satisfies the class of service, APPN support chooses this route.

Class of service is the link and node characteristics that determine the quality of the route selected for the sessions. For more information about class of service, see the *OS/400* Communications Configuration Reference* manual or the *APPN Guide*.

However, if you want to sign on to System D from System A, there are three local location names on that system. The value you specify for the RMTLOCNAME parameter can be SYSD, LOCD, or LOCD1. The current traffic in the network, the status of the links, and the class of service specified determine the route chosen by APPN support.

If you pass through to System E, APPN support determines which of the two communications lines connecting System D and System E to use. The line APPN support chooses depends on the state of the network when you issue the STRPASTHR command. For example, APPN support considers such factors as the speed of the communications lines and the relative cost of using those lines.

Three other parameters (mode, local location name, and remote network identifier) are used only when the remote location name is specified. These parameters are used by APPN support to determine the route of the pass-through session.

Specifying Mode

A mode describes the attributes of a group of APPC sessions. Before beginning a conversation between the source and target systems, pass-through must know the mode under which the conversation runs.

The MODE parameter allows you to specify the communications mode that must be used when the pass-through session is established. The MODE parameter appears only if RMTLOCNAME(*CNNDEV) is not specified.

If you specify a location name for the RMTLOCNAME parameter on the Start Pass-Through (STRPASTHR) command, you can also specify a mode name. If you do not specify a mode, pass-through attempts to use the system default mode defined in the network attributes.

When specifying a mode, you can choose one of the IBM-supplied modes, or you can choose a mode that you create by using the Create Mode Description (CRTMODD) command to define enough sessions and conversations to allow all users of that mode to run at the same time. For example, you can create a mode that can be used by 10 pass-through users at one time by specifying MAXSSN(10) and MAXCNV(10) on the CRTMODD command.

For example, in Figure 3-1 on page 3-2, if you pass through from SYSA to SYSE, a mode on SYSE must match the mode you specify for the MODE parameter on system A.

MODE values are:

***NETATR** The default mode name specified in the network attributes. To display or change this value, use the Display Network Attributes (DSPNETA) command or the Change Network Attributes (CHGNETA) command. This is the default value.

mode-name The name of a mode created with the Create Mode Description (CRTMODD) command or provided with the system.

Note: If you specify RMTLOCNAME(*CNNDEV), the system uses the first mode name specified for each APPC device on the APPC device (CNNDEV) parameter. You cannot specify a mode. For example, in Figure 3-2 on page 3-6, the mode used between System B and System A is the first mode of the list of modes associated with the APPC D4 device on System B. You must be certain that the mode that appears first on each APPC device has a matching mode on the next system in the route to the target system.

You can use the Display Device Description (DSPDEV) command to display the first mode listed for each device.

Specifying Local Location Name

The local location (LCLLOCNAME) parameter is the name of a location defined at the source system. You can specify any of the local location names defined on your system. This parameter specifies the location of the source of the pass-through session.

For example, to start a pass-through session on System A in Figure 3-1 on page 3-2, specify LCLLOCNAME(*NETATR). If the default local location name is SYSA, APPN support tries to establish a session using SYSA as the source system. If the maximum number of sessions between SYSA and the remote location is already running, the STRPASTHR command fails. However, you can issue the STRPASTHR command with LCLLOCNAME(SYSA1) because sessions may be available from SYSA1 to the location on the target system.

LCLLOCNAME values are:

- *LOC** The system selects the local location name. This is the default value.
- *NETATR** The default local location name specified in the network attributes. To display or change this value, use the DSPNETA command or the CHGNETA command.

location-name

A location name on the source system. To determine which location names are defined, use one of the following commands on the source system:

- Work with Configuration Lists (WRKCFGL)
- Display Network Attributes (DSPNETA)
- Display APPN Information (DSPAPPNINF)

Specifying Remote Network Identifier

The remote network identifier (RMTNETID) parameter allows you to specify the network that contains the target remote location. The RMTNETID parameter allows you to pass through to a system on another APPN network that is connected to your local network by using a system with APPN cross-network routing capability. AS/400 system network nodes have this cross-network routing capability. For more information on APPN cross-network routing, see the information on multiple network connectivity in the *APPN Guide*.

RMTNETID values are:

- *LOC** The system selects the network ID. This is the default value.
- *NETATR** The remote location exists in the same network as the source system. Use the DSPNETA command to determine the network ID.
- *NONE** The remote location does not support network identifiers.

remote-network-ID

The network identifier of the remote network.

For more information about the basic concepts of the RMTLOCNAME, RMTNETID, MODE, and LCLLOCNAME parameters, see the *OS/400* Communications Configuration Reference* manual. For more information about system association of these parameters with specific communications links, see the *APPC Programmer's Guide*.

Specifying Connection Device

If your network consists of System/38 or AS/400 systems without APPN support configured, use the APPC device (CNNDEV) parameter. Use this parameter to specify the names of the APPC device descriptions that connect the systems in your network. If you specifically choose some or all of the route from your source system to the target system, you must know the name of the **connection devices** on the route between the source system and the target system. APPC connection devices are objects in a System/38 and an AS/400 system, each of which represents a data link between systems. If you did not create these devices, ask the system administrator or the user who created the devices for the correct names.

If you type *CNNDEV for the RMTLOCNAME parameter and press the Enter key, the following parameters are displayed:


```

                                Start Pass-Through (STRPASTHR)

Type choices, press Enter.

Remote location . . . . . > *CNNDEV      Name, *CNNDEV
APPC device . . . . .          *LOC        Name, *LOC
      + for more values
Virtual controller . . . . .    *NONE      Name, *NONE
Virtual display device . . . . . *NONE      Name, *NONE
      + for more values
System request program . . . . . *SRQMNU   Name, *SRQMNU
Library . . . . .              _____ Name, *LIBL, *CURLIB

```

The APPC device (CNNDEV) parameter accepts up to 16 names. These names are used as names of APPC devices on the intermediate systems.

An **intermediate system** is a system through which a connection is made when a direct route is not available for pass-through. When the CNNDEV parameter is used, each intermediate system in which display station pass-through performs the networking functions has a pass-through job for each pass-through session. The display station pass-through job passes the data between adjacent systems. Intermediate systems do not need virtual device descriptions.

If you specify a location name on the RMTLOCNAME parameter and omit the CNNDEV parameter, all systems in the pass-through route must use APPN support. Because APPN support routes the data through, pass-through jobs do not exist on the intermediate systems.

Note: Only devices, not locations, can be used in the CNNDEV parameter. If locations are used, the intermediate system attempting to use the location as a device name ends the pass-through attempt because the device name does not exist. To arrive at the target system, these APPC device names must be listed in the order in which the intermediate systems are passed through.

At any point in the route to the target system, one or more of the intermediate systems can use its APPN routing capability to choose part of the route, depending on how your network is configured. (For more information on configuring an APPN network, see Figure 6-1 on page 6-9 and Figure 7-9 on page 7-11.)

When you specify a remote location name, you can specify connection devices for additional routing purposes by using the APPC device (CNNDEV) parameter. This parameter does not appear on the initial Start Pass-Through display. However, you can view all of the parameters used by STRPASTHR, including CNNDEV, by pressing F9 (All parameters). For more information about combining RMTLOCNAME and CNNDEV parameters, see "Specifying Remote Location Name and Connection Device Together" on page 3-7.

If the entire route to the target system consists of systems using APPN networking, you do not need to specify the APPC device (CNNDEV) parameter. You can use the default value (*LOC) for the APPC device (CNNDEV) parameter and specify the target system using the RMTLOCNAME parameter.

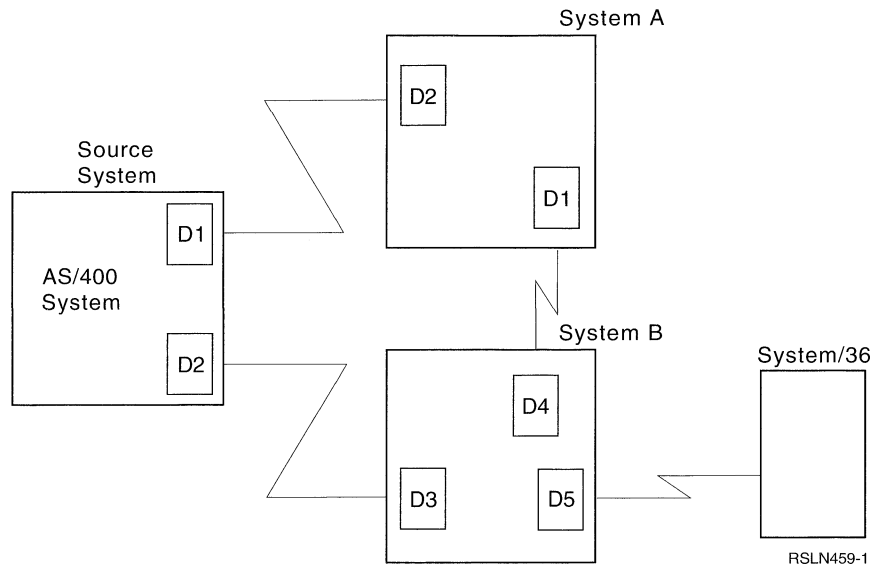


Figure 3-2. Networking Using CNNDEV

In the configuration represented by Figure 3-2, there are four systems. System A and System B may be either a System/38 or an AS/400 system for which the APPC configuration is not configured to use APPN support.

Three of the systems in this example contain objects describing the connection between the system on which the object exists, and the system at the other end of the connection. For example, D4 describes the connection between System B and System A. These objects are the connection devices in the discussion of the remote location name parameter. The connection devices must be nonnetworking devices or you cannot specify your own route to the target system. For this example, assume the names of the devices are the values shown inside each of the small boxes. For example, System A has two devices, D1 and D2.

Notice that the names of the connection devices do not have to be unique throughout the network, but they must be unique in a system. Also, notice the System/36 does not have connection devices.

If you are signed on to a display station attached to the source system and you want to pass through to System A, two routes are possible. Because D1 connects the source system to System A, you can pass through directly to System A by specifying:

```
STRPASTHR RMTLOCNAME(*CNNDEV) CNNDEV(D1)
```

The alternative is to specify CNNDEV (D2 D4) because D2 on the source system connects to System B, and D4 on system B connects to System A. System B is an intermediate system in this example.

Note: You may also use the RMTLOCNAME parameter to establish the pass-through route. For example, if device D1 was created with the value SYSA (see Figure 3-1 on page 3-2) as its remote location name and if no other devices use that remote location name, the following two commands perform the same function:

```
STRPASTHR RMTLOCNAME(*CNNDEV) CNNDEV(D1)
```

```
STRPASTHR RMTLOCNAME(SYSA)
```

To pass through from the source system to the System/36, you can specify either CNNDEV (D2 D5) or CNNDEV (D1 D1 D5). Notice the connection devices are specified in a sequence beginning with the device on the source system and ending with the device that connects to the target system. Both choices require at least one intermediate system because a direct link does not exist between the source system and the System/36.

Note: You can pass through from the source system to the System/36 by specifying only a remote location name if the System/36 is configured as a low-entry networking node and System B is configured as a network node. (**Low-entry networking nodes** use the logical unit (LU) 6.2 node type 2.1 architecture without the APPN extension.)

The *OS/400* Communications Configuration Reference* also contains information about location names and networking. All devices specified on the CNNDEV parameter must be varied on before you enter the STRPASTHR command.

CNNDEV values are:

***LOC** No connection devices are specified. Use the location name specified with the remote location name parameter. This is the default value.

connection-device

The name of the connection device or devices.

Specifying Remote Location Name and Connection Device Together

You can specify the APPC device (CNNDEV) parameter as an additional parameter when you specify RMTLOCNAME. This allows you to use APPN support as far through the network as possible. Then you can use pass-through routing through more than one system to complete the path.

Refer to Figure 3-2 on page 3-6 for an example network where this routing can be used. You can specify RMTLOCNAME(SYSA) with CNNDEV(D1 D5) or RMTLOCNAME(SYSB) with CNNDEV(D5) to pass through from the source system to the System/36. When you use the RMTLOCNAME and CNNDEV parameters in this way, RMTLOCNAME does not identify the target system; it identifies the system containing the first device in the CNNDEV device list.

To specify a remote location name and a connection device name together, type in the remote location name on the Start Pass-Through display and press F9.

Start Pass-Through (STRPASTHR)

Type choices, press Enter.

| | | |
|-------------------------------------|-----------------------------|----------------------------|
| Remote location | > <u>SYSB</u> | Name, *CNNDEV |
| APPC device | > <u>D5</u> | Name, *LOC |
| | + for more values | |
| Virtual controller | <u>*NONE</u> | Name, *NONE |
| Virtual display device | <u>*NONE</u> | Name, *NONE |
| | + for more values | |
| Mode | <u>*NETATR</u> | Name, *NETATR |
| Local location | <u>*LOC</u> | Name, *LOC, *NETATR |
| Remote network identifier | <u>*LOC</u> | Name, *LOC, *NETATR, *NONE |
| System request program | <u>*SRQMNU</u> | Name, *SRQMNU |
| Library | <u> </u> | Name, *LIBL, *CURLIB |

Additional Parameters

| | | |
|-------------------------|--------------|-----------------------|
| User profile | <u>*NONE</u> | Name, *NONE, *CURRENT |
| User password | <u>*NONE</u> | Name, *NONE |

More...

F3=Exit F4=Prompt F5=Refresh F12=Cancel F13=How to use this display
F24=More keys

Specifying Virtual Controllers and Virtual Devices

A virtual device description provides information about your physical display station to the programs on the target system, just as the physical device description on your source system provides information about your physical display station to the programs on the source system.

When you specify the STRPASTHR command, the pass-through support on the target system attempts to find a virtual device on the target system with a device type and model similar to the device description on the source system. Use the virtual controller (VRTCTL) parameter or the virtual display device (VRTDEV) parameter if you want to indicate to the target system which device to use.

Requesting Automatic Configuration

To request that the target system automatically set up a virtual device, use the default value (*NONE) for the VRTCTL and VRTDEV parameters.

If the target system does not allow automatic configuration of virtual devices, or if you want to be more selective about which virtual device to use, you can use the VRTCTL or the VRTDEV parameter.

Virtual Controller (VRTCTL) Parameter

The virtual controller parameter is the name of the virtual controller on the target AS/400 system or System/38. During configuration on the System/38 and AS/400 system, virtual devices are grouped under virtual controllers. You can enter the name of the virtual controller in the VRTCTL parameter. The target pass-through support chooses the first available virtual device attached to that virtual controller that has the appropriate type and model values.

To determine which virtual device types and models are appropriate for the physical device types and models, see Table 2-1 on page 2-3. If you did not create these device names, ask the system administrator or the user who created these names for the correct values. If your target system is a System/36, you can use the default value for the VRTCTL parameter because virtual controllers do not exist on the System/36. If you specify a value for this parameter, the target System/36 ignores the value.

VRTCTL values are:

***NONE** The VRTDEV parameter specifies the virtual device descriptions to choose from. If this value is specified when the VRTDEV parameter is *NONE, you are requesting pass-through to automatically configure a virtual device for you. VRTCTL(*NONE) must be specified when the VRTDEV parameter specifies a list of virtual device names. If no value is specified for the VRTCTL parameter, the system defaults to *NONE.

virtual-controller-name

The name of the virtual controller that exists on the target system. For more information about virtual controllers, see “Configuring Virtual Controllers and Devices” on page 2-1.

Virtual Display Device (VRTDEV) Parameter

The virtual device list shows from 1 to 32 virtual device names on the target AS/400 system or System/38. Use the VRTDEV parameter to specify this list. The first available device listed with the appropriate type and model values is chosen.

To determine the virtual device types and models that are appropriate for the physical device types and models, see Table 2-1 on page 2-3.

Because System/36 does not have virtual devices, use the default value of the VRTDEV parameter if your target system is a System/36. If you specify a value for this parameter, the target System/36 ignores it.

VRTDEV values are:

***NONE** The VRTCTL parameter specifies the virtual device descriptions to choose from. If this value is specified when the VRTCTL parameter is *NONE, you request pass-through to automatically configure a virtual device for you. VRTDEV(*NONE) must be specified when the VRTCTL parameter specifies a virtual controller name. If no value is specified for the VRTDEV parameter, the system defaults to *NONE.

virtual-device-names

The names of up to 32 virtual devices. If more than one virtual device is listed, the first available virtual device that matches the type and model of the physical device is chosen.

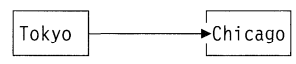

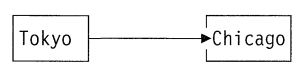
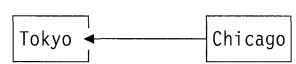
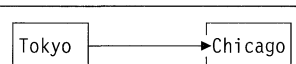
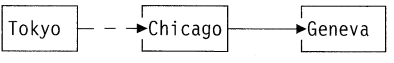
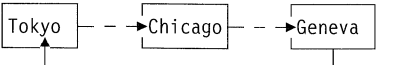
For more information about the virtual devices, see “Manual Configuration” on page 2-2.

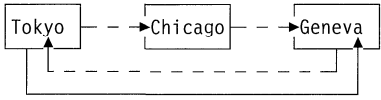

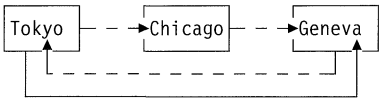
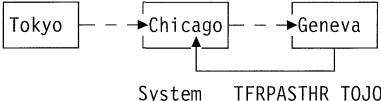
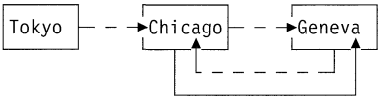
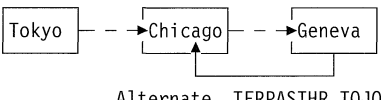
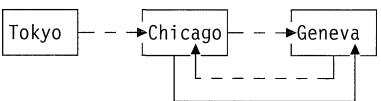
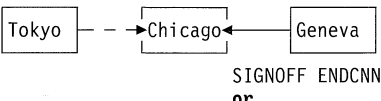
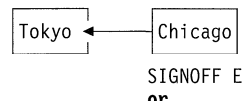
Chapter 4. Going Back and Forth between Systems

You can use pass-through functions to go back and forth between systems. This chapter has an example of using pass-through to go back and forth between systems. It also discusses the Transfer Pass-Through (TFRPASTHR) command and the System Request options.

The example shows three systems with default local location names of Tokyo, Chicago, and Geneva. All the necessary configuration has been done. The following commands and menu are used to go back and forth between the three systems:

Start Pass-Through (STRPASTHR) command
 Transfer Pass-Through (TFRPASTHR) command
 End Pass-Through (ENDPASTHR) command
 Sign Off (SIGNOFF) command
 System Request menu

| Number | Diagram | Description |
|--------|---|---|
| 1 |  <p>STRPASTHR CHICAGO</p> | Pass through from Tokyo to Chicago using the STRPASTHR command. |
| 2 |  <p>System Request menu</p> <p>TFRPASTHR TOJOB(*SRC) or TFRPASTHR TOJOB(*HOME) or System Request option 10 or System Request option 13</p> | Return to the System Request menu at Tokyo after passing through from Tokyo to Chicago (which is shown in number 1). Any of the four methods shown can be used. |
| 3 |  <p>System Request menu F3 or System Request option 15</p> | Go back to Chicago again after number 2 by pressing F3 on the System Request menu or by using System Request option 15. |
| 4 |  <p>Alternate job</p> <p>TFRPASTHR TOJOB(*ALT) or TFRPASTHR TOJOB(*HOMEALT) or System Request option 11 or System Request option 14</p> | Go to the alternate job at Tokyo after number 1 or number 3. Any of the four methods shown can be used. |
| 5 |  <p>Alternate job SIGNOFF or TFRSECJOB or System Request option 1</p> | Go back to Chicago again after number 4. Any of the three methods shown can be used from the alternate job at Tokyo. |
| 6 |  <p>STRPASTHR GENEVA</p> | Pass through from Chicago to Geneva by using the STRPASTHR command after passing through from Tokyo to Chicago (shown in numbers 1, 3, and 5). |
| 7 |  <p>System Request menu</p> <p>TFRPASTHR TOJOB(*HOME) or System Request option 13</p> | Return to the Tokyo System Request menu from Geneva after number 6 by using either the TFRPASTHR command or System Request option 13. |

| Number | Diagram | Description |
|--------|--|--|
| 8 |  <p>System Request menu F3 or System Request option 15</p> | Return to Geneva after number 7 by using either F3 or System Request option 15. |
| 9 |  <p>Alternate job TFRPASTHR TOJOB(*HOMEALT) or System Request option 14</p> | Return to the alternate job on Tokyo from Geneva after number 6 or number 8 by using either the TFRPASTHR command or System Request option 14. |
| 10 |  <p>Alternate job SIGNOFF or TFRSECJOB or System Request option 1</p> | Return to Geneva after number 9. Any of the three methods shown can be used from the alternate job at Tokyo. |
| 11 |  <p>System Request menu TFRPASTHR TOJOB(*SRC) or System Request option 10</p> | Return to the Chicago System Request menu from Geneva after numbers 6, 8, or 10 by using either the TFRPASTHR command or System Request option 10. |
| 12 |  <p>System Request menu F3 or System Request option 15</p> | Return to Geneva after number 11 by using either F3 or System Request option 15. |
| 13 |  <p>Alternate job TFRPASTHR TOJOB(*ALT) or System Request option 11</p> | Return to the alternate job on Chicago from Geneva after numbers 6, 8, 10, or 12 by using the TFRPASTHR command or System Request option 11. |
| 14 |  <p>Alternate job SIGNOFF or TFRSECJOB or System Request option 1</p> | Return to Geneva after number 13. Any of the three methods shown can be used from the alternate job at Chicago. |
| 15 |  <p>SIGNOFF ENDCNN(*YES) or ENDPASTHR</p> | End the job on Geneva and return to Chicago by using either the SIGNOFF command or ENDPASTHR command. |
| 16 |  <p>SIGNOFF ENDCNN(*YES) or ENDPASTHR</p> | End the job on Chicago and return to Tokyo by using either the SIGNOFF command or ENDPASTHR command. |

Notes:

- In this example, the system request program (SRQ10PGM) parameter is always allowed to be the default. Therefore, the System Request menu is displayed at the previous system after System Request option 10 is used.
- To use the System Request options, use the System Request menu or the System Request entry line.
 - To use the System Request menu:
 - a. Press the System Request key.
 - b. Press the Enter key.
 - c. Enter the number of the option on the System Request menu.
 - To use the System Request entry line:
 - a. Press the System Request key.
 - b. Type the option number on the System Request entry line.
 - c. Press the Enter key.
- The pass-through function has no built-in limit to the number of systems you can sign on by passing through from system to system.
- You can mix pass-through and TELNET sessions. For example, you can go from Tokyo to Chicago using pass-through and from Chicago to Geneva using TELNET.
- You can use the TFRPASTHR command only at a pass-through target system. You cannot use it at a TELNET server system.

For more information about TELNET, see the *TCP/IP Guide*.
- You can use the Transfer Secondary Job (TFRSECJOB) command to transfer from an alternate job at a source system to the original job. Because the original job is running display station pass-through, you end up at the target system. In number 5 of the example on page 4-1, the TFRSECJOB command transfers you to your original job at Tokyo. Because your original job at Tokyo is still running display station pass-through, you end up at Chicago.
- You can have only one pass-through or TELNET session per job.
- The system where you first use pass-through or TELNET is called the **home system** as shown in Figure 4-1. The home system may be either a pass-through source system or a TELNET client system.
- The last pass-through target system or the last TELNET server system is called the **end system** (see Figure 4-1).

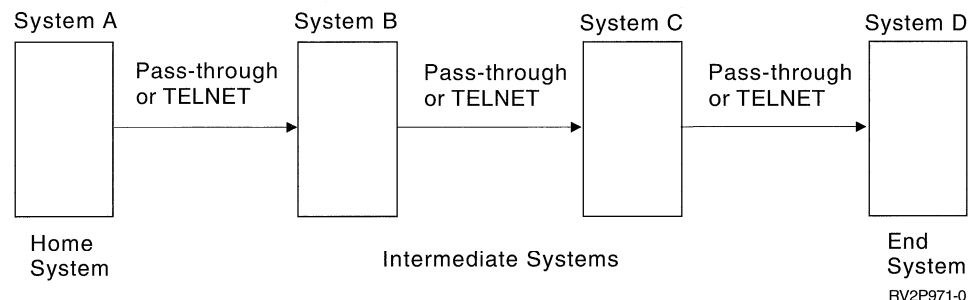


Figure 4-1. Pass-Through and TELNET Home System and End System

- The home system intercepts System Request options 13 and 14 when 13 or 14 is entered on the System Request entry line. This function may be helpful if you pass through to a system to which you cannot sign on. You can end pass-through to that system by doing the following:
 - a. Press the System Request key.
 - b. Enter 13 on the System Request entry line.
 - c. Enter 2 on the System Request menu.

All pass-through and TELNET sessions are stopped and you return to the home system.

- For pass-through, the home system and intermediate systems must be running OS/400 Version 2 Release 3 or later. In Figure 4-1 on page 4-3, for example, System A, System B, and System C must all be running OS/400 Version 2 Release 3 or later.
- To pass through from an end system to another system, the end system must be running OS/400 Version 2 Release 3 or later. For example, if System D in Figure 4-1 is running OS/400 Version 2 Release 2 or earlier, you cannot pass through from it.
- To use System Request options 13, 14, and 15; the system must be running OS/400 Version 2 Release 3 or later. System Request options 10 and 11 function differently on systems prior to OS/400 Version 2 Release 3.
- You can also use group jobs to pass through to multiple systems from your home system. For information about group jobs, see the *Work Management Guide*.

Using the Transfer Pass-Through (TFRPASTHR) Command

You can return to the source system or the home system by using the TFRPASTHR command. This command does not end your pass-through session. It also does not end your session at the target system. Therefore, you can resume your work on the target system when you finish working at the source or home system.

To use the Transfer Pass-Through command, type TFRPASTHR and the appropriate TOJOB parameter on the command line and press the Enter key. You can do this when you are working on the target system and want to return to the source system or to the home system. The TFRPASTHR command has the same functions as System Request options 10, 11, 13, and 14. As the name implies, the TFRPASTHR command works only for pass-through sessions and not for TELNET sessions. (The System Request options work for both pass-through and TELNET sessions.)

The options available on the TFRPASTHR command are:

TOJOB(*SRC)

This option suspends the job on the target system and transfers the user back to the source system. The program specified by the SRQ10PGM on the Start Pass-Through request is given control. By default, the SRQ10PGM parameter specifies the System Request menu. The TFRPASTHR TOJOB(*SRC) command is the same as System Request option 10.

When the SRQ10PGM program ends, pass-through returns you to the job on the target system from which you transferred.

TOJOB(*ALT)

This option suspends the job on the target system and transfers the user back to the source system. The alternate job at the source system is given control. The TFRPASTHR TOJOB(*ALT) command is the same as System Request option 11.

To go back to the suspended job at the target system, do one of the following:

- Sign off the alternate job.
- Use the TFRSECJOB command to transfer from the alternate job to the original job. Because the original job is still running pass-through, it gives control to the target system.

TOJOB(*HOME)

This option suspends the job on the system where the TFRPASTHR command is entered and transfers control back to the home system. The job on the home system runs the program specified by the system request program (SRQ10PGM) parameter on the STRPASTHR command that you entered on the home system. By default, the

SRQ10PGM parameter specifies the System Request menu. The TFRPASTHR TOJOB(*HOME) command is the same as System Request option 13.

When the SRQ10PGM program ends, pass-through returns you to the job on the system from which you transferred.

TOJOB(*HOMEALT)

This option suspends the job on the system where the TFRPASTHR command is entered and transfers control back to the home system. The alternate job at the home system is given control. The TFRPASTHR TOJOB(*HOMEALT) command is the same as System Request option 14.

To go back to the suspended job at the system from which you transferred, do one of the following:

- Sign off the alternate job.
- Use the TFRSECJOB command to transfer from the alternate job to the original job. Because the original job is still running pass-through, it gives control to the system from which you transferred.

Using System Request Options

When you press the System Request key on the target system, an entry line appears at the bottom of the display. If you press the Enter key on a target System/38 or an AS/400 system, a menu appears on which you can indicate the options you want. If you press the Enter key on a target System/36, a System/36 system message appears: System Request Invalid at Command Display Station. The System Request menu is not available on the System/36. To avoid this message, enter a 10, 11, 13, or 14 on the system request entry line before pressing the Enter key. This starts System Request option 10, 11, 13, or 14 at the source system. This method can be used on any target system, not only on a target System/36.

AS/400 System Request Options

You can use the following AS/400 system request options to go back and forth between systems after passing through to them.

Option 10 (Start system request at previous system) takes you from an intermediate or end system to the previous system. The previous system is the source system if pass-through was used or the client system if TELNET was used. The program specified by the system request program (SRQ10PGM) parameter on the STRPASTHR command that was entered at the previous system will be running.

Option 11 (Transfer to previous system) takes you from an intermediate or end system to the alternate job on the previous system. The previous system is the source system if pass-through was used or the client system if TELNET was used.

Option 13 (Start system request at home system) takes you from an intermediate or end system to the home system. The program specified by the system request program (SRQ10PGM) parameter on the STRPASTHR command that was entered at the home system will be running.

Option 14 (Transfer to home system) takes you from an intermediate or end system to the home system. Control is given to the alternate job at the home system.

Option 15 (Transfer to end system) takes you from an intermediate or home system back to the system you came from. The system you came from is the system where you used System Request option 10, 11, 13, or 14 to get to the intermediate or home system. Using option 15, whatever job and program were interrupted when you left the end system resume control when you return to the end system.

Option 80 (Disconnect job) provides a function that disconnects some types of interactive jobs. This allows you to sign off the job temporarily and return to the same point in processing that you left. Even though this type of disconnection is not currently possible for pass-through jobs, you can disconnect the job on the home system.

If you pass through and then return to the System Request menu of the home system, you can select option 80 (Disconnect job). (You can return to the System Request menu of the home system by using System Request option 13 or System Request option 10. If you use System Request option 10, you may need to do so multiple times.) If you do this, remember your pass-through session is still active. Using option 80 gives you the advantage of signing on to your source system again to resume your operations on the target system. However, the cost of the communications connection is a disadvantage. You pay for the time your job is disconnected from the source system because your pass-through connection remains active. For more information about the disconnection option, see the *New User's Guide* and the *Work Management Guide*.

Using the System Request Program (SRQ10PGM) Parameter

System request program (SRQ10PGM) is a parameter on the STRPASTHR command. You can use the SRQ10PGM parameter to specify the program to be called when you select options 10 or 13 on the System Request menu on an intermediate or end system. (Option 10 is Start system request at previous system, and option 13 is Start system request at home system.) By default, the SRQ10PGM parameter specifies the System Request menu.

If you want a program other than the System Request menu to be called, specify that program on the SRQ10PGM parameter. SRQ10PGM values on the STRPASTHR command are:

- *SRQMNU: The System Request menu from the previous or home system is displayed. This is the default value.
- *program-name*: The name of the program to be called. If a library name is not specified, the libraries in the library list (*LIBL) are searched for the program.

Note: This program runs when you transfer back to the system where you issued the STRPASTHR command and specified this program. You can transfer back to this system using one of the following methods:

- System Request option 10
- System Request option 13
- TFRPASTHR TOJOB(*SRC)
- TFRPASTHR TOJOB(*HOME)

If you press the System Request key and choose System Request option 15 while this program is running, you return to this program and not the end system. When you end this program, you transfer back to the system from which you came.

To return to your source job without ending pass-through, specify SRQ10PGM (QSYS/QCMD) on the STRPASTHR command. Thereafter, when you select option 10 or 13 from the System Request menu, the Command Entry display on the previous (option 10) or home (option 13) system appears. To exit the Command Entry display and return to the target system, press F3 (Exit).

System/38 System Request Options 10 and 11

On the target System/38, option 10 (Start system request at source system) allows you to transfer back to the source system. After you transfer back to the source system, you can use its System Request menu.

Option 11 (Transfer to source system) starts an alternate job on the source system.

Chapter 5. Work Management Considerations for Display Station Pass-Through

When managing your system functions, it is important to know the extent of the function's capabilities. This chapter discusses the capabilities and limitations you should consider when configuring your system for the display station pass-through function.

Controlling Remote Sessions from Other Systems

If you are responsible for pass-through configuration or for the security of your system, you must know the capabilities and limitations of the QRMTSIGN system value. The pass-through support on your system examines this value each time a user attempts to pass through to your system or attempts to use the work station function of PC Support/400 to attach to your system.

You can use the QRMTSIGN system value to do the following:

- Prevent all pass-through and work station function sessions from starting on the system.
- Force all pass-through and work station function sessions requesting automatic sign-on to use the same user profile they are currently using on the source system, provided they specify the appropriate password. All other pass-through and work station function sessions must use normal sign-on procedures.
- Allow all pass-through and work station function sessions to start, and decide which of those sessions requesting automatic sign-on will be allowed to do so, providing they specify the appropriate password.
- Use a program to decide which pass-through and work station function sessions can automatically sign-on.
- Allow all pass-through and work station function sessions to start, and decide to which target user profile the user should sign on.

Specifying the QRMTSIGN System Value

Use the Change System Value (CHGSYSVAL) command or the Work with System Value (WRKSYSVAL) command to specify the QRMTSIGN system value.

Note: Only a user with *ALLOBJ authority can change the QRMTSIGN system value.

Valid values for QRMTSIGN are:

Force sign-on (*FRCSIGNON)

The force sign-on value requires all pass-through sessions started for this system to go through normal sign-on procedures. This is the default value.

Same profile (*SAMEPRF)

The same profile value allows you to bypass the sign-on display by specifying the target system use the same user profile that the source system is using. Bypassing the sign-on display should be allowed for pass-through attempts only if the user profile name on the source system and the user profile name on the target system are identical.

Password verification occurs before the target pass-through program is used. If a password that is not valid is sent on an automatic sign-on attempt, the pass-through session always ends and an error message is sent to the user. However, if the profile names are different, *SAMEPRF indicates that the session ends with a security failure even if the user entered a valid password for the remote user profile.

The sign-on display appears for pass-through attempts not requesting automatic sign-on.

Verify (*VERIFY)

The VERIFY value allows you to bypass the sign-on display of the target system if valid security information is used. Bypassing the sign-on display should be allowed for any pass-through attempt that provides valid security information. If the password is not valid for the specified target user profile, the pass-through session ends with a security failure.

If this system has a QSECURITY value of 10, any automatic sign-on request will be allowed.

The sign-on display appears for pass-through attempts not requesting automatic sign-on.

Reject (*REJECT)

No pass-through is allowed. All pass-through attempts to this target system are rejected.

Specifying QRMTSIGN(*REJECT) is the most effective method for preventing users from passing through to a system. However, the batch jobs controlling the pass-through sessions run briefly. If the security officer wants to prevent this, the subsystem that handles pass-through requests should be ended or the communications objects should be varied off.

program-library

The user can specify a remote sign-on control program name that meets the input and output specifications described in "QRMTSIGN Program Specifications." This program runs at the beginning and end of every target pass-through job. The security officer can tailor how the automatic sign-on requests are handled and identify the users who have passed through to this system by using this method.

The program name must precede the library name.

Remote Sign-On Considerations

This section discusses the capabilities and limitations you should consider when configuring a remote location system for the display station pass-through function.

QRMTSIGN Program Specifications

By writing a program using the following specifications and specifying that program in the QRMTSIGN system value, you can more closely control which pass-through and work station function sessions are successful and which successful sessions can automatically sign on. An example program, RMTSIGNEX2, is shown in Figure 5-1 on page 5-4.

Input to the QRMTSIGN Program

The input to the QRMTSIGN program is a 128-character string containing the following:

Source location — CHAR(8)

Source network ID — CHAR(8)

Source user profile — CHAR(10)

If the source user is passing through from an older system not providing the source user profile, this field will be filled with blanks (X'40').

Target user profile — CHAR(10)

If the source user has not requested automatic sign-on, this field will be filled with blanks (X'40').

The user program determines by using this information if automatic sign-on was requested. If this field is filled with blanks, a return code of 2 is not appropriate and that value is treated as 1 (See the topic "Output from the QRMTSIGN Program" on page 5-3).

This value may be overridden by the program. To do so, put the new value in this field and use return code 3.

Session start and stop indicator — CHAR(1)

'1' (X'F1') indicates that this is a pass-through session being started. '0' (X'F0') indicates that this pass-through session is ending.

Target initial program — CHAR(10)

If the source user has not requested automatic sign-on or did not specify an initial program, this field is filled with blanks (X'40').

This value may be overridden by the program. To do so, put the new value in this field and use return code 3.

Target initial menu — CHAR(10)

If the source user has not requested automatic sign-on or did not specify an initial menu, this field is filled with blanks (X'40').

This value may be overridden by the program. To do so, put the new value in this field and use return code 3.

Target current library — CHAR(10)

If the source user has not requested automatic sign-on or did not specify a current library, this field is filled with blanks (X'40').

This value may be overridden by the program. To do so, put the new value in this field and use return code 3.

Virtual device name — CHAR(10)

This is the name of the virtual device used by this pass-through attempt.

Version/Release/Modification number — CHAR(6)

This is the version, release, and modification number for the operating system at the target system.

Allow pass-through indicator — CHAR(1)

'1' (X'F1') indicates that the user may pass through from this system, which is the target of the current pass-through session, to another system. '0' (X'F0') indicates that the user may not pass through from this system, which is the target of the current pass-through session.

When this value is '1', it can be overridden by the QRMTSIGN program. To do so, put the new value in this field and use any return code. When this value is '0', it cannot be overridden by the QRMTSIGN program, and any new value assigned by the QRMTSIGN program is ignored.

Reserved space — CHAR(44)

All blanks (X'40').

Output from the QRMTSIGN Program

The output from the QRMTSIGN program is an 8-character string containing the following:

Return code — CHAR(1)

Value ignored if the pass-through start and stop indicator is specified as '0' (Stop).

'0' - Reject

Pass-through not allowed to progress further. A QRMTSIGN value of *REJECT does this for all pass-through attempts.

'1' - Reject, but show sign-on

Do not allow automatic sign-on for this pass-through, but let a blank sign-on display be shown. A QRMTSIGN value of *FRCSIGNON does this for all pass-through attempts.

'2' - Accept automatic sign-on attempt

Allow automatic sign-on for this pass-through attempt.

If you return this value when automatic sign-on has not been requested, the pass-through support handles the pass-through attempt as if the program returned with

a '1' value. When the target user profile name that is passed to the program is blank, and the program returns this value, a blank sign-on display appears.

'3' - Override the automatic sign-on information

Allow this pass-through attempt, but override the following values with the override values specified by the QRMTSIGN program:

- Target user profile
- Target initial program
- Target initial menu
- Target current library

Reserved — CHAR(7)

These characters are ignored by the current support, but could be used in future support.

Figure 5-1 is an example of a CL program that uses the QRMTSIGN programming specification shown in “QRMTSIGN Program Specifications” on page 5-2.

```

/*****
/* Program RMTSIGNEX2 */
/* */
/* This program is meant to be an example which shows how attempts */
/* to remotely sign on using AS/400 Display Station Pass-Through */
/* or Work Station Function can be handled using a program. The */
/* program, such as this one, would be compiled and then named in */
/* the QRMTSIGN system value. */
/* */
/* DESIGN: */
/* The program simply returns if it is called when pass-through is */
/* ending. */
/* */
/* The following remote sign on requests will be allowed to bypass */
/* normal sign on (automatically sign on) if they request it. */
/* This means that the program returns a '2' to its caller. */
/* Source User Source Location Target User Special Checks */
/* ----- */
/* QSECOFR SECUREL1 any none */
/* any SECUREL1 same none */
/* any any TIMECRDUSR INLPGM must be TIME */
/* any any 'PCxxxxx' same none */
/* */
/* The following remote sign on requests will be disallowed; */
/* that is, they will not even be presented with a sign-on screen. */
/* This means that the program returns a '0' to its caller. */
/* Source User Source Location Target User Special Checks */
/* ----- */
/* PCHACKER any any none */
/* EXEMPLOYEE any any none */
/* */
*****/

```

Figure 5-1 (Part 1 of 3). QRMTSIGN Example Sign On CL Program


```

/*****/
/* If the source user is FRED and FRED requests to pass-through, */
/* he is forced to sign-on as the target user, SERVICE.          */
/*                                                                */
/* Source User  Source Location  Target User  Special Checks    */
/* -----    - - - - -        - - - - -    - - - - -          */
/* FRED        any                SERVICE    source user must    */
/*                                                    be FRED      */
/*                                                                */
/* The remaining remote sign on requests will be forced through */
/* normal sign-on procedures (they must use the sign on display.) */
/* This means that the program returns a '1' to its caller.      */
/*                                                                */
/* These remaining requests are not allowed to pass through from */
/* this system.                                                  */
/*                                                                */
/*****/

```

```
PGM PARM(&DATA &RTNCODE)
```

```

/*****/
/* Parameter declares                                          */
/*****/

```

```

DCL VAR(&DATA) TYPE(*CHAR) LEN(128) /* Input information */
DCL VAR(&RTNCODE) TYPE(*CHAR) LEN(8) /* Return code */

```

```

/*****/
/* Variable declares                                          */
/*****/

```

```

DCL VAR(&ZERO) TYPE(*CHAR) LEN(1) VALUE('0') /* End the +
                                                passthru session */
DCL VAR(&ONE) TYPE(*CHAR) LEN(1) VALUE('1') /* Show the signon +
                                                screen */
DCL VAR(&TWO) TYPE(*CHAR) LEN(1) VALUE('2') /* Allow automatic +
                                                signon request */
DCL VAR(&THREE) TYPE(*CHAR) LEN(1) VALUE('3') /* Overrides the +
                                                target user profile */
DCL VAR(&WHENCALD) TYPE(*CHAR) LEN(1) /* When this program is +
                                                being called -
                                                '1' STRPASTHR command
                                                '0' ENDPASTHR command */
DCL VAR(&SRCPROF) TYPE(*CHAR) LEN(10) /* Source user profile */
DCL VAR(&TGTPROF) TYPE(*CHAR) LEN(10) /* Target user profile */
DCL VAR(&INLPGM) TYPE(*CHAR) LEN(10) /* Initial program */
DCL VAR(&SRCLOC) TYPE(*CHAR) LEN(8) /* Source location */
DCL VAR(&LOCPREF) TYPE(*CHAR) LEN(2) /* Location Prefix */
DCL VAR(&ENDPASTH) TYPE(*CHAR) LEN(1) VALUE('0') /* This program +
                                                is being called
                                                because of the
                                                ENDPASTHR command */

```

```

/*****/
/* Includes user profile names and location names            */
/*****/

```

```

DCL VAR(&QSECOFR) TYPE(*CHAR) LEN(10) VALUE('QSECOFR ')
DCL VAR(&TIMECRDUSR) TYPE(*CHAR) LEN(10) VALUE('TIMECRDUSR')
DCL VAR(&PCHACKER) TYPE(*CHAR) LEN(10) VALUE('PCHACKER ')
DCL VAR(&EXEMPLOYEE) TYPE(*CHAR) LEN(10) VALUE('EXEMPLOYEE')
DCL VAR(&TIMEPGM) TYPE(*CHAR) LEN(10) VALUE('TIME ')
DCL VAR(&SECLOC) TYPE(*CHAR) LEN(8) VALUE('SECUREL1')
DCL VAR(&PCPREFIX) TYPE(*CHAR) LEN(2) VALUE('PC')
DCL VAR(&SERVICE) TYPE(*CHAR) LEN(10) VALUE('SERVICE ')
DCL VAR(&FRED) TYPE(*CHAR) LEN(10) VALUE('FRED ')

```

Figure 5-1 (Part 2 of 3). QRMTSIGN Example Sign On CL Program

```

/*****/
/* Start of program */
/*****/

CHGVAR &WHENCALD VALUE(%SST(&DATA 37 1)) /* Indication of when +
                                         this program is being +
                                         called */
IF (&WHENCALD = &ENDPASTH) RETURN /* If being called +
                                   because of ENDPASTHR +
                                   command then return */
CHGVAR &SRCPROF VALUE(%SST(&DATA 17 10)) /* Source user profile */
CHGVAR &TGTPROF VALUE(%SST(&DATA 27 10)) /* Target user profile */
CHGVAR &SRCLOC VALUE(%SST(&DATA 1 8)) /* Source location */
CHGVAR &INLPGM VALUE(%SST(&DATA 38 10)) /* Initial program */
CHGVAR &LOCPREF VALUE(%SST(&DATA 1 2)) /* Location prefix */

/* *** Check for those not allowed at all *** */
/* PCHACKER returns 0 */
/* EXEMPLOYEE returns 0 */
IF ((&SRCPROF = &PCHACKER) *OR
    (&SRCPROF = &EXEMPLOYEE)) DO
    CHGVAR &RTNCODE VALUE(&ZERO)
    RETURN
ENDDO

/* *** Check for those who can do automatic sign-on *** */
IF (((&SRCLOC = &SECLOC) *AND (&SRCPROF = &QSECOFR)) *OR
    ((&SRCLOC = &SECLOC) *AND (&SRCPROF = &TGTPROF)) *OR
    ((&INLPGM = &TIMEPGM) *AND (&TGTPROF = &TIMECRDUSR)) *OR
    ((&LOCPREF = &PCPREFIX) *AND (&SRCPROF = &TGTPROF)) ) DO
    CHGVAR &RTNCODE VALUE(&TWO)
    RETURN
ENDDO

/* *** Check for FRED *** */
IF (&SRCPROF = &FRED) DO
    CHGVAR &RTNCODE VALUE(&THREE)
    CHGVAR %SST(&DATA 27 10) VALUE(&SERVICE)
    RETURN
ENDDO

/* Everyone else must go through normal sign on */
CHGVAR &RTNCODE VALUE(&ONE)

/* Disallow multiple pass-through. */
CHGVAR %SST(&DATA 84 1) VALUE(&ZERO)
ENDPGM

```

Figure 5-1 (Part 3 of 3). QRMTSIGN Example Sign On CL Program

QRMTSIGN Programming Considerations

If a program is specified for the QRMTSIGN system value, that program is called twice by every pass-through session: once to see if pass-through should be allowed and once when the session ends. This allows system administrators to track the users passing through to their systems.

The pass-through session ends and a job log is created on the system if any of the following situations occur:

- Program does not exist
- Program creates an exception
- Program returns with a value not defined in the programming specification
- User profile under which the pass-through job is running does not have authority to use the program

Note: A message in the job log on the target system indicates the type of problem found by the target pass-through programs. If an error was detected in your QRMTSIGN program, the user of the STRPASTHR command receives a CPF8935 or CPF8936 message. The CPF8935 message is the same message the user receives when the QRMTSIGN value is *REJECT. CPF8936 is sent when the user profile under which the pass-through job is running does not have authority to use the QRMTSIGN program.

If your program returns a value of '2' in the return code field (indicating that it will allow automatic sign-on for this pass-through attempt), automatic sign-on may not necessarily occur. For example, if the user did not request automatic sign-on, the sign-on display is shown. Also, if the user specified an initial menu, initial program, or current library that does not exist or to which the user does not have authority, the session could end, or the sign-on display could be presented. The results depend on the type of error found during the automatic sign-on attempt.

Creating a Subsystem for Display Station Pass-Through

If you are using the AS/400 system as a target system, the instructions in the following sections are not necessary if your system uses the IBM-supplied subsystems. If you do not use the IBM-supplied subsystems, you must perform the instructions in the following sections. Using these subsystems is recommended. Remember, a minor mistake can cause pass-through to have a time-out failure after being started. If you find such an error after following these instructions, verify each section again.

All the instructions discussed in this section are required on a System/38 if it is used as a target system. For more information about using System/38, see the *System/38 Environment Programmer's Guide/Reference*.

Follow these instructions for the AS/400 system only if you create your own subsystems to control your pass-through environment.

Creating Default User Profiles for the Subsystem

You can create a default user profile with limited authority at the target system and at each intermediate system, or you can choose to use an IBM-supplied user profile, such as the QUSER profile. This user profile is used by the APPC jobs started at remote systems that support pass-through. If a default user profile is not available, and the source system sends either an undefined user ID or an empty (null) user ID, an authorization error occurs.

The profile should have the authority:

- To run the IBM-supplied program QPAPAST2, which is specified in the program start request. The profile is used by the subsystem when a program start request is received without a user ID request.
- To use the device descriptions that are part of the APPC network through which you plan to run pass-through.
- To use the pass-through job description that you will create in the "Creating Job Descriptions" step.
- To use the pass-through virtual devices and virtual controllers that are accessed.

To create the default user profile for the subsystem, use the Create User Profile (CRTUSRPRF) command as shown in the following example:

```
CRTUSRPRF USRPRF(PTUSRPRF) JOBD(PTJOBDD)
          TEXT('Example pass-through user profile')
```

This command string causes an error message to be returned because you created the profile for a job description not yet created. To create the job description or user profile without error messages, create either one without referring to the other. After the second description or profile is created, change one to refer to the other.

Creating Job Descriptions

You can create a job description to use at the target system and at each intermediate AS/400 system and System/38. On an AS/400 system, you may choose to use an IBM-supplied job description. The job description must be in a library in the default library list of an interactive subsystem description. The following example shows a possible job description:

```
CRTJOBDB  JOBD(PTJOBDB)  USER(PTUSRPRF)  LOG(4 10 *SECLVL)
          TEXT('Example pass-through job description')
```

Adding a Work Station Entry

At the target system, you can add a work station entry to the interactive subsystem description that controls the virtual work station. This is not necessary if a correct work station entry already exists.

To see if a correct entry exists, use the Display Subsystem Description (DSPSBSD) command. To add a new entry, use the Add Work Station Entry (ADDWSE) command as in the following example:

```
ADDWSE  SBS(USRSBS)  WRKSTNTYPE(5291)
```

Type this command and then start the USRSBS subsystem using the Start Subsystem (STRSBS) command. All 5291 devices, including all virtual devices of that type that are varied on, will run under the USRSBS subsystem.

Note: You can also add work station entries by name. For example, you can add an entry for the VDEV1 virtual device to the USRSBS subsystem by using the following command:

```
ADDWSE  SBS(USRSBS)  WRKSTN(VDEV1)
```

If you control your virtual devices by using work station name entries, and if you want to use the support for automatic configuration of virtual devices, you must add the work station entries for the automatically configured virtual devices. For example, you must run the ADDWSE command for the QPADEV0001 and QPADEV0002 entries.

Adding Communications Entries

Ensure a communications entry exists in the subsystem description for each APPC device description at the target system and at each intermediate system. Use the QCMN subsystem or a user-created subsystem to isolate interactive users from APPC error recovery.

These communications entries enable users on the source system and each intermediate system to request pass-through. The communications entry must specify a default user profile that must exist on those systems. To add a new entry, use the Add Communications Entry (ADDCMNE) command. For example, to add a communications entry, specify the following command on the target system:

```
ADDCMNE  SBS(USRSBS)  DEV(DET)
          JOBD(PTJOBDB)  DFTUSR(PTUSRPRF)
```

DET is the name of the APPC device description that connects that system to the next system closer to the source system on the APPC network through which you plan to run pass-through. PTUSRPRF is the name of the user profile created in the first step of the work management configuration steps.

To change an existing entry, use the Change Communications Entry (CHGCMNE) command.

Adding Routing Entries

The subsystem that receives the program start request requires a routing entry with *RTGDTA specified as the program name. The IBM-supplied subsystems, QCMN and QBASE, have routing entries that can be used for APPC.

Add the entry as follows:

```
ADDRTGE  SBS(USRSBS)  SEQNBR(500)  CMPVAL('PGMEVOKE' 29)  PGM(*RTGDTA)
```

After running the ADDRTGE command and starting the USRSBS subsystem by using the Start Subsystem (STRSBS) command, the following occurs:

- All communications work requests that come to the DET device are handled by the USRSBS subsystem.
- All pass-through program start requests are handled by the USRSBS subsystem. The subsystem starts the job by using the PTUSRPRF, which in turn runs the IBM-supplied program, QPAPAST2.

You may want to set up the target system and each intermediate system to reduce the effect of sharing the same class for pass-through jobs as other jobs. To do this, specify a class in the routing table at the target system and each intermediate system using the Create Class (CRTCLS) command and add a routing entry to the subsystem description.

The CRTCLS command contains parameters to control the run-time environment of a job. For more information about using the parameters of the CRTCLS command, see the *Work Management Guide* or the *CL Reference* manual.

Chapter 6. Display Station Pass-Through Considerations

The display station pass-through function can be used to accomplish tasks not available on your system. To use the display station pass-through function efficiently, you should be aware of all the functions available. This chapter discusses the capabilities and limitations you should consider when using the display station pass-through function.

Security Considerations

A user with security officer (*ALLOBJ) authority must be explicitly authorized to use devices on the following systems:

- System/38.
- Systems using an OS/400 release earlier than Version 1 Release 2.0 with a system security level (QSECURITY) system value of 30 or greater.

For example, for each display device (local, remote, or virtual) that a security officer wants to sign on to, that user must specify the following command:

```
GRTOBJAUT OBJ(display_name) OBJTYPE(*DEV) AUT(*CHANGE)
```

Likewise, a remotely started job cannot start under a security officer profile unless that profile has been granted specific authority to the communications device.

The OS/400 Version 1 Release 2.0 and later releases support the limit security officer (QLMTSECOFR) system value. If the QLMTSECOFR value is set to 1, the AS/400 system provides the same support as in previous releases. However, when this value is set to 0, the system does not limit the devices that the security officer can use to sign on.

This procedure is very important when automatic configuration of virtual devices is allowed. If the QLMTSECOFR value is set to 0, all devices automatically configured by pass-through can be used for the security officer. If the QLMTSECOFR value is set to 1, the security officer may not have authority to use automatically configured virtual devices. Therefore, if the QLMTSECOFR value is 1, consider manually creating a virtual controller and devices for the specific use of your security officer.

Setting this value is also important when a security officer attempts to automatically sign on. If the target system has the QLMTSECOFR value set to 1, a user with *ALLOBJ authority must be granted specific authority to the APPC device used by pass-through on the target system. If that authority is not granted, the automatic sign-on attempt fails with a security error.

The QRMTSIGN system value is also an important security consideration. For information about the QRMTSIGN system value, see "Controlling Remote Sessions from Other Systems" on page 5-1.

Using Pass-Through with System/36

Some special considerations are necessary when the AS/400 display station pass-through is used to a System/36. These considerations are not included in this topic, but are discussed in the *Concepts and Programmer's Guide for the System/36 Environment*.

Pass-through from an AS/400 system to a System/36 is essentially the same as pass-through to another AS/400 system or to a System/38 except for the following:

- The virtual controller (VRTCTL) parameter is never used by the System/36, even if the VRTCTL parameter is specified on the STRPASTHR command.
- AS/400 system pass-through support does not send any control character bytes on a read command to a target System/36 because System/36 does not support the use of control characters on read commands.

- When AS/400 user-defined data streams are sent to a System/36 using pass-through, they should not include save and restore commands combined with other data stream commands. Save and restore commands must be sent in a separate data stream, or results may occur that are not predictable, such as ending the pass-through session.
- If you want to request automatic configuration when you use pass-through from a System/36 to an AS/400 system, do not specify the virtual controller parameter on the System/36 PASSTHRU procedure or specify the special controller name QPACTL00 in the virtual controller parameter.

In addition, if you pass through a locally attached display station on an AS/400 system to the System/36, there is a limitation of 127 input fields for any application that is run. To avoid this limitation, either use the Expanded Workstation Feature on the System/36 or use a remotely attached display station. The Expanded Workstation Feature on the System/36 increases the number of input fields the System/36 can handle.

Automatic Sign-On

AS/400 display station pass-through allows you to request an automatic sign-on to the target system. If you have the correct security authorization and if the target system allows automatic sign-on, you can bypass the sign-on display on the target system.

The following examples show some of the ways you can use automatic sign-on:

- If you have the same user ID on all systems in a secure APPN network, you can set up another version of the STRPASTHR command that requests the current user ID be used to automatically sign on to the target system. For more information about using these parameters, see the automatic sign-on examples in this chapter. For more information about secure APPN networks, see the *APPN Guide*.
- If you write a menu and want a menu option to run a program on another system, you can use the STRPASTHR command to request the target system to automatically sign on by using a user ID especially created to run that program. On the same STRPASTHR command, you can specify the target system to sign the job off when the program ends.
- If you have many users who must pass through to a single user ID on another system, you may not want to tell them the new password each time it changes. You can write a CL program to automatically retrieve the new password from a data area and use the password to automatically sign the users on to the target system.

Using the STRPASTHR Command for AS/400 Automatic Sign-On

You must explicitly specify the STRPASTHR command parameters used for automatic sign-on. However, the defaults for these parameters can be changed. To change the default values of the STRPASTHR command, the system operator should follow these steps:

1. Create a duplicate STRPASTHR command.
2. Change the defaults in the duplicate command.
3. Place the duplicate command in a library that is located before the QSYS library in the library list of the system.

For an example of the commands used to create a duplicate STRPASTHR command, see “Automatic Sign-On Examples” on page 6-5.

To use automatic sign-on for pass-through, enter the remote location name on the Start Pass-Through display and press F10 (Additional parameters).


```

Start Pass-Through (STRPASTHR)

Type choices, press Enter.

Remote location . . . . . > SYSA      Name, *CNNDEV
Virtual controller . . . . . NONE      Name, *NONE
Virtual display device . . . . . NONE      Name, *NONE
      + for more values
Mode . . . . . NETATR      Name, *NETATR
Local location . . . . . LOC      Name, *LOC, *NETATR
Remote network identifier . . . . . LOC      Name, *LOC, *NETATR, *NONE
System request program . . . . . SRQMNU      Name, *SRQMNU
      Library . . . . . LIBL      Name, *LIBL, *CURLIB

Additional Parameters

User profile . . . . . NONE      Name, *NONE, *CURRENT
User password . . . . . NONE      Name, *NONE
Initial program to call . . . . . RMTUSRPRF      Name, *RMTUSRPRF, *NONE
Initial menu . . . . . RMTUSRPRF      Name, *RMTUSRPRF, *SIGNOFF
      More...

F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

```

To continue to the next display, press the Page Up key.

```

Start Pass-Through (STRPASTHR)

Type choices, press Enter.

Current library . . . . . RMTUSRPRF      Name, *RMTUSRPRF
Display option . . . . . YES      Character value, *YES, *NO

```

Automatic Sign-On Parameters

The STRPASTHR command parameters used for automatic sign-on are:

User profile (RMTUSER)

The user profile for automatic sign-on to the target system. Allowed values are:

***NONE:** Automatic sign-on is not requested and will not occur unless the system security officer uses the QRMTSIGN program to force automatic sign-on to a specified target user profile. This is the default value.

***CURRENT:** User profile of the job using the STRPASTHR command is used. You are automatically signed on if the target system allows automatic sign-on, if the user profile exists on the target system, and if the password specified in the RMTPWD parameter is valid for the profile. Otherwise, a sign-on display appears on the target system or a failure message appears on the source system, depending on the configuration on the target system.

profile-name:

Specify a profile name that you expect to exist on the target system. You are automatically signed on if the target system allows automatic sign-on, if the user profile exists on the target system, and if the password specified in the RMTPWD parameter is valid for the profile. Otherwise, either a sign-on display on the target system or a failure message appears on the source system, depending on the configuration of the target system. If a profile is specified, a password must also be specified, even if the profile specified is the same as the current profile.

User password (RMTPWD)

A password that is not encrypted is sent to the target system. Allowed values are:

***NONE:** The system does not send a password. If you specify a profile on the RMTUSER parameter, you cannot specify RMTPWD(*NONE). If you specify RMTUSER(*CURRENT) and the location specified in RMTLOCNAME is secure, this value is allowed. This value is the default.

password: Specify a password to use on the target system to verify the sign-on of the user specified in the RMTUSER parameter. Unless the target system indicates it does not have a security manager, this password is not encrypted when it is sent over the communications line. On the AS/400 system, this indicates the target system has the QSECURITY system value specified as 10.

Note: If you are not using automatic sign-on, the password you enter on the sign-on display of the target system is not encrypted before it is passed over the communications line. Therefore, no additional security exposure exists when using automatic sign-on support.

Parameters That Can be Overridden by the Remote Sign-On Control Program

The following parameters can be overridden by the remote sign-on control program on the target system. For more information about the remote sign-on control program, see "Specifying the QRMTSIGN System Value" on page 5-1.

User profile (RMTUSER)

The user profile for automatic sign-on to the target system.

Initial program to call (RMTINLPGM)

The initial program started on the remote system after successful automatic sign-on. The initial program always runs before the initial menu specified in the RMTINLMNU parameter. Allowed values are:

***RMTUSRPRF:** Use the initial program in the remote user profile. This value is the default.

***NONE:** No program will be called even if you specify a program in the remote user profile. If automatic sign-on is not used, the same result occurs if you enter *NONE in the *Initial program* field of the sign-on display.

program: Specify the name of a program called as a part of automatic sign-on.

Initial menu (RMTINLMNU)

The initial menu shown when automatic sign-on occurs on the target system, after the program specified in the RMTINLPGM ends. Allowed values are:

***RMTUSRPRF:** Use the initial menu in the remote user profile. This value is the default.

***SIGNOFF:** Use this value to sign off after the RMTINLPGM program runs. Your job on the target system does not call a menu, even if you specify a menu in the remote user profile. If automatic sign-on is not used, almost the same effect occurs if you enter *SIGNOFF in the *Initial menu* field on the sign-on display. However, if you specify RMTINLMNU(*SIGNOFF) when you start the pass-through session, the pass-through session ends when the RMTINLPGM ends because all pass-through sessions established with automatic sign-on end when the job ends.

menu: Specify a menu to appear immediately after the initial program, if any, runs during automatic sign-on.

Current library (RMTCURLIB)

The name of the library that should become the current library in the library list of the job as a part of the automatic sign-on. Allowed values include:

***RMTUSRPRF:**

Use the current library in the remote user profile. This value is the default.

library: Specify the library that becomes the current library during the process of automatic sign-on.

Automatic Sign-On Examples

These examples show how to use these parameters to request automatic sign-on:

- To automatically sign on using your current user ID, specify:
STRPASTHR RMTLOCNAME(UNSECSYS) RMTUSER(*CURRENT) RMTPWD(MYPWD)
- To automatically sign on to a secure location using your current user ID, specify:
STRPASTHR RMTLOCNAME(SECSYS) RMTUSER(*CURRENT)
- To automatically sign on to a secure location using your current user ID, run a program, and return to the source system, specify:
STRPASTHR RMTLOCNAME(SECSYS) RMTUSER(*CURRENT)
RMTINLPGM(MYPGM) RMTINLMNU(*SIGNOFF)

To change the default value of one of the parameters, create a duplicate STRPASTHR command, change the defaults in that duplicate command, and place the duplicate command in a library located before the QSYS library in the system library list. For example, you can issue the following commands:

```
CRTDUPOBJ OBJ(STRPASTHR) FROMLIB(QSYS) OBJTYPE(*CMD) TOLIB(yourlib)
```

```
CHGCMDDFLT CMD(yourlib/STRPASTHR) NEWDFLT('RMTUSER(*CURRENT)')
```

```
CHGSYSLIBL LIB(yourlib) OPTION(*ADD)
```

After these commands finish running, use either of the following commands to automatically sign on to location SECSYS while using your current user ID:

```
STRPASTHR RMTLOCNAME(SECSYS)
```

```
QSYS/STRPASTHR RMTLOCNAME(SECSYS) RMTUSER(*CURRENT)
```

If you want this new command to be used by all the users on your system, use the CHGSYSVAL command to change the QSYSLIBL system value and add the library to the system library list.

Note: Do not change the IBM-supplied objects in the QSYS library.

Automatic Sign-On Considerations

Consider the following when using automatic sign-on support:

- You cannot automatically sign on or off a system if it does not support the automatic sign-on function. This function is not supported on systems at an OS/400 release earlier than Version 1 Release 2.0. Automatic sign-on is not supported with either System/36 or System/38. If you attempt to pass through to a system that does not support automatic sign-on, the target system ignores the automatic sign-on data and the sign-on display appears.
- If you specify security information that is not correct, the pass-through session fails.
- When you specify the RMTUSER value to request automatic sign-on to the appropriate release (Version 1 Release 2.0 or later) with the correct security information (RMTUSER and RMTPWD), automatic sign-on could still fail if the target system rejects the sign-on attempt. If you are not successful, contact the security officer of the target system to determine what you must change for your automatic pass-through attempt to be accepted.

For more information about setting up the target system to allow automatic sign-on using the QRMTSIGN system value, see Chapter 5.

- You cannot request automatic sign-on if you do either of the following:
 - Specify more than one device on the APPC device (CNNDEV) parameter
 - Specify a location name on the RMTLOCNAME parameter and any device names on the CNNDEV parameter
- If your session was established using the automatic sign-on support, the SIGNOFF command works differently. When you are automatically signed on, ending the job by using either the SIGNOFF command or another method usually ends your pass-through session. This process occurs because pass-through is intended to appear transparent to the user during automatic sign-on.

If you started an alternate job by using the TFRJOB command or a System Request option 1 on the target system, your job becomes a part of a system request pair. Using SIGNOFF does not end your session. If you end your original automatically signed-on session you are placed into the other job. When this alternate job ends, your pass-through session ends, just as if you had automatically signed on to that alternate job. For more information about alternate jobs, see the discussion on using the ENDPASTHR command.

PASTHRSCN Parameter

If you want to design a menu with an option that requests a pass-through operation, such as one requesting the automatic sign-on function, you may want to conceal the attempt to establish pass-through. The display option (PASTHRSCN) parameter allows you to conceal the usual display that appears when the pass-through session is being established. The PASTHRSCN parameter also allows you to conceal the informational messages sent to the display before the pass-through session starts.

The allowed values of the PASTHRSCN parameter are:

- *YES:** The pass-through display and informational messages appear before the pass-through connection occurs on the target system. This value is the default.
- *NO:** The pass-through display and informational status messages that usually appear before pass-through connection with the target system occurs do not appear. Specify this value in the program to achieve the transparent pass-through.

If you want to pass through to a secure location to simply run a program and return to the source system, you could specify the following:

```
STRPASTHR RMTLOCNAME(SECSYS) RMTUSER(*CURRENT)
          RMTINLPGM(MYPGM) RMTINLMNU(*SIGNOFF) PASTHRSCN(*NO)
```

Because you specified PASTHRSCN(*NO), neither the pass-through display nor any informational messages usually sent by the pass-through programs appear.

Example Scenarios for Pass-Through Sign-On Attempts

The following sections present scenarios of pass-through attempts, with an emphasis on automatic sign-on, and the results of those attempts. In these sections, assume a user with a user profile named FRED has signed on to the source system. Also assume that the target system is an AS/400 system with the OS/400 Version 1 Release 2.0 program (or a later release) installed and the target system verifies the password specified in the user password (RMTPWD) parameter. For target systems with password security active, the password is valid only if it matches the password specified for the remote user profile. (The target system has password security active when it has a QSECURITY system value of 20 or greater.) For target systems without password security active (with a QSECURITY system value of 10), all passwords are considered valid.

Sign-On Example Specifying Remote User Profile as *NONE

If FRED specifies RMTUSER(*NONE), the pass-through attempt does not request automatic sign-on. Pass-through attempts from systems that cannot request automatic sign-on have the same results as this example. The results depend on the target system QRMTSIGN value.

If FRED specifies RMTUSER(*NONE), the following results occur for the specified QRMTSIGN values:

Table 6-1. User Specifies RMTUSER(*NONE)

| QRMTSIGN Value | Result | | | | | | | | |
|----------------------------------|--|----------------|--------|-----------------|--|-----------------|--|-----------------|--|
| *REJECT | No pass-through session occurs. A CPF8935 message is sent to the user of the STRPASTHR command, and a job log is created on the target system. | | | | | | | | |
| *FRCSIGNON, *SAMEPRF, *VERIFY | User sees the sign-on display for the target system. | | | | | | | | |
| Program library | The result depends on the program action. | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Program Action</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Return 0</td> <td>No pass-through session occurs. A CPF8935 message is sent to the user of the STRPASTHR command, and a job log is created on the target system.</td> </tr> <tr> <td>Return 1</td> <td>User sees the sign-on display for the target system.</td> </tr> <tr> <td>Return 2</td> <td>User sees the sign-on display for the target system.</td> </tr> </tbody> </table> | Program Action | Result | Return 0 | No pass-through session occurs. A CPF8935 message is sent to the user of the STRPASTHR command, and a job log is created on the target system. | Return 1 | User sees the sign-on display for the target system. | Return 2 | User sees the sign-on display for the target system. |
| Program Action | Result | | | | | | | | |
| Return 0 | No pass-through session occurs. A CPF8935 message is sent to the user of the STRPASTHR command, and a job log is created on the target system. | | | | | | | | |
| Return 1 | User sees the sign-on display for the target system. | | | | | | | | |
| Return 2 | User sees the sign-on display for the target system. | | | | | | | | |

Sign-On Example Specifying Remote User Profile as *CURRENT

If FRED specifies RMTUSER(*CURRENT), he can specify either RMTPWD(*NONE) or RMTPWD(*password*). If FRED specifies RMTPWD(*NONE), the remote location must be a secure location (with SECURELOC(*YES) specified on the APPC device description), or he receives a CPD8905 error message. If FRED specifies RMTPWD(*password*), the password must be valid for user profile FRED on the target system, or FRED receives a CPF8936 error message. For more information about the RMTUSER and RMTPWD parameters, see "Using the STRPASTHR Command for AS/400 Automatic Sign-On" on page 6-2.

If FRED does not receive either error message, the following results occur for the specified QRMTSIGN values:

Table 6-2. User Specifies RMTUSER(*CURRENT)

| QRMTSIGN Value | Result | | | | | | | | |
|-------------------|--|----------------|--------|-----------------|--|-----------------|--|-----------------|----------------------------------|
| *REJECT | No pass-through session occurs. A CPF8935 message is sent to the user of the STRPASTHR command, and a job log is created on the target system. | | | | | | | | |
| *FRCSIGNON | User sees the sign-on display for the target system. | | | | | | | | |
| *SAMEPRF, *VERIFY | User is automatically signed on. | | | | | | | | |
| Program library | The result depends on the program action. | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Program Action</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Return 0</td> <td>No pass-through session occurs. A CPF8937 message is sent to the user of the STRPASTHR command, and a job log is created on the target system.</td> </tr> <tr> <td>Return 1</td> <td>User sees the sign-on display for the target system.</td> </tr> <tr> <td>Return 2</td> <td>User is automatically signed on.</td> </tr> </tbody> </table> | Program Action | Result | Return 0 | No pass-through session occurs. A CPF8937 message is sent to the user of the STRPASTHR command, and a job log is created on the target system. | Return 1 | User sees the sign-on display for the target system. | Return 2 | User is automatically signed on. |
| Program Action | Result | | | | | | | | |
| Return 0 | No pass-through session occurs. A CPF8937 message is sent to the user of the STRPASTHR command, and a job log is created on the target system. | | | | | | | | |
| Return 1 | User sees the sign-on display for the target system. | | | | | | | | |
| Return 2 | User is automatically signed on. | | | | | | | | |

Sign-On Example Specifying an Individual Remote User

If FRED specifies his own user profile, RMTUSER(FRED), he can specify either RMTPWD(*NONE) or RMTPWD(*password*). If FRED specifies RMTPWD(*NONE), he receives a CPF8905 error message because he must always specify a password when specifying a user profile name in the RMTUSER parameter. If he specifies RMTPWD(*password*), the password must be valid for user profile FRED on the target system, or FRED receives a CPF8936 error message.

If FRED does not receive either error message, the following results occur for the specified QRMTSIGN values:

Table 6-3. User Specifies RMTUSER(Own Profile)

| QRMTSIGN Value | Result | | | | | | | | |
|-------------------|--|----------------|--------|-----------------|--|-----------------|--|-----------------|----------------------------------|
| *REJECT | No pass-through session occurs. A CPF8935 message is sent to the user of the STRPASTHR command, and a job log is created on the target system. | | | | | | | | |
| *FRCSIGNON | User sees the sign-on display for the target system. | | | | | | | | |
| *SAMEPRF, *VERIFY | User is automatically signed on. | | | | | | | | |
| Program library | The result depends on the program action. | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Program Action</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Return 0</td> <td>No pass-through session occurs. A CPF8937 message is sent to the user of the STRPASTHR command, and a job log is created on the target system.</td> </tr> <tr> <td>Return 1</td> <td>User sees the sign-on display for the target system.</td> </tr> <tr> <td>Return 2</td> <td>User is automatically signed on.</td> </tr> </tbody> </table> | Program Action | Result | Return 0 | No pass-through session occurs. A CPF8937 message is sent to the user of the STRPASTHR command, and a job log is created on the target system. | Return 1 | User sees the sign-on display for the target system. | Return 2 | User is automatically signed on. |
| Program Action | Result | | | | | | | | |
| Return 0 | No pass-through session occurs. A CPF8937 message is sent to the user of the STRPASTHR command, and a job log is created on the target system. | | | | | | | | |
| Return 1 | User sees the sign-on display for the target system. | | | | | | | | |
| Return 2 | User is automatically signed on. | | | | | | | | |

If FRED specifies RMTUSER(MARY), he can specify either RMTPWD(*NONE) or RMTPWD(*password*). If he specifies RMTPWD(*NONE), he receives a CPF8905 error message because he must always specify a password when specifying a user profile name in the RMTUSER parameter. If he specifies RMTPWD(*password*), the password must be valid for the user profile MARY on the target system, or he receives a CPF8936 error message.

If FRED does not receive either error message, the following results occur for the specified QRMTSIGN values:

Table 6-4. User Specifies RMTUSER(Other Profile)

| QRMTSIGN Value | Result | | | | | | | | |
|-----------------|--|----------------|--------|-----------------|--|-----------------|--|-----------------|----------------------------------|
| *REJECT | No pass-through session occurs. A CPF8935 message is sent to the user of the STRPASTHR command, and a job log is created on the target system. | | | | | | | | |
| *FRCSIGNON | User sees the sign-on display for the target system. | | | | | | | | |
| *SAMEPRF | No pass-through session occurs. A CPF8936 message is sent to the user of the STRPASTHR command and a job log is created on the target system. | | | | | | | | |
| *VERIFY | User is automatically signed on. | | | | | | | | |
| Program library | The result depends on the program action. | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Program Action</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Return 0</td> <td>No pass-through session occurs. A CPF8937 message is sent to the user of the STRPASTHR command, and a job log is created on the target system.</td> </tr> <tr> <td>Return 1</td> <td>User sees the sign-on display for the target system.</td> </tr> <tr> <td>Return 2</td> <td>User is automatically signed on.</td> </tr> </tbody> </table> | Program Action | Result | Return 0 | No pass-through session occurs. A CPF8937 message is sent to the user of the STRPASTHR command, and a job log is created on the target system. | Return 1 | User sees the sign-on display for the target system. | Return 2 | User is automatically signed on. |
| Program Action | Result | | | | | | | | |
| Return 0 | No pass-through session occurs. A CPF8937 message is sent to the user of the STRPASTHR command, and a job log is created on the target system. | | | | | | | | |
| Return 1 | User sees the sign-on display for the target system. | | | | | | | | |
| Return 2 | User is automatically signed on. | | | | | | | | |

APPC and APPN Considerations for Pass-Through

This section discusses the capabilities and limitations of the display station pass-through function when using advanced program-to-program communications (APPC) and Advanced Peer-to-Peer Networking (APPN) support.

Low-Entry Networking Nodes

A low-entry networking node uses the node type 2.1 architecture without APPN extensions. A type 2.1 node is a system, such as an AS/400 system, that supports local users and system functions to allow participation in an APPN network.

A low-entry networking node can participate in an APPN network using the services of an attached **network node server** (a system that provides services to other systems). However, the user at the low-entry networking node must specifically configure all the remote locations with which communications occur as if they exist at the network node server. The ability of a low-entry networking node to use the APPN network varies, depending on the specific use. Examples of a low-entry networking node are:

- System/38
- System/36 without the APPN feature
- An AS/400 system configured not to use APPN support (APPN(*NO) specified in the controller description)
- A personal computer

Figure 6-1 provides an example of low-entry networking nodes. Three specific systems are shown.

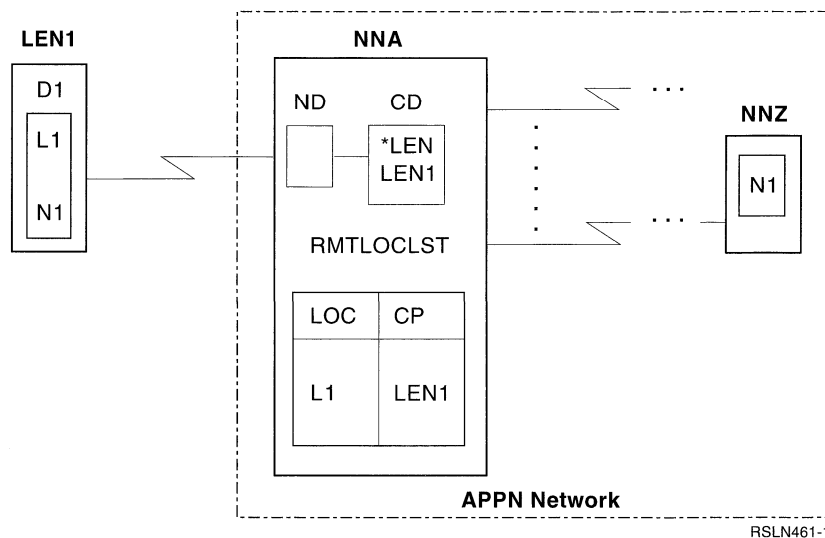


Figure 6-1. Low-Entry Network Nodes Example

The following discussion pertains to Figure 6-1.

- System LEN1 is a low-entry networking system. LEN1 may be a System/38 or an AS/400 system that is connected to the APPN network using a nonnetworking APPC device, or may be a System/36 using an APPC subsystem configuration. (If LEN1 is a System/36, then the device description D1 represents the corresponding System/36 configuration objects.)

D1 is a device description, contained in LEN1, used for a nonnetworking APPC device. This device description specifies that it is associated with a local location name of L1, and connects to remote location named N1.

- System NNA is a network node that is serving location L1 on LEN1. NNA informs the remainder of the APPN network that any traffic intended for location L1 should be

directed to NNA. Both the System/36 and the AS/400 system can be network nodes, but this example assumes that NNA is an AS/400 system.

The name LEN1 is not configured on the system named LEN1, but is actually the control point name used in defining the locations on system LEN1. Specify this control point name when you create the APPC controller on the serving network node, system NNA. For more information about configuring control point names and serving network nodes, refer to the *APPN Guide*.

To configure system NNA as the network node serving location L1 on system LEN1, do the following:

1. Create the controller description that is named CD and is associated with the communications line description named ND using the low-entry networking value on the node type (NODETYPE) parameter of the Create Controller (APPC) (CRTCTLAPPC) command. (*LENNODE is represented as *LEN in Figure 6-1 on page 6-9.)
2. Add an entry for location L1 (on the LEN1 control point) to the APPN remote location configuration list. To add this entry, use the Add Configuration List Entry (ADDCFGLE), the Work with Configuration List (WRKCFGL), or the Change Configuration List (CHGCFGL) command.

If the APPN remote location configuration list does not already exist on the system, you can create this list with the Create Configuration List (CRTCFGL) command, specifying *APPNRMT for the TYPE parameter.

- System NNZ is the system in the APPN network with the location name N1, or serving location N1, if N1 is a location on another low-entry networking node. System NNZ can be either a System/36 using an APPN subsystem configuration or an AS/400 system.

To pass-through from LEN1 to NNZ, do the following:

- If LEN1 is an AS/400 system, specify CNNDEV(D1) with the Start Pass-Through (STRPASTHR) command.
- If LEN1 is a System/38, specify CNNDEV(D1) with the Begin Pass-Through (BGNPASTHR) command.

Note: If LEN1 is a System/38 or an AS/400 system connected to the network using a nonnetworking device, a unique nonnetworking device must be created on LEN1 for each location in the APPN network you might want to pass through.

For example, to use pass-through between LEN1 and NNA, a new APPC device must be created on LEN1 with one of the location names on NNA specified as the remote location in that nonnetworking APPC device.

- If LEN1 is a System/36, specify N1 on the remote location prompt. Even if there are many systems between LEN1 and NNZ, system NNA sets up the route from itself to NNZ.

To pass through from NNZ to LEN1, do the following:

- If NNZ is a System/36, specify RMTLOCNAME(L1) on the System/36 PASSTHRU procedure.
- If NNZ is an AS/400 system, specify RMTLOCNAME(L1) with the STRPASTHR command to use pass through from NNZ to LEN1.

The example programs in “Configuring a System/38 in an APPN Network” show the commands to create the configuration described in Figure 6-1 on page 6-9. In these programs, system LEN1 is a System/38 and systems NNA and NNZ are AS/400 systems.

Only the configuration commands needed to connect system LEN1 to system NNA and to define location N1 on system NNZ are shown. Systems NNA and NNZ also need configurations for attaching to the APPN network. NNZ needs to have a virtual work station controller and at least one virtual display device created. For more APPC configuration examples, see the *APPN Guide* and the *APPC Programmer's Guide*. The *System/38 Environment*

Programmer's Guide/Reference discussion of configuring for display station pass-through contains more information for configuring your system for these examples.

Printer Output from a Target System

To receive your printer output, use an object distribution spooled file. No specific action, such as entering a command, is needed to receive a spooled file. When it arrives at your system, the spooled file is placed on the output queue specified in your user profile. Both the user sending the distribution and you are notified of the arrival of a spooled file.

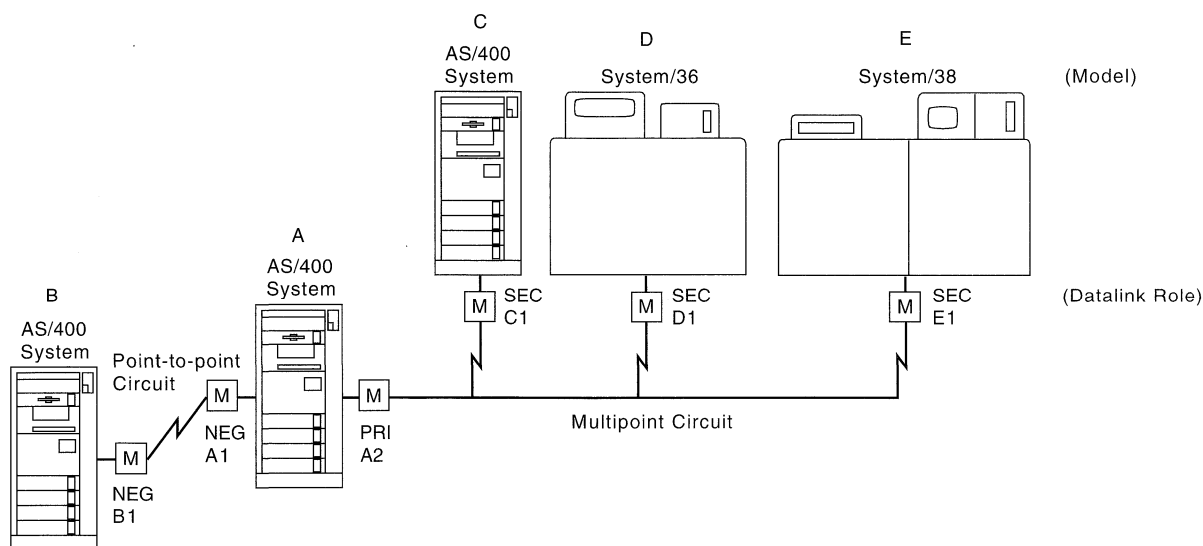
For more information about object distribution and spooled output, refer to the topic about sending and receiving spooled files in the *Distribution Services Network Guide*.

Chapter 7. Display Station Pass-Through Configuration Example

This chapter shows a configuration example for display station pass-through use in an APPN network of five systems in five cities.

APPN Configuration Example for Display Station Pass-Through

Figure 7-1 is an illustration of the network and the systems used in each city.



M=Modem
IBM 7861-015
9600 BPS, 1 Port

RV2P101-1

Figure 7-1. Pass-Through Configuration Example

Table 7-1 lists the vital statistics for each city and its system and how each system is linked to the series.

Table 7-1. Pass-Through Configuration Text

| System Location | B Denver | A Rochester | C Indianapolis | D Pittsburgh | E Boston |
|------------------------|-------------|---|-------------------|-----------------|-------------|
| System name | DENVER | ROCHESTE | INDIANA | PITTSBUR | BOSTON |
| Local location name | DENVER | ROCHESTE | INDIANA | PITTSBUR | BOSTON |
| Control point name | DENVER | ROCHESTE | INDIANA | PITTSBUR | BOSTON |
| Node type | NETNODE | NETNODE | NETNODE | NETNODE | LENNODE |
| Exchange identifier | 056000B1 | 056000A1 056000A2 | 056000C1 | 03E000D1 | 022000E1 |
| Line description | PTP | PTP MTPP | MTPP | MTPP | MTPP |
| Controller description | ROCHESCTL | DENVERCTL INDIANACTL PITTSBCTL BOSTONCTL | ROCHESCTL | | ROCHESCTL |

A point-to-point line is used between Rochester and Denver. A multipoint line is used to connect Rochester, Indianapolis, Pittsburgh, and Boston with Rochester as the central site.

The point-to-point line must carry a high volume of data traffic between Rochester and Denver so a dedicated, non-switched line between them is necessary.

The multipoint line takes advantage of multipoint capabilities by allowing a single circuit to go from Rochester to Indianapolis, Pittsburgh, and Boston.

Denver Configuration

Figure 7-2 is an example of a control language (CL) program that could be used to configure the Denver AS/400 system in Figure 7-1 on page 7-1 for use in the APPN network.

```

/*****/
/*                                          */
/* System: AS/400 system in Denver        */
/*                                          */
/* Configuration:                          */
/*   Line(PTP):  SDLC non-switched         */
/*               EXCHID 056000B1          */
/*                                          */
/*   Controller(ROCHESTCTL)                */
/*               Remote control point name: ROCHESTE */
/*               *NETNODE                   */
/*               Attaches to EXCHID: 056000A1      */
/*                                          */
/*****/

PGM
/* Create the LINE                          */
CRTLINS DLC  LIND(PTP) + /* Call the line PTP */
             RSRNAME(LIN011) + /* Resource name of port */
             EXCHID(056000B1) + /* System exchange ID */
             MODEM(*IBMLPDA2) + /* Modem type */
             DUPLEX(*FULL) + /* */
             TEXT('Point-to-point line to Rochester')

/* Create the CONTROLLER                    */
CRTCTLAPPC CTLD(ROCHESTCTL) + /* Controller Description */
           LINKTYPE(*SDLC) + /* Link type */
           LINE(PTP) + /* Attached nonswitched line*/
           RMTCPCNAME(ROCHESTE) + /* Remote control point */
           EXCHID(056000A1) + /* System exchange ID */
           STNADR(B1) + /* Station address */
           NODETYPE(*NETNODE) + /* APPN node type */
           TEXT('For the AS/400 system in Rochester')

ENDPGM

```

Figure 7-2. CL Program for Configuring Denver AS/400 System

Rochester Configuration

Figure 7-3 on page 7-3 is an example of a control language (CL) program that could be used to configure the Rochester AS/400 system in Figure 7-1 on page 7-1 for use in the APPN network.

```

/*****/
/*                                          */
/* System: AS/400 system in Rochester      */
/*                                          */
/* Configuration:                          */
/*   Line(PTP):  SDLC non-switched         */
/*               EXCHID 056000A1          */
/*                                          */
/*   Line(MTPP): SDLC non-switched         */
/*               EXCHID 056000A2          */
/*                                          */
/*   Controller(DENVERCTL)                  */
/*       Remote control point name: DENVER */
/*       *NETNODE                           */
/*       Attaches to EXCHID: 056000B1      */
/*                                          */
/*   Controller(INDIANACTL)                 */
/*       Remote control point name: INDIANA */
/*       *NETNODE                           */
/*       Attaches to EXCHID: 056000C1      */
/*                                          */
/*   Controller(PITTSBUCTL)                 */
/*       Remote control point name: PITTSBUR */
/*       *NETNODE                           */
/*       Attaches to EXCHID: 03E000D1      */
/*                                          */
/*   Controller(BOSTONCTL)                  */
/*       Remote control point name: BOSTON   */
/*       *LENNODE                           */
/*       Attaches to EXCHID: 022000E1      */
/*                                          */
/*****/

PGM
/* Create the LINES                          */
CRTLINS DLC  LIND(PTP) + /* Call the line PTP */
             RSRCNAME(LIN012) + /* Resource name of port */
             EXCHID(056000A1) + /* System exchange ID */
             MODEM(*IBMLPDA2) + /* Modem type */
             DUPLEX(*FULL) + /* */
             TEXT('Point-to-point line to Denver')

CRTLINS DLC  LIND(MTPP) + /* Call the line MTPP */
             RSRCNAME(LIN022) + /* Resource name of port */
             ROLE(*PRI) + /* Data Link role */
             CNN(*MP) + /* Connection type */
             EXCHID(056000A2) + /* System exchange ID */
             MAXCTL(3) + /* Maximum controllers */
             MODEM(*IBMLPDA2) + /* Modem type */
             DUPLEX(*FULL) + /* */
             TEXT('Multipoint line to Indianapolis, +
                 Pittsburgh, Bosto')

```

Figure 7-3 (Part 1 of 2). CL Program for Configuring Rochester AS/400 System

```

/* Create the CONTROLLERS                                     */
CRTCTLAPPC CTLD(DENVERCTL) + /* Controller Description */
LINKTYPE(*SDLC) + /* Link type */
LINE(PTP) + /* Attached nonswitched line*/
RMTCPCNAME(DENVER) + /* Remote control point */
EXCHID(056000B1) + /* System exchange ID */
STNADR(A1) + /* Station address */
NODETYPE(*NETNODE) + /* APPN node type */
TEXT('For the AS/400 system in Denver')

CRTCTLAPPC CTLD(INDIANACTL) + /* Controller Description */
LINKTYPE(*SDLC) + /* Link type */
LINE(MTPP) + /* Attached nonswitched line*/
RMTCPCNAME(INDIANA) + /* Remote control point */
EXCHID(056000C1) + /* System exchange ID */
STNADR(C1) + /* Station address */
ROLE(*SEC) + /* Data link role */
TEXT('For the AS/400 system in Indianapolis')

CRTCTLAPPC CTLD(PITTSBUCTL) + /* Controller Description */
LINKTYPE(*SDLC) + /* Link type */
LINE(MTPP) + /* Attached nonswitched line*/
RMTCPCNAME(PITTSBUR) + /* Remote control point */
EXCHID(03E000D1) + /* System exchange ID */
STNADR(D1) + /* Station address */
ROLE(*SEC) + /* Data link role */
NODETYPE(*NETNODE) + /* APPN node type */
TEXT('For the S/36 system in Pittsburgh')

CRTCTLAPPC CTLD(BOSTONCTL) + /* Controller Description */
LINKTYPE(*SDLC) + /* Link type */
LINE(MTPP) + /* Attached nonswitched line*/
RMTCPCNAME(BOSTON) + /* Remote control point */
EXCHID(022000E1) + /* System exchange ID */
STNADR(E1) + /* Station address */
ROLE(*SEC) + /* Data link role */
NODETYPE(*LENNODE) + /* APPN node type */
TEXT('For the S/38 system in Boston')

ENDPGM

```

Figure 7-3 (Part 2 of 2). CL Program for Configuring Rochester AS/400 System

Indianapolis Configuration

Figure 7-4 on page 7-5 is an example of a control language (CL) program that could be used to configure the Indianapolis AS/400 system in Figure 7-1 on page 7-1 for use in the APPN network.

```

/*****/
/* */
/* System: AS/400 system in Indianapolis */
/* */
/* Configuration: */
/* Line(MTPP): SDLC non-switched */
/* EXCHID 056000C1 */
/* */
/* Controller(ROCHESTCTL) */
/* Remote control point name: ROCHESTE */
/* *NETNODE */
/* Attaches to EXCHID: 056000A2 */
/* */
/*****/

PGM
/* Create the LINE */
CRTLINS DLC LIND(MTPP) + /* Call the line MTPP */
          RSRNAME(LIN011) + /* Resource name of port */
          ROLE(*SEC) + /* Data Link role */
          CNN(*MP) + /* Connection type */
          EXCHID(056000C1) + /* System exchange ID */
          MAXCTL(1) + /* Maximum controllers */
          MODEM(*IBMLPDA2) + /* Modem type */
          DUPLEX(*HALF) + /* */
          TEXT('Multipoint line to Rochester')

/* Create the CONTROLLER */
CRTCTLAPPC CTLD(ROCHESTCTL) + /* Controller Description */
          LINKTYPE(*SDLC) + /* Link type */
          LINE(MTPP) + /* Attached nonswitched line*/
          RMTCPNAME(ROCHESTE) + /* Remote control point */
          EXCHID(056000A21) + /* System exchange ID */
          STNADR(C1) + /* Station address */
          ROLE(*PRI) + /* Data link role */
          TEXT('For the AS/400 system in Rochester')

ENDPGM

```

Figure 7-4. CL Program for Configuring Indianapolis AS/400 System

Pittsburgh Configuration

The System/36 used in Pittsburgh in Figure 7-1 on page 7-1 does not support the use of CL programs for configuration. This system instead uses a menu-driven interface. For information on how to configure a System/36 in an APPN environment, see the *Using S/36 Communications Guide*.

Boston Configuration

Figure 7-5 on page 7-6 is an example of a control language (CL) program that could be used to configure the Boston System/38 in Figure 7-1 on page 7-1 for use in the APPN network.

```

/*****/
/* */
/* System: S/38 system in Boston */
/* */
/* Configuration: */
/* Line(MTPP): SDLC non-switched */
/* EXCHID 022000E1 */
/* */
/* Controller(ROCHESTCTL) */
/* Control unit address: A220 */
/* Attaches to EXCHID: 056000A2 */
/* */
/* Device(ROCHESTDEV) */
/* Device address: 01A220 */
/* */
/* Device(DENVERDEV) */
/* Device address: 02A220 */
/* */
/* Device(INDIANADEV) */
/* Device address: 03A220 */
/* */
/* Device(PITTSBUDEV) */
/* Device address: 04A220 */
/* */
/*****/

PGM
/* Create the LINE */
CRTLIND LIND(MTPP) + /* Call the line MTPP */
        LINNBR(20) + /* Resource name of port */
        TYPE(*SDLCS) + /* SDLC Secondary */
        CNN(*MP) + /* Connection type */
        RATE(9600) + /* Data rate */
        EXCHID(022000E1) + /* System exchange ID */
        WIRE(4) + /* 4-wire connection */
        STNADR(E1) /* Station address */

/* Create the CONTROLLER */
CRTCUD CUD(ROCHESTCTL) + /* Controller Description */
        TYPE(*PEER) + /* Using APPC */
        MODEL(0000) + /* Model always 0000 w *PEER */
        CTLADR(A220) + /* Unique address of CTL */
        LINE(MTPP) + /* Attached nonswitched line */
        EXCHID(056000A2) /* System exchange ID */

/* Create the DEVICE */
CRTDEV DEV(ROCHESTDEV) + /* Device Description */
        DEVADR(01A220) + /* Unique address for device */
        DEVTYPE(*PEER) + /* Using APPC */
        MODEL(0000) + /* Model always 0000 w *PEER */
        CTLU(ROCHESTCTL) + /* Attached to CTL UNIT */
        LLLU(BOSTON) + /* Local LU name */
        RMTLU(ROCHESTE) /* Attached to remote LU nam */

```

Figure 7-5 (Part 1 of 2). CL Program for Configuring Boston System/38


```

/* Add a MODE to the device */
ADDDEVMODE DEVD(ROCHESTDEV) + /* Add a mode to device */
MODE(*BLANK) + /* The mode is *blank */
MAXCNV(8) /* Max concurrent conversations*/

/* Create the DEVICE */
CRTDEVD DEVD(DENVERDEV) + /* Device Description */
DEVADR(02A220) + /* Unique address for device */
DEVTYPE(*PEER) + /* Using APPC */
MODEL(0000) + /* Model always 0000 w *PEER */
CTLU(ROCHESTCTL) + /* Attached to CTL UNIT */
LCLLU(BOSTON) + /* Local LU name */
RMTLU(DENVER) /* Attached to remote LU nam */

/* Add a MODE to the device */
ADDDEVMODE DEVD(DENVERDEV) + /* Add a mode to device */
MODE(*BLANK) + /* The mode is *blank */
MAXCNV(8) /* Max concurrent conversations*/

/* Create the DEVICE */
CRTDEVD DEVD(INDIANADEV) + /* Device Description */
DEVADR(03A220) + /* Unique address for device */
DEVTYPE(*PEER) + /* Using APPC */
MODEL(0000) + /* Model always 0000 w *PEER */
CTLU(ROCHESTCTL) + /* Attached to CTL UNIT */
LCLLU(BOSTON) + /* Local LU name */
RMTLU(INDIANA) /* Attached to remote LU name */

/* Add a MODE to the device */
ADDDEVMODE DEVD(INDIANADEV) + /* Add a mode to device */
MODE(*BLANK) + /* The mode is *blank */
MAXCNV(8) /* Max concurrent conversations*/

/* Create the DEVICE */
CRTDEVD DEVD(PITTSBUDEV) + /* Device Description */
DEVADR(04A220) + /* Unique address for device */
DEVTYPE(*PEER) + /* Using APPC */
MODEL(0000) + /* Model always 0000 w *PEER */
CTLU(ROCHESTCTL) + /* Attached to CTL UNIT */
LCLLU(BOSTON) + /* Local LU name */
RMTLU(PITTSBUR) /* Attached to remote LU name */

/* Add a MODE to the device */
ADDDEVMODE DEVD(PITTSBUDEV) + /* Add a mode to device */
MODE(*BLANK) + /* The mode is *blank */
MAXCNV(8) /* Max concurrent conversations*/

ENDPGM

```

Figure 7-5 (Part 2 of 2). CL Program for Configuring Boston System/38

Configuring a System/38 in an APPN Network

This section provides example programs for configuring a System/38 in the following Advanced Peer-to-Peer Networking (APPN) networks:

- System/38 connecting to an AS/400 system
- AS/400 system connecting to and serving a System/38

This section also provides an example program for adding a local location to an AS/400 system APPN local location configuration list.

System/38 Attached to an AS/400 System

Figure 7-6 is a program that shows how to set up the configuration on a System/38 that connects to an AS/400 system. An example of this configuration is shown in Figure 6-1 on page 6-9.

```
/******  
/*  
/* System: System/38 (LEN1) */  
/* */  
/* Configuration: */  
/* Line: SDLC non-switched secondary */  
/* EXCHID 02200001 */  
/* Control Unit: Attaches to AS/400 EXCHID 05600001 */  
/* Device: Local LU L1 */  
/* Remote LU N1 */  
/*  
/* Note : You must add this device as a communication */  
/* entry to the appropriate subsystem by */  
/* using the ADDCMNE command. */  
/*  
/******  
PGM  
/* Create the line that connects S/38 (LEN1) to AS/400 system (NNA)*/  
CRTLIND LIND(LEN1TONNA) + /* Call the line LEN1TONNA */  
LINNBR(21) + /* Operational Unit 21 */  
TYPE(*SDLCS) + /* SDLC Secondary */  
CNN(*PP) + /* Non-switched point-to-point */  
RATE(9600) + /* Line speed 9600 bps */  
WIRE(4) + /* 4-wire connection */  
STNADR(01) + /* Must match NNA CTL STNADR */  
EXCHID(02200001) /* Exchange ID for the system */  
/* Create the CUD that attaches S/38 (LEN1) to AS/400 system (NAA) */  
CRTCUD CUD(LEN1TONNA) + /* Call the ctl unit LEN1TONNA */  
TYPE(*PEER) + /* Using APPC */  
MODEL(0000) + /* MODFI always 0000 with *PEER */  
CTLADR(0121) + /* Unique address of the ctl unit*/  
LINE(LEN1TONNA) + /* Attach to line LEN1TONNA */  
EXCHID(05600001) /* Exchange ID remote controller */  
/* Create the device connecting LU L1 (LEN1) to LU N1 (NNZ) */  
CRTDEV DEVD(D1) + /* The device is called D1 */  
DEVADR(010121) + /* Unique address of the device */  
DEVTYPE(*PEER) + /* Using APPC */  
MODEL(0000) + /* MODEL always 0000 with *PEER */  
CTLU(LEN1TONNA) + /* Attach to ctl unit LEN1TONNA */  
LCLLU(L1) + /* Local LU name is L1 */  
RMTLU(N1) /* Attach to remote LU name N1 */  
/* Add a mode to the device description D1 */  
ADDDEVMODE DEVD(D1) + /* Add a mode to device D1 */  
MODE(*BLANK) + /* The mode is *BLANK */  
MAXSSN(8) + /* Maximum concurrent sessions */  
PREBNDSSN(1) + /* Number preestablished sessions*/  
MAXSRCSSN(4) + /* Maximum source sessions */  
MAXCNV(8) /* Max concurrent conversations */  
ENDPGM
```

Figure 7-6. System/38 Attached to an AS/400 System Program Example

AS/400 System Attached to a System/38

Figure 7-7 on page 7-9 is a program that shows how to set up the configuration on an AS/400 system that connects to and serves a System/38 that is acting as a low-entry net-working node. An example of this configuration is shown in Figure 6-1 on page 6-9.

```

/*****
/*
/* System: AS/400 system (NNA)
/*
/* Configuration:
/* Line: SDLC non-switched primary
/* EXCHID 05600001
/* Controller : Attaches to S/38 EXCHID 02200001
/* APPN capable, supporting *LENNODE
/* with remote control point name LEN1
/* on the default network.
/*
/* Devices : none; these are created dynamically by APPN support*/
/* Mode: A mode must exist on this system which matches the
/* mode on device D1 on the S/38. However, because the
/* mode used for device D1 is *BLANK, and that mode
/* matches the IBM-supplied mode BLANK on the AS/400
/* system, no mode description needs to be created.
/*
/* Configuration List: Add Remote Location L1 on
/* Control Point LEN1
/*
/* Note : If you are adding configuration
/* list entries in an interactive
/* environment, rather than in
/* a program such as this, you
/* may find that the "Change"
/* option on the menu presented by
/* the WRKCFGL command is easier
/* to use than the ADDCFGLE command.
/*
/*****
PGM
/* Create the line that connects AS/400 system (NNA) to S/38 (LEN1)*/
CRTLINSDLC LIND(ND) + /* Call the line ND */
RSRCNAME(LIN011) + /* Resource name of port */
ROLE(*PRI) + /* Assume primary role */
EXCHID(05600001) /* System exchange ID */
/* Create the controller which will designate LEN1 a *LENNODE */
CRTCTLAPPC CTLD(CD) + /* Name controller CD */
LINKTYPE(*SDLC) + /* Attached to an SDLC line */
LINE(ND) + /* Attached to line ND */
ROLE(*SEC) + /* Remote side is secondary */
STNADR(01) + /* Remote station address */
EXCHID(02200001) + /* Remote exchange ID */
APPN(*YES) + /* APPN support is being used */
NODETYPE(*LENNODE) + /* Remote system is a LEN node */
RMTCPNAME(LEN1) + /* Assign remote control point */
RMTNETID(*NETATR) /* Use the default network ID */
/* Add an entry to the APPN remote configuration list for location */
/* L1 in the default network served by system NNA. Define L1 to */
/* reside on control point LEN1, also in the default network. */
ADDCFGLE TYPE(*APPNRMT) APPNRMTE((L1 *NETATR NNA LEN1))
ENDPGM

```

Figure 7-7. AS/400 System Attached to System/38 Program Example

Note: This program assumes the local location list exists on the system and need not be created.

Adding a Local Location to an AS/400 APPN Configuration

Figure 7-8 on page 7-10 is a program that shows how to add a local location to an AS/400 APPN local location configuration list. This example corresponds to the example network in Figure 6-1 on page 6-9.

```

/*****/
/*                                          */
/* System: AS/400 system (NNZ)           */
/*                                          */
/* Configuration:                         */
/*   Mode: A mode must exist on this system which matches the */
/*         mode on device D1 on the S/38. However, because the */
/*         mode used for device D1 is *BLANK, and that mode */
/*         matches the IBM-supplied mode BLANK on the AS/400 */
/*         system, no mode description needs to be created.   */
/* Configuration List: Add Local Location N1                    */
/*   Notes : This ADDCFGLE would not be necessary if the */
/*           control point name or the default local location */
/*           name of system NNZ was N1.                      */
/*           : This program assumes that location N1 is on */
/*           system NNZ, not on a low-entry networking node */
/*           served by NNZ.                                  */
/*           : If you are adding configuration list entries in an */
/*           interactive environment, rather than in a program */
/*           such as this, you may find that the "Change" */
/*           option on the menu presented by the WRKCFGL */
/*           command is easier to use than the ADDCFGLE command.*/
/*                                          */
/*****/
PGM
/* Add an entry to the APPN local configuration list for */
/* location N1.                                         */
  ADDCFGLE  TYPE(*APPNCL) APPNLCLE((N1))
ENDPGM

```

Figure 7-8. Adding a Local Location to an AS/400 APPN Configuration

Note: This program assumes the local location list exists on the system and need not be created.

Pass-Through in a Multiple Product Network

This section provides an example of a network of systems to clarify the effect of the network configuration on the display station pass-through function used in that network.

This example may be helpful in determining which method of configuration is the easiest for the pass-through users to use. The pass-through user may also gain a better understanding of how to specify device and location names on the various pass-through commands to determine the route to the target system.

Figure 7-9 on page 7-11 shows a network of seven systems:

- Two System/38s, labeled S38A and S38B
- Two System/36s, labeled S36A and S36B
- Two AS/400 systems, labeled AS400A and AS400B
- One system, labeled SXX, whose system type is not important in this example, except that it must be a System/36, System/38, or an AS/400 system

Note: Each system has many configuration objects not mentioned in the figure or in the following examples. For example, for each APPC device in each system in the figure, a corresponding APPC device in the system containing the remote location is shown in the device.

Only the communications objects that are used in the example are discussed. Two nonnetworking devices are shown on system S38A. Device DEV1 has a local logical unit (LU) name (S38A) and a remote LU name (S38B). Device DEV2 has a local LU name (S38A) and a remote LU name (AS400B1). An LU name on System/38 corresponds to a location name on a System/36 and an AS/400 system.

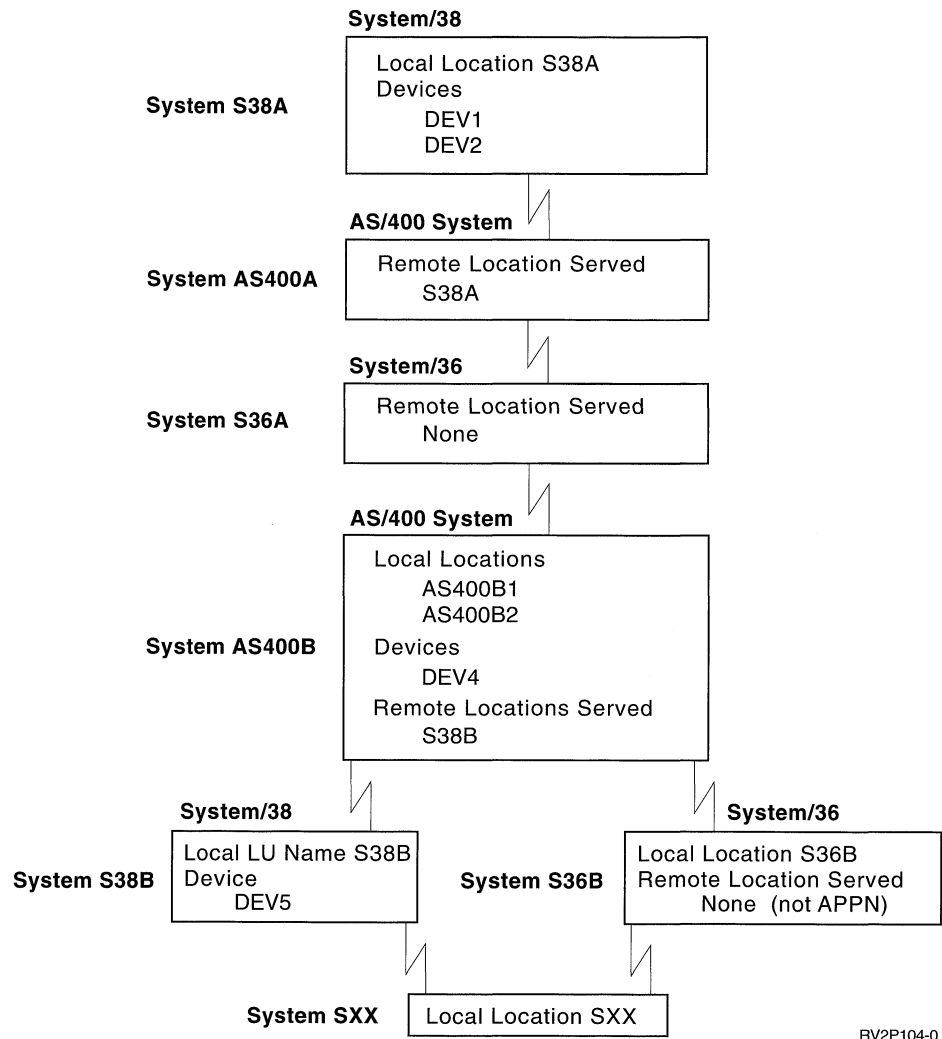
There are no nonnetworking devices shown on system AS400A. It is a network node in the APPN network with S36A and AS400B. System AS400A acts as the serving network node for location S38A.

System S36A does not have any devices because it is a System/36. It is a network node in the APPN network with AS400A and AS400B.

System AS400B shows a nonnetworking device. Device DEV4 has a local location name AS400B1 and a remote location name S36B. System AS400B acts as the serving network node for location S38B. AS400B2 is the name of another location on system AS400B.

System S38B shows one nonnetworking device. Device DEV5 has a local LU name S38B and a remote LU name SXX.

System S36B does not have any devices because it is a System/36. For the purposes of this example, assume S36B is a System/36 that is not using an APPN subsystem configuration. Based on these assumptions made about the network, see Figure 7-9 for some of the possible ways to pass through from one system to another. (Only the parameters associated with choosing the target system are specified.)



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Figure 7-9. Complex Example of Pass-Through Networking

- From S38A to S38B, using the Begin Pass-Through (BGNPASTHR) command:
 - CNNDEV(DEV1): DEV1 is the only device you need to specify because DEV1 specifies the local location name S38A (served by system AS400A's APPN network

node function) and specifies the remote location name S38B (served by system AS400B's APPN network node function), and because S36A is an APPN networking node.

Notice that only one device is specified, but several systems are in the route to the target system.

- From AS400B to S38B, using the Start Pass-Through (STRPASTHR) command:
 - RMTLOCNAME(S38B): AS400B serves remote location S38B; therefore, simply specifying the location name sets up the route. You can reach S38B from any of the APPN-capable systems in the network (AS400A, S36A, and AS400B) by specifying RMTLOCNAME(S38B) because a network node serves that location.
- From AS400B to S36B, using the STRPASTHR command:
 - RMTLOCNAME(S36B): Specifying the location name sets up the route because AS400B serves remote location S36B.
 - CNNDEV(DEV4): You can specify this device because DEV4 is connected directly to S36B, and DEV4 is a nonnetworking APPC device.
- From AS400B to SXX, using the STRPASTHR command:
 - RMTLOCNAME(S38B) CNNDEV(DEV5): APPN support finds the path to S38B. Specify DEV5 to complete the path from S38B to SXX.

You cannot specify RMTLOCNAME(SXX) because SXX is not a location known to any APPN network node in the network.

- From S36A to SXX, using the Pass-Through (PASSTHRU) procedure:
 - RMTLOCNAME(S38B) CNNDEV (DEV5): The remote location name S38B in the node list member takes the route to system S38B, then DEV5 completes the route through S38B to SXX.

Part 2. Configuring for 5250 Remote Control Units

This part discusses the 5250-type remote control units. It contains information about defining devices, configuring keyboards, and understanding error messages. It also contains examples on configuring these controllers. The first chapter describes configuring general 5250-type devices, and the final two chapters describe configuring specific 5250-type devices: the 5394 type 2.1 node, and the 5494 Remote Control Unit.

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Chapter 8. Configuring 5250-Type Controllers

This chapter provides an example of a switched SDLC line used to connect an AS/400 system to two 5394 Remote Control Units with several attached devices. General considerations for using 5250-type controllers are discussed, including considerations for attaching double-byte character set (DBCS) devices. See the *OS/400* Communications Configuration Reference* for more information about matching parameters between the AS/400 system and these remote controllers.

5250 Remote Work Station Communications

Twinaxial, 5250-type remote controllers (5251-12, 5294, 5394, and 5494) can be used to remotely attach display stations and printers to the AS/400 system. This example describes the configuration shown in Figure 8-1 on page 8-2, using a switched SDLC line to connect two 5394 Remote Control Units and several attached devices to the AS/400 system.

The basic steps required for this configuration are:

1. Hardware setup and assignment of device addresses to the remote devices
2. 5394 configuration
3. AS/400 configuration, including:
 - Creating the line description (CRTLINSDLC command)
 - Creating the controller descriptions (CRTCTLRWS command)
 - Creating the device descriptions (CRTDEVDSP and CRTDEVPRT commands)

This example assumes that all equipment is set up correctly. The discussion of the configuration for the remote site is limited to describing dependencies shared between the configuration of the remote controllers and the configuration of the AS/400 system.

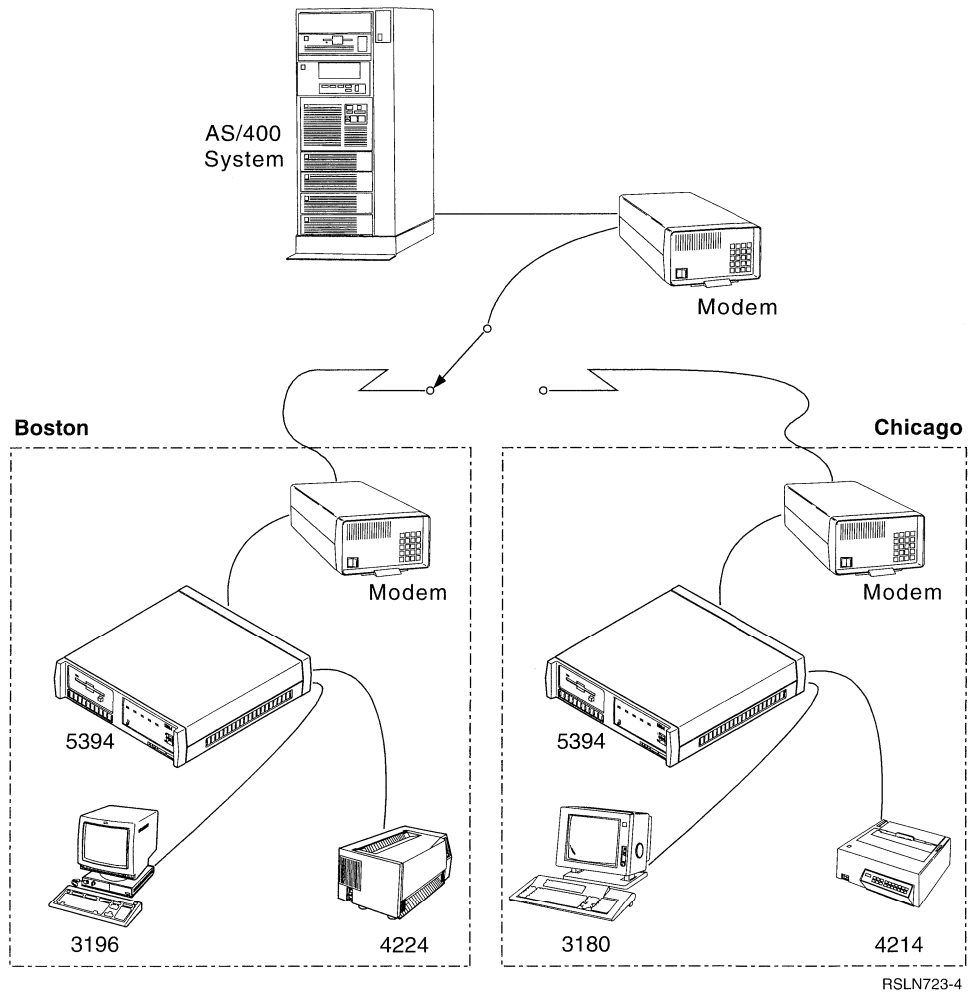


Figure 8-1. Remote Work Station Communications Example

Configuring the Remote Devices and 5394 Remote Control Units

Before configuring the 5394 Remote Control Units, the address of each of the attached devices should be set. For example, 3180 display stations use the Setup key and PF24 to set the device address; some types of display stations use switches. The addresses of devices attached to the same port must be unique.

The 5394 Control Unit requires an attached display station for the configuration procedure. The configuration display for the 5394 Remote Control Unit located in Boston is shown in Figure 8-2.

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|----|---|---|---|---|---|---|---|
| 0/ | . | D | . | . | . | . | . |
| 1/ | P | . | . | . | . | . | . |
| 2/ | . | . | . | . | . | . | . |

AA-> 0 BB->0
 1-> 00 2-> 04 3-> 1 0 1 0 0 0 0 08-> 0A 0
 P-> _ _

Figure 8-2. 5394 Configuration Display—Boston

The top part of the display shows the device addresses (0-6) and the 5394 ports (0-2) to which the devices are attached. Attached display stations are shown with a D, printers with a P. For example, the configuration display for the 5394 controller in Boston shows a display station with address 1 attached to port 0; a printer with address 0 is attached to port 1.

The port assignments and device addresses shown on the 5394 configuration display are used to determine the value specified for the LOCADR parameter on the AS/400 CRTDEV DSP command later in the configuration procedure.

The fields shown at the bottom of the 5394 configuration display are used to specify the type of communications to be used. The fields shown and the use of the fields is dependent on the model of the controller and on the value specified for Field AA. Field AA specifies whether the controller is to be used for SDLC, X.25, or X.21 switched communications. In this example, Field AA is set to 0, indicating SDLC communications.

Field BB specifies the operating mode of the 5394. If Field BB is 0, the controller will be used in 5394 mode (for connections to the AS/400 system). Field BB should be set to 1 (5294 emulation mode) for connections to System/36 or System/38.

For SDLC communications, several values specified in Fields 2 and 3 must match values specified in the AS/400 configuration.

Field 2 Field 2 contains the station address assigned to the controller. This value must be matched in two parameters on the AS/400 CRTCTLRWS command:

- The STNADR parameter
- The last two digits of the 8-digit EXCHID parameter

Field 3 Field 3 contains seven subfields:

- Subfield 1 determines whether the line is nonswitched (0), manual-dial switched (1), or auto-dial switched V.25bis (2).
- Subfield 2 indicates whether the communications line is half-duplex (0) or duplex (1). This value must match the value specified by the DUPLEX parameter on the CRTLINS DLC command.
- Subfield 3 determines whether the line is multipoint (0) or point-to-point (1). The combination of subfields 1 and 3 must be coordinated with the connection type (CNN parameter) specified on the CRTLINS DLC command. In this example, both subfields are set to 1 (manual-dial, switched point-to-point).

- Subfield 4 indicates whether NRZI (0) or NRZ (1) data encoding is used. This value must match the value specified by the NRZI parameter on the CRTLINS DLC command.

The following tables show the port numbers and device addresses for devices attached to the 5394 controllers in Boston and Chicago. The station addresses assigned during the 5394 configuration (Field 2) are: 04 (Boston), 05 (Chicago).

| <i>Table 8-1. Devices Attached to Boston 5394 Controller, Station Address = 04</i> | | |
|--|-------------|----------------|
| Attached Device | Port Number | Device Address |
| 3196-A1 Display Station | 0 | 1 |
| 4224 Intelligent Printer Data Stream* (IPDS*) Printer | 1 | 0 |

| <i>Table 8-2. Devices Attached to Chicago 5394 Controller, Station Address = 05</i> | | |
|---|-------------|----------------|
| Attached Device | Port Number | Device Address |
| 3180-2 Display Station | 0 | 0 |
| 4214-2 Printer | 2 | 0 |

The station addresses assigned to the 5394 controllers and the values shown in the preceding tables will be used to configure remote work station communications on the AS/400 system.

Configuring the AS/400 System

The AS/400 configuration requirements for the connections shown in Figure 8-1 on page 8-2 are as follows:

- An SDLC line description (CRTLINS DLC command) to describe the switched connection between the AS/400 system and the remote controllers in Boston and Chicago.
- Remote work station controller descriptions (CRTCTLRWS command) for each of the 5394 Remote Control Units.
- Device descriptions for each of the display stations and printers attached to the 5394 Remote Control Units (CRTDEV DSP and CRTDEV PRT commands).

The AS/400 configuration objects should be created in the order shown above (line, controllers, devices); the controller and device descriptions contain parameters that refer to their associated line and controller descriptions.

Before creating the line description, use the Work with Hardware Resources (WRKHDWRSC) command to determine the system-assigned resource name for the line you are going to use.

The following sections show how the configuration example can be created using either the command prompt displays or CL commands.

Configuration Using the Command Prompt Displays

This section shows how the objects required for the remote work station communications configuration example shown in Figure 8-1 on page 8-2 can be created using the command prompt displays.

Following each of the displays is a discussion of some of the more important prompts.

Creating the Line Description

To create the switched SDLC line description, type CRTLINSDLC on the command line and press F4. Fill in the prompt displays as shown below, then press the Enter key to create the line description.

```

Create Line Desc (SDLC) (CRTLINSDLC)

Type choices, press Enter.

Line description . . . . . > SOXLINE 1 Name
Resource names . . . . . > LIN021 2 Name
+ for more values
Online at IPL . . . . . > *NO 3 *YES, *NO
Data link role . . . . . > *PRI 4 *NEG, *PRI, *SEC
Physical interface . . . . . *RS232V24 *RS232V24, *V35, *X21, ...
Connection type . . . . . > *SWTPP 5 *NONSWTPP, *SWTPP, *MP, *SHM
Vary on wait . . . . . *NOWAIT *NOWAIT, 15-180 (1 second)
Autocall unit . . . . . *NO *NO, *YES
Exchange identifier . . . . . *SYSGEN 05600000-056FFFFF, *SYSGEN
NRZI data encoding . . . . . *YES *YES, *NO
Line speed . . . . . 9600 600, 1200, 2400, 4800...
Modem type supported . . . . . *NORMAL *NORMAL, *V54, *IBMWRAP...
Switched connection type . . . . . > *ANS 6 *BOTH, *ANS, *DIAL
Autoanswer . . . . . *YES *YES, *NO
Autodial . . . . . *NO *NO, *YES

F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display F24=More keys
More...

```

```

Create Line Desc (SDLC) (CRTLINSDLC)

Type choices, press Enter.

Calling number . . . . . *NONE
Connect poll retry . . . . . 7 0-64
Maximum frame size . . . . . 521 265, 521, 1033, 2057
Duplex . . . . . *HALF *HALF, *FULL
Nonproductive receive timer . . . 320 160-4200 (0.1 seconds)
Idle timer . . . . . 30 5-300 (0.1 seconds)
Connect poll timer . . . . . 30 2-300 (0.1 seconds)
Poll cycle pause . . . . . 0 0-2048 (0.0001 seconds)
Frame retry . . . . . 7 0-64
Data Set Ready drop timer . . . 6 3-60 (seconds)
Autoanswer type . . . . . *DTR *DTR, *CDSTL
Remote answer timer . . . . . 60 30, 35, 40, 45 (seconds)...
Text 'description' . . . . . > 'Switched line for Boston and Chicago RWS'

7

F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display F24=More keys
Bottom

```

Figure 8-3. Prompt Displays for SOXLINE SDLC Line Description

Considerations for specifying the CRTLINSDLC command:

- 1 Specifies the name of the line description. The name specified here is also specified for the SWTLINLST parameter of both controller descriptions to associate this switched line with the remote controllers.
- 2 This is the system resource name assigned to the communications port to which the physical line is attached. Use the WRKHDWPRD or WRKHDWRSC command to determine the resource name before creating the line description.
- 3 Specifies that this line description is not automatically varied on at IPL. When all of the configuration objects have been created, each will have to be varied on using the VRYCFG command or the WRKCFGSTS command.

- 4** The default value, *NEG, can also be used; the AS/400 system will then negotiate to take the primary (*PRI) role when communications with the remote work station controller is started.
- 5** Specifies that the line is to be used for switched point-to-point communications.
- 6** *ANS indicates that this switched connection will be used to handle incoming calls (from the remote controllers) only.
- 7** A brief description of the object of no more than 50 characters. When the TEXT parameter is specified on a CL command, the description must be enclosed in apostrophes; the apostrophes are optional when using the prompt displays.

Creating the Controller Descriptions

To create the controller descriptions for Boston and Chicago, type CRTCTRLRWS on the command line and press F4. Fill in the prompt displays as shown below, then press the Enter key to create the controller descriptions.

```

                                Create Ctl Desc (Remote WS) (CRTCTRLRWS)

Type choices, press Enter.

Controller description . . . . . > BOSTON 1 Name
Controller type . . . . . > 5394 1 3174, 3274, 5251, 5294...
Controller model . . . . . > 1 1 0, 1, 0001, 2, 0002, 12, 0012
Link type . . . . . > *SDLC 1 *IDLC, *LAN, *NONE, *SDLC...
Online at IPL . . . . . > *NO 1 *YES, *NO
Switched connection . . . . . > *YES 1 *NO, *YES
Short hold mode . . . . . > *NO 1 *NO, *YES
Switched line list . . . . . > SOXLINE 2 Name
                                + for more values
Maximum frame size . . . . . > *LINKTYPE 1 265-1994, 256, 261, 265...
Exchange identifier . . . . . > 05F00004 3 00100000-FFFFFFFF
Initial connection . . . . . > *ANS 4 *DIAL, *ANS
Connection number . . . . . > 16172344567 5
Station address . . . . . > 04 6 01-FE
Text 'description' . . . . . > 'Boston 5394 RWS controller'

-----
F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display F24=More keys
                                Bottom

```

Figure 8-4. Prompt Display for BOSTON Remote Work Station Controller Description

Considerations for specifying the CRTCTRLRWS command:

- 1** Specifies the name of the controller description. The name specified here is also specified for the CTL parameter of all device descriptions associated with this controller.
- 2** Specifies the name of the switched line description with which this controller description is associated.
- 3** The exchange identifier specified for the 5394 Remote Control Unit must be 05F000 followed by the 2-digit station address specified in Field 2 of the 5394 configuration display.
- 4** *ANS indicates that the initial switched connection is made when the AS/400 system answers an incoming call from the remote controller.
- 5** The connection number specifies the telephone number of the modem to which the remote controller is attached.
- 6** This value must match the station address specified in Field 2 of the 5394 configuration display.

Considerations for creating the second controller description (CHICAGO) are the same as for the first:

```

Create Ctl Desc (Remote WS) (CRTCTLRWS)

Type choices, press Enter.

Controller description . . . . . > CHICAGO      Name
Controller type . . . . . > 5394           3174, 3274, 5251, 5294...
Controller model . . . . . > 1             0, 1, 0001, 2, 0002, 12, 0012
Link type . . . . . > *SDLC             *IDLC, *LAN, *NONE, *SDLC...
Online at IPL . . . . . > *NO           *YES, *NO
Switched connection . . . . . > *YES       *NO, *YES
Short hold mode . . . . . > *NO         *NO, *YES
Switched line list . . . . . > SOXLINE      Name
      + for more values
Maximum frame size . . . . . > *LINKTYPE   265-1994, 256, 261, 265...
Exchange identifier . . . . . > 05F00005  00100000-FFFFFFFF
Initial connection . . . . . > *ANS       *DIAL, *ANS
Connection number . . . . . > 13123455678
Station address . . . . . > 05           01-FE
Text 'description' . . . . . > 'Chicago 5394 RWS controller'

Bottom
F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

Figure 8-5. Prompt Display for CHICAGO Remote Work Station Controller Description

Determining the LOCADR Parameter Value

Before creating the display and printer device descriptions, you should determine the location addresses (LOCADR parameters) that will be specified for each device.

The value specified for the LOCADR parameter on the CRTDEV DSP and CRTDEV PRT commands is based on the device address and 5394 port assignment as shown in the following table. Note the similarity of the table to the 5394 configuration display shown in Figure 8-2 on page 8-3.

For example, as shown in Table 8-1 on page 8-4, the 5394 Remote Control Unit in Boston has a display station attached to port 0 with device address 1 and a printer attached to port 1 with device address 0. Using Table 8-3, the location addresses specified will be 01 for the display station, 07 for the printer.

Table 8-3. LOCADR Values for Devices Attached to 5394 Controllers

| Port Number | Device Address | | | | | | |
|-------------|----------------|----|----|----|----|----|----|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 0 | 00 | 01 | 02 | 03 | 04 | 05 | 06 |
| 1 | 07 | 08 | 09 | 0A | 0B | 0C | 0D |
| 2 | 0E | 0F | 10 | 11 | 12 | 13 | 14 |

Creating the Printer Device Descriptions

To create the printer device descriptions, type CRTDEV PRT on the command line and press F4. Fill in the prompt displays as shown below, then press the Enter key to create the device description.

```

Create Device Desc (Printer) (CRTDEVPRT)

Type choices, press Enter.

Device description . . . . . > BOSPRT      Name
Device class . . . . . > *RMT 1         *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > *IPDS 2         3287, 3812, 4019, 4201...
Device model . . . . . > 0 3           0, 1, 2, 3, 4, 10, 13, 301...
Advanced function printing . . . . . *NO      *NO, *YES
Local location address . . . . . > 07 4     00-FE
Online at IPL . . . . . > *NO          *YES, *NO
Attached controller . . . . . > BOSTON 5    Name
Font:
  Identifier . . . . . > 011 6         3, 5, 11, 12, 13, 18, 19...
  Point size . . . . . *NONE          000.1-999.9, *NONE
Form feed . . . . . *TYPE          *TYPE, *CONT, *CUT, *AUTOCUT
Separator drawer . . . . . *FILE      *FILE, 1, 2, 3
Separator program . . . . . *NONE      Name, *NONE
Library . . . . . *LIBL            Name, *LIBL, *CURLIB
Printer error message . . . . . *INQ    *INQ, *INFO
More...
F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

```

Create Device Desc (Printer) (CRTDEVPRT)

Type choices, press Enter.

Message queue . . . . . QSYSOPR      Name, QSYSOPR
Library . . . . . *LIBL            Name, *LIBL, *CURLIB
Pacing . . . . . 7                1-7
Text 'description' . . . . . > 'Boston 4224 IPDS printer'

```

Figure 8-6. Prompt Display for BOSPRT Printer Device Description

Considerations for specifying the CRTDEVPRT command:

- 1** The device class specified for remote work station communications must be *RMT.
- 2** IPDS printers must specify *IPDS as the device type.
- 3** IPDS printers must specify 0 as the device model.
- 4** Use Table 8-3 on page 8-7 to determine the location address that should be specified for the device.
- 5** Specifies the name of the controller to which the display station is attached.
- 6** Font identifier is required for printer types 3812, 5219, or *IPDS.

Considerations for creating the second printer device description (CHIPRT) are the same as for BOSPRT. Requirements for IPDS printers do not apply to the CHIPRT printer device description.


```

                                Create Device Desc (Printer) (CRTDEVPRT)

Type choices, press Enter.

Device description . . . . . > CHIPRT           Name
Device class . . . . . > *RMT                   *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 4214                     3287, 3812, 4019, 4201...
Device model . . . . . > 2                       0, 1, 2, 3, 4, 10, 13, 301...
Local location address . . . . . > 0E           00-FE
Online at IPL . . . . . > *NO                   *YES, *NO
Attached controller . . . . . > CHICAGO         Name
Form feed . . . . . > *TYPE                   *TYPE, *CONT, *CUT, *AUTOCUT
Separator drawer . . . . . > *FILE             *FILE, 1, 2, 3
Separator program . . . . . > *NONE           Name, *NONE
Library . . . . . > _____                Name, *LIBL, *CURLIB
Printer error message . . . . . > *INQ         *INQ, *INFO
Message queue . . . . . > QSYSOPR           Name, QSYSOPR
Library . . . . . > *LIBL                   Name, *LIBL, *CURLIB
Pacing . . . . . > 7                          1-7
Host print transform . . . . . > *NO          *NO, *YES

```

More...

Figure 8-7. Prompt Display for CHIPRT Printer Device Description

Creating the Display Device Descriptions

To create the display device descriptions, type CRTDEVDS on the command line and press F4. Fill in the prompt displays as shown below, then press the Enter key to create the device description.

```

                                Create Device Desc (Display) (CRTDEVDS)

Type choices, press Enter.

Device description . . . . . > BOSDSP           Name
Device class . . . . . > *RMT 1             *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 3196                   3101, 3151, 3161, 3162...
Device model . . . . . > A1                     0, 1, 2, 4, 11, 12, 23...
Local location address . . . . . > 01 2       00-FE
Online at IPL . . . . . > *NO                   *YES, *NO
Attached controller . . . . . > BOSTON 3       Name
Drop line at signoff . . . . . > *YES         *YES, *NO
Allow blinking cursor . . . . . > *YES         *YES, *NO
Printer . . . . . > BOSPRT 4             Name
Text 'description' . . . . . > 'Boston 3196 display station'

```

Bottom

```

F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
F13=How to use this display   F24=More keys

```

Figure 8-8. Prompt Display for BOSDSP Display Device Description

Considerations for specifying the CRTDEVDS command:

- 1** The device class specified for remote work station communications must be *RMT.
- 2** Use Table 8-3 to determine the location address that should be specified for the device.
- 3** Specifies the name of the controller to which the display station is attached.
- 4** Specifies the name of an existing printer device description that identifies the printer associated with this display device. If the printer device description does not yet exist, you can use the CHGDEVDS command to specify this parameter after the printer device description has been created.

Considerations for creating the second display device description (CHIDSP) are the same as for BOSDSP.

```

                                Create Device Desc (Display) (CRTDEVDS)

Type choices, press Enter.

Device description . . . . . > CHIDSP      Name
Device class . . . . . > *RMT             *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 3180             3101, 3151, 3161, 3162...
Device model . . . . . > 2                0, 1, 2, 4, 11, 12, 23...
Local location address . . . . . > 00      00-FE
Online at IPL . . . . . > *NO             *YES, *NO
Attached controller . . . . . > CHICAGO    Name
Drop line at signoff . . . . . > *YES      *YES, *NO
Allow blinking cursor . . . . . > *YES      *YES, *NO
Printer . . . . . > _____            Name
Text 'description' . . . . . > 'Chicago 3180 display station'
_____

                                                                    Bottom
F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

Configuration Using CL Commands

CL commands can be used instead of the prompt displays to create the configuration objects, either by entering the commands interactively or by including the commands in a CL program. The following commands can be entered on the Command Entry display or can be included in a CL program to create the line, controller, and device descriptions required for the remote work station communications configuration.

Default values are used for all parameters not specified.

```
CRTLINS DLC LIND(SOXLINE) RSRNAME(LIN021) ONLINE(*NO) ROLE(*PRI)
      CNN(*SWTPP) SWTCNN(*ANS) TEXT('Switched line for Boston and Chicago RWS')
```

```
CRTCTLRWS CTLD(BOSTON) TYPE(5394) MODEL(1) LINKTYPE(*SDLC)
      ONLINE(*NO) SWITCHED(*YES) SWTLINLST(SOXLINE) EXCHID(05F00004)
      INLCNN(*ANS) CNNNBR('16172344567') STNADR(04)
      TEXT('Boston 5394 RWS controller')
```

```
CRTCTLRWS CTLD(CHICAGO) TYPE(5394) MODEL(1) LINKTYPE(*SDLC)
      ONLINE(*NO) SWITCHED(*YES) SWTLINLST(SOXLINE) EXCHID(05F00005)
      INLCNN(*ANS) CNNNBR('13123455678') STNADR(05)
      TEXT('Chicago 5394 RWS controller')
```

```
CRTDEVPR T DEVD(BOSPRT) DEVCLS(*RMT) TYPE(*IPDS) MODEL(0)
      LOCADR(07) ONLINE(*NO) CTL(BOSTON) FONT(011)
      TEXT('Boston 4224 IPDS printer')
```

```
CRTDEVDS P DEVD(BOSDSP) DEVCLS(*RMT) TYPE(3196) MODEL(A1)
      LOCADR(01) ONLINE(*NO) CTL(BOSTON) PRINTER(BOSPRT)
      TEXT('Boston 3196 display station')
```

```
CRTDEVPR T DEVD(CHIPRT) DEVCLS(*RMT) TYPE(4214) MODEL(2)
      LOCADR(0E) ONLINE(*NO) CTL(CHICAGO) TEXT('Chicago 4214-2 printer')
```

```
CRTDEVDS P DEVD(CHIDSP) DEVCLS(*RMT) TYPE(3180) MODEL(2)
      LOCADR(00) ONLINE(*NO) CTL(CHICAGO) PRINTER(CHIPRT)
      TEXT('Chicago 3180 display station')
```

See the *OS/400* Communications Configuration Reference* for information about how to use the Retrieve Configuration Source (RTVCFGSRC) command to create a CL program using the configuration objects described in this chapter. CL programs can be used to save con-

figuration information for your system or to create configurations for other AS/400 systems. See the *CL Reference* manual for more information about using CL commands.

Configuring Controller Descriptions for Automatic Connection

When creating remote controller descriptions that will connect over switched links, you can specify that you want the connection made automatically when you vary on the controller, even when no application program is requesting a bind with the controller.

Automatic connection is accomplished through the dial initiation (DIALINIT) parameter, which is only valid when *DIAL is specified for the initial connection (INLCNN) parameter on remote work station, APPC, and host controller description objects. DIALINIT supports these values:

- *LINKTYPE** This is the default value and is described Table 8-4.
- *IMMED** This value causes the connection to the controller to be made immediately.
- *DELAY** This value causes the system to wait for an application to be started which requires the connection.

Note: The dial initiation (DIALINIT) parameter applies only to the initial connection to the controller when you specify *DIAL on the *Initial connection* prompt.

| *LINKTYPE default | DIALINIT value |
|--------------------------|----------------|
| LAN (local area network) | *IMMED |
| X.25 network | *DELAY |
| SDLC: Short Hold Mode | *IMMED |
| SDLC: Other | *DELAY |

Figure 8-9 shows a remote work station controller description configured to automatically connect when varied on. Notice that the *Initial connection* prompt specifies *DIAL and the *Dial initiation* prompt specifies *IMMED.

```

                                Create Ct1 Desc (Remote WS) (CRTCLRWS)

Type choices, press Enter.

Controller description . . . . . > DIALIMMED      Name
Controller type . . . . . > 5294                 3174, 3274, 5251, 5294...
Controller model . . . . . > 0001                 0, 1, 0001, 2, 0002, 12, 0012
Link type . . . . . > *SDLC                       *IDL, *LAN, *NONE, *SDLC...
Online at IPL . . . . . > *NO                     *YES, *NO
Switched connection . . . . . > *YES              *NO, *YES
Short hold mode . . . . . > *NO                   *NO, *YES
Switched line list . . . . . _____           Name
+ for more values
Exchange identifier . . . . . > 04500000          00100000-FFFFFFF
Initial connection . . . . . > *DIAL              *DIAL, *ANS
Dial initiation . . . . . > *IMMED                *LINKTYPE, *IMMED, *DELAY
Connection number . . . . . > 123456789
Station address . . . . . > 01                   01-FE
Text 'description' . . . . . > *BLANK

_____
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys
    
```

Figure 8-9. Controller Description Specifying Automatic Connection When Varied On

Automatic Dialing to a Remote Work Station Controller

The following example uses V.25bis modems and the STRRMTDSP program to initiate a dial operation from an AS/400 system to a 5394 controller. The STRRMTDSP program is a sample control language program and is shown in Figure 8-10. This program allocates a display device and opens the QDSIGNON display file. This causes the system to attempt to dial the remote work station controller.

Once the connection is established, a display record is sent to the remote work station device. The device is then deallocated and the program ends. This allows the device to be allocated by the subsystem, and a sign-on screen appears.

Note: This example does not work for 5494 controllers or for 5394 controllers with type 2.1 support. Also, the device description needs to be configured as DROP(*NO) for this function to work. If the device is configured as DROP(*YES), the system disconnects the switched line when the STRRMTDSP program completes. The drop parameter configured in the device description can be overridden by specifying DROP(*YES) when signing off (SIGNOFF command) the work station device.

```
CRTLINS DLC LIND(RWS5394) RSRNAME(LIN012) CNN(*SWTPP) EXCHID(05603100)
AUTODIAL(*YES) DIALCMD(*V25BIS) STNADR(01)
TEXT('5394 RWS switched line')
```

```
CRTCTLRWS CTLD(RWS5394) TYPE(5394) MODEL(1) LINKTYPE(*SDLC) ONLINE(*NO)
SWITCHED(*YES) SWTLINLST(RWS5394)
EXCHID(05F00004) CNNBR(5550000) STNADR(04)
TEXT('RWS 5394 controller')
```

```
CRTDEV DSP DEVD(RWS5394) DEVCLS(*RMT) TYPE(5291) MODEL(1) LOCADR(01)
ONLINE(*YES) CTL(RWS5394) DROP(*NO)
TEXT('5291 RWS device attached to 5394 controller')
```

Start Remote Display (STRRMTDSP) Command

```
CMD      PROMPT('START REMOTE DISPLAY')
PARM    KWD(DEVD) TYPE(*SNAME) LEN(10) MIN(1) +
        PROMPT('DEVICE DESCRIPTION')
```

```
/* **** */
/* NAME: STRRMTDSP */
/*
/* The following CL program will open the QDSIGNON */
/* display file and send a display record to a device. */
/* This will cause the system to dial out to the remote */
/* work station controller. For this program to work */
/* correctly, the device description needs to be */
/* configured as DROP(*NO), otherwise when this */
/* program ends, the system will attempt to drop the */
/* switched line. */
/* **** */
```

Figure 8-10 (Part 1 of 2). Automatic-Dial Example CL Program

```

PGM      PARM(&DEVD)
DCL      VAR(&DEVD) TYPE(*CHAR) LEN(10)
DCLF     FILE(QSYS/QDSIGNON)

          /* Allocate the device and send the display record */
          /* to the device.                                     */

ALCOBJ   OBJ((&DEVD *DEVD *EXCLRD)) WAIT(10)
OVRDSPF  FILE(QDSIGNON) DEV(&DEVD)
SNDF

          /* Deallocate the device to allow it to be         */
          /* allocated by the subsystem.                       */

DLCOBJ   OBJ((&DEVD *DEVD *EXCLRD))
ENDPGM

```

Figure 8-10 (Part 2 of 2). Automatic-Dial Example CL Program

Attaching DBCS-Capable Devices to 5250 Controllers

DBCS-capable devices (display stations and printers) can be attached to the system in the same way as other devices are attached. Devices attached to 5250-type (twinaxial) remote work station controllers can be attached using any of the following controllers:

- 5494 Remote Control Unit
- 5394 Remote Control Unit
- The Remote 5250 Work Station Adapter. This optional adapter card for the IBM Personal System/55 allows the PS/55 to be attached to the AS/400 system as a remote work station without using a 5294 or 5394 Remote Control Unit. (An **adapter card** is the an electrical circuit on a logic card that connect one device to another or to a computer.) When the Remote 5250 Work Station Adapter is used, it should be configured as a 5394 Remote Control Unit.
- 5294 Model K01 Remote Control Unit (for Japanese devices only). If you attach both Japanese DBCS-capable display stations and alphanumeric display stations to the same 5294-K01, the alphanumeric display stations must have either an attached Katakana keyboard or no attached keyboard.
- The 5294 Model S01 Remote Control Unit (for Chinese and Korean devices) must be configured as a 5294-K01.

AS/400 System

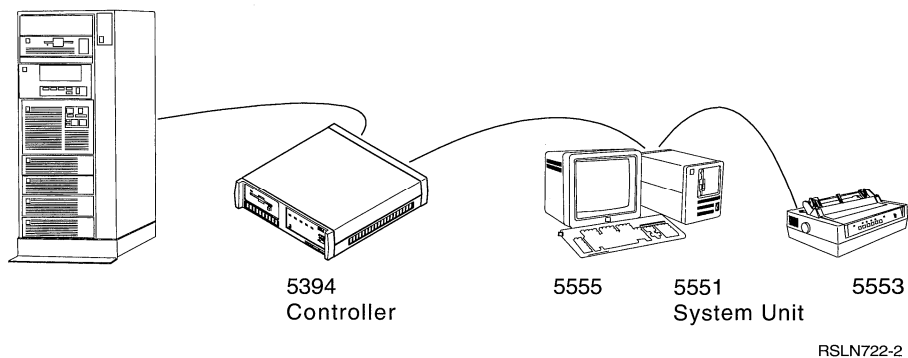


Figure 8-11. Configuration Example Using DBCS-Capable Devices

The following prompt displays show examples of device descriptions created for a PS/55 and a 5553 printer attached to a 5394 Remote Control Unit as shown in Figure 8-11.

Create Device Desc (Display) (CRTDEV DSP)

Type choices, press Enter.

```
Device description . . . . . > DBCSDSP      Name
Device class . . . . . > *RMT          *LCL, *RMT, *VRT
Device type . . . . . > 5555         3101, 3151, 3161, 3162...
Device model . . . . . > B01          0, 1, 2, 11, 12, 23, 31...
Local location address . . . . . > 01         00-FE
Online at IPL . . . . . > *NO          *YES, *NO
Attached controller . . . . . > DBCCTL       Name
Drop line at signoff . . . . . > *YES         *YES, *NO
Allow blinking cursor . . . . . > *YES         *YES, *NO
Printer . . . . . _____ Name
DBCS feature:
  Device features . . . . . > 2424J4      Character value
  Last code point . . . . . > 68FE         4141-FFFE
Text 'description' . . . . . > 'DBCS display attached to 5394 controller'
```

Bottom

F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display F24=More keys

Create Device Desc (Printer) (CRTDEVPRT)

Type choices, press Enter.

```
Device description . . . . . > DBCSPRT      Name
Device class . . . . . > *RMT          *LCL, *RMT, *VRT
Device type . . . . . > 5553         3287, 3812, 4201, 4202...
Device model . . . . . > B01          0, 1, 2, 3, 4, 10, 13, 200...
Local location address . . . . . > 02         00-FE
Online at IPL . . . . . > *NO          *YES, *NO
Attached controller . . . . . > DBCCTL       Name
Form feed . . . . . > *AUTOCUT      *TYPE, *CONT, *CUT, *AUTOCUT
Separator drawer . . . . . > *FILE         *FILE, 1, 2, 3
Separator program . . . . . > *NONE         Name, *NONE
  Library . . . . . _____ Name, *LIBL, *CURLIB
Printer error message . . . . . > *INQ         *INQ, *INFO
Message queue . . . . . > QSYSOPR       Name, QSYSOPR
  Library . . . . . _____ Name, *LIBL, *CURLIB
Pacing . . . . . > 7          1-7
```

More...

F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display F24=More keys

Create Device Desc (Printer) (CRTDEVPRT)

Type choices, press Enter.

```
DBCS feature:
  Device features . . . . . > 2424J1      Character value
  Last code point . . . . . > 68FE         4141-FFFE
Text 'description' . . . . . > 'DBCS printer attached to 5394 controller'
```

Chapter 9. Configuring for the IBM 5394 Type 2.1 RPQ

This chapter describes the support available on the AS/400 system for the IBM 5394 Remote Control Unit as a type 2.1 node. This chapter includes an overview of the support available on the AS/400 system, an explanation of the AS/400 configuration descriptions that must be created to use the support, and an explanation of how that support may be used.

Overview of the AS/400 System 5394 Type 2.1 Support

The 5394 Remote Control Unit can connect to the AS/400 system as a type 2.1 node:

- As part of an SNA subarea network
- Through an APPN network
- Directly, as a peer network node

In each case, the 5394 Remote Control Unit is treated as a switched controller by the AS/400 system; the controller only connects to the AS/400 system when needed, and then, if configured to, will drop that connection when it is inactive. Programmable and nonprogrammable work stations that are attached to the 5394 Type 2.1 Remote Control Unit can communicate with the AS/400 system.

5394 Remote Control Unit as an SNA Subarea Network Node

The 5394 Type 2.1 Remote Control Unit can be attached to an AS/400 system through an SNA subarea network. A subarea network consists of type 4 or type 5 nodes on an SNA network. A type 4 node is a communications controller (for example, 3720, 3725, or 3745 controller) running the Network Control Program (NCP). A type 5 node is a System/370* host system running the Virtual Telecommunications Access Method (VTAM*) licensed program. The 5394 and the AS/400 system attach to the subarea network through a low-entry networking boundary function that is provided by either the NCP or VTAM.

Figure Figure 9-1 shows a 5394 Remote Control Unit attached to an AS/400 system through an SNA subarea network:

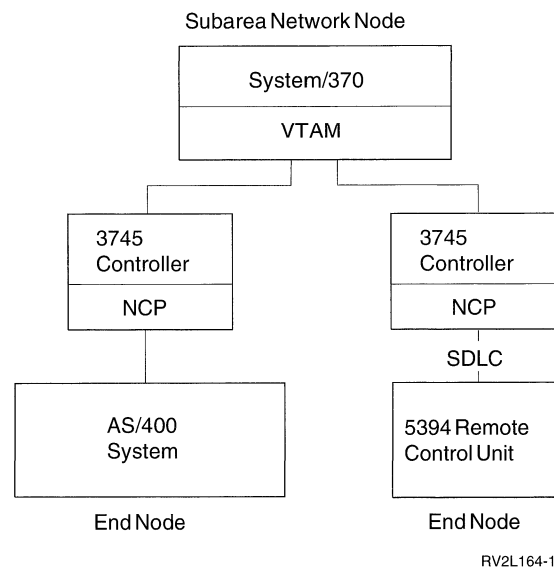


Figure 9-1. Subarea Network

The advantages of using your 5394 controller from an SNA subarea network are:

- Easier network management. Because sessions on the 5394 Type 2.1 Remote Control Unit can be tracked through the host-central control network, people managing the SNA

network are able to control and monitor network use, and help resolve problems on the 5394 controller.

- Only one line into the AS/400 system is required to both attach the AS/400 system to the SNA subarea network and the 5394 Type 2.1 Remote Control Unit to the AS/400 system.

5394 Remote Control Unit as an APPN Network Node

The 5394 Type 2.1 Remote Control Unit can also attach to an AS/400 system through an Advanced Peer-to-Peer Network (APPN) network. An APPN network consists of type 2.1 nodes on an SNA network. Figure 9-2 shows a 5394 Type 2.1 Remote Control Unit attached to an AS/400 system through an APPN network.

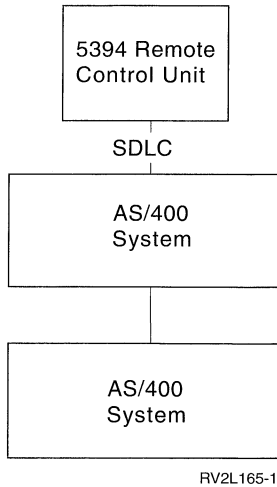


Figure 9-2. APPN Network

By connecting your 5394 Remote Control Unit to an AS/400 system through an APPN network, the 5394 can be connected to one AS/400 system while the work stations attached to that controller communicate with another AS/400 system in the network.

5394 Remote Control Unit as a Peer Network Node

The 5394 Remote Control Unit that is directly attached to an AS/400 system acts as a low-entry networking end node. An end node operates in a peer environment, and can communicate directly with the AS/400 system. Figure 9-3 shows a 5394 Remote Control Unit directly connected to an AS/400 system as a peer network node.

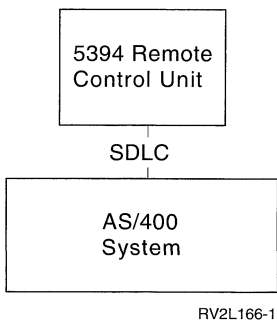


Figure 9-3. Peer Network

Directly connecting the 5394 Remote Control Unit as a type 2.1 node to an AS/400 system allows you to test new applications or configurations before they are attached to a subarea network.

Setting Up the 5394 Type 2.1 Node Support

Before you can use the work stations attached to the 5394 Type 2.1 Remote Control Unit, you must first create or change configuration information that is located on both the 5394 controller and the AS/400 system. Instructions for changing configuration information on the 5394 are located in *IBM 5394 Remote Control Unit Type 2.1 Node Support RPQ 8Q0775, SC30-3531*.

The AS/400 configuration is done in two steps:

- Creating configuration descriptions to allow communications between the AS/400 system and the 5394 Type 2.1 Remote Control Unit on a subarea or APPN network.
- Creating configuration descriptions for the 5394 Remote Control Unit and its work stations on the AS/400 system.

Configuring the AS/400 System to Communicate With the 5394 Type 2.1 Remote Control Unit

This first step involves configuring the AS/400 system to communicate with the 5394 Remote Control Unit. This needs to be done if the 5394 is to be attached to the AS/400 system through an SNA subarea network, through an APPN network, or if it is directly attached to the AS/400 system. Where possible, you should allow automatic configuration to create your configuration descriptions for you.

To allow the AS/400 system to communicate with the 5394 Remote Control Unit, create configuration descriptions for the line, communications controller, mode, and configuration list by using the following commands:

- Create Line Description: (CRTLINxxx, where xxx indicates the type of line used to attach the AS/400 system with the network. This can be ETH, IDLC, SDLC, TRN, or X25, depending on the line type).
- Create Controller Description (APPC): (CRTCTLAPPC command when the next node on the network on the subarea network is another type 2.1 node). To create an APPC controller description, refer to “Step 2: Configuring a Controller Description” on page 10-3. The instructions in that section also apply to the 5394 Type 2.1 controller.

or

Create Controller Description (SNA Host): (CRTCTLHOST command when the next node on the subarea network is a System/370* host system (type 4 or type 5 node)). When using the CRTCTLHOST command, you should be aware of the following fields on the display:

```

Create Ctl Desc (SNA Host) (CRTCTLHOST)

Type choices, press Enter.

Controller description . . . . . > CTLHOST      Name
Link type . . . . . > *SDLC 1                *IDLC, *FR, *LAN, *SDLC, *X25
Online at IPL . . . . . > *NO                 *YES, *NO
Switched connection . . . . . > *NO         *NO, *YES
Switched network backup . . . . . > *NO        *NO, *YES
APPN-capable . . . . . > *YES             *YES, *NO
Attached nonswitched line . . . . . > IBMTPOUT   Name
Maximum frame size . . . . . > 2057           265-16393, 256, 265, 512...
Remote network identifier . . . . . > IBMMIN     Name, *NETATR, *NONE, *ANY
Remote control point . . . . . > *ANY 2        Name, *ANY
Adjacent link station . . . . . > *NONE        Name, *NONE, *ANY
SSCP identifier . . . . . >                  050000000000-05FFFFFFFFFFFF
Local exchange identifier . . . . . > *LIND      05600000-056FFFFFF, *LIND
Station address . . . . . > C1 3              01-FE
APPN CP session support . . . . . > *YES       *YES, *NO
APPN node type . . . . . > *ENDNODE          *ENDNODE, *LENNODE...

F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys
More...

```

Figure 9-4. Host Controller Description Example

The following information will help you fill in the fields:

- 1** Link type: Use *SDLC or *X25. The value you use depends on the type of line you created in the previous step. Use *SDLC if you created an SDLC line and *X25 if you created an X.25 line. If you created a token-ring line, use the value *LAN.
- 2** Remote control point: Use *ANY to have the system determine the name of the remote control point used.
- 3** Station address: Enter the value of the station address used when communicating with the controller. The value can be from 01 to FE.

- Create Mode Description: (CRTMODD command).
- Create Configuration List: (CRTCFGL command. You may need an entry in the configuration list for the network. Consult your network manager for additional information.).

Note: There is no need to create an APPC device description because it will be created by automatic configuration when the 5394 Remote Control Unit begins a session with the AS/400 system.

The *APPN Guide* contains the information needed to attach and configure the AS/400 system to a subarea network, an APPN network, and directly to a peer network node.

Configuring the 5394 Remote Control Unit and Its Work Stations

After you configure your AS/400 system to communicate, you need to change or create configuration descriptions for the 5394 Remote Control Unit and the devices that will attach to it.

Use the Create Controller Description (Remote Work Station) (CRTCTLRWS) command to create the controller description on the AS/400 system for the 5394 controller. There are special values you need to enter in this description to indicate the use of the 5394 Type 2.1 Remote Control Unit node support.

Changed Parameter Meaning

LINKTYPE Link type. The type of line to which this controller is attached. Enter *NONE to indicate the type 2.1 node support. The controller description will not be physically attached to a line description.

| New Parameter | Meaning |
|----------------------|---|
| RMTLOCNAME | Remote location name. The location name of the 5394 work station controller. This value must match the logical unit (LU) name of the 5394 Remote Control Unit. |
| LCLLOCNAME | Local location name. The location name of the AS/400 system. You can enter *NETATR to use the default local location. To display this value, use the Display Network Attributes (DSPNETA) command. |
| RMTNETID | Remote network identifier. The network ID of the network on which the 5394 is attached. You can enter *NETATR to use the default network identifier. To display this value, use the Display Network Attributes (DSPNETA) command. |
| ALCRTYTMR | Allocation Retry Interval Timer. The amount of time in seconds the AS/400 system will wait after an unsuccessful attempt to activate a device before attempting to activate it again. Attempts to activate a device will continue until the device is varied off, or the device is powered off. |

When you enter your information using the CRTCTRLWS command, your description could look like this:

```

                                Create Ctl Desc (Remote WS) (CRTCTRLWS)

Type choices, press Enter.

Controller description . . . . . > CTL5394      Name
Controller type . . . . . > 5394              3174, 3274, 5251, 5294...
Controller model . . . . . > 1                0, 1, 0001, 2, 0002, 12, 0012
Link type . . . . . > *NONE                  *IDL, *LAN, *NONE, *SDLC...
Online at IPL . . . . . > *YES                *YES, *NO
Remote location . . . . . > R5394             Name
Local location . . . . . > *NETATR           Name, *NETATR
Remote network identifier . . . > *NETATR     Name, *NETATR, *NONE
Text 'description' . . . . . > *BLANK

-----

                                Bottom
F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

You also need to configure the devices that will attach to your 5394 Remote Control Unit. Use the Create Device Description (Display) (CRTDEV DSP) command or the Create Device Description (Printer) (CRTDEV PRT) command to create these descriptions. This is done as though there is no intervening network between the 5394 Remote Control Unit and the AS/400 system.

Note: No device descriptions need to be created for programmable work stations. Programmable work stations are already type 2.1 nodes, and therefore operate independently of the 5394 controller. Programmable work stations configurations are like APPC device descriptions attached to the APPC or host controller descriptions. The programmable work stations are automatically configured.

For example, if you were trying to create a configuration description for a 3196 Display Station that was attached to the remote controller that was just configured, your description could look like this:

```

                                Create Device Desc (Display) (CRTDEV DSP)

Type choices, press Enter.

Device description . . . . . > DSP09      Name
Device class . . . . . > *RMT          *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 3196          3101, 3151, 3161, 3162...
Device model . . . . . > A1           0, 1, 2, 4, 11, 12, 23...
Local location address . . . . . > 0E    00-FE
Online at IPL . . . . . > *NO         *YES, *NO
Attached controller . . . . . > CTL5394   Name
Drop line at signoff . . . . . > *YES    *YES, *NO
Allow blinking cursor . . . . . > *YES    *YES, *NO
Printer . . . . . > _____         Name
Text 'description' . . . . . > *BLANK

_____

                                                                    Bottom
F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

Using the 5394 Remote Control Unit

Before you can begin using the work stations attached to your controller, the configuration descriptions for the 5394 Remote Control Unit and the devices attached to it must be active, varied on, or in a varied-on pending state. The configuration descriptions needed for the AS/400 system to communicate with the SNA subarea network or the APPN network also need to be active, varied on, or in a varied-on pending state.

When the first device attached to the 5394 Remote Control Unit is powered on, the 5394 tries to attach to the AS/400 system. It attaches to the SNA subarea network and sends a request to the AS/400 system to start sessions for all of the devices attached to the controller that are powered on.

If, for some reason, the connection between the 5394 Remote Control Unit and the SNA subarea network has been lost, a user at a device attached to the 5394 controller need only press the System Request key, and then the Enter key, to begin the connection process again. If the AS/400 system detects an error, it goes through the normal remote work station recovery procedures.

Managing the 5394 Remote Control Unit

To manage your 5394 Type 2.1 Remote Control Unit, refer to "Managing the 5494 Remote Control Unit" on page 10-13. The suggestions described in that section also apply to the 5394 Type 2.1 controller.

Chapter 10. Configuring 5494 Remote Control Units

This chapter discusses how to configure and manage the 5494 controller on the AS/400 system. It includes information about configuring the AS/400 system for the IBM 5494 Remote Control Unit Attachment to Subarea Network Request for Price Quotation (RPQ). For information on how to configure the 5494 controller hardware, see the *5494 Remote Control Unit User's Guide, GA27-3960*. If applicable, see also the *5494 Remote Control Unit Attachment to Subarea Network RPQ 8Q0932, SC30-3566*.

The 5494 controller performs all of the functions of the 5394 controller, with these added functions:

- The 5494 Remote Control Unit Models 001 and 002 can manage the operation of up to a total of 56 twinaxial attached devices.
- The 5494 Remote Control Unit Model 002 can attach to a token-ring network, with the following token-ring configurations:
 - Token-ring gateway configuration, which supports up to 80 downstream devices. The 80 devices can be a combination of twinaxially attached devices (56 maximum) and independent work stations attached to a token-ring network.

Note: The 5494 Remote Control Unit Release 2.0 supports up to 80 devices. Earlier releases support fewer devices. Refer to the *5494 Remote Control Unit Planning Guide Release 2.0* for the number of devices supported per release and recommendations.

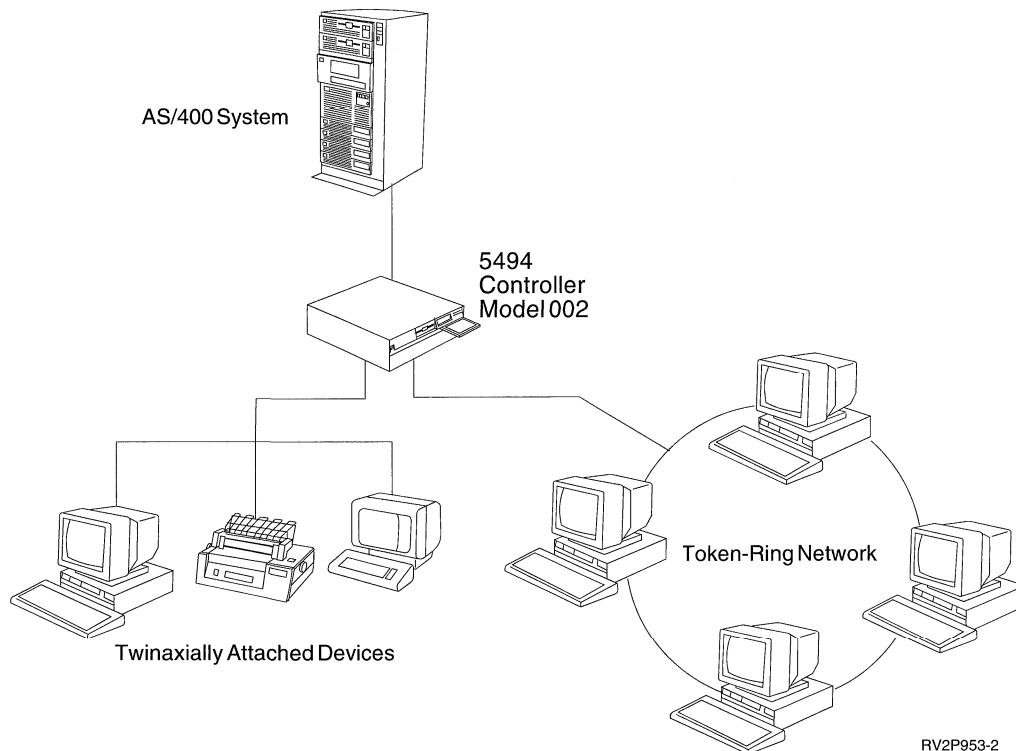


Figure 10-1. 5494 Remote Control Unit in a Token-Ring Gateway Configuration. Up to 80 devices may be attached to the 5494 controller.

- AS/400 token-ring attachment configuration, which allows you to connect the 5494 controller to an AS/400 system through a token-ring network. You can connect up to fifty-six 5250 devices in this configuration.

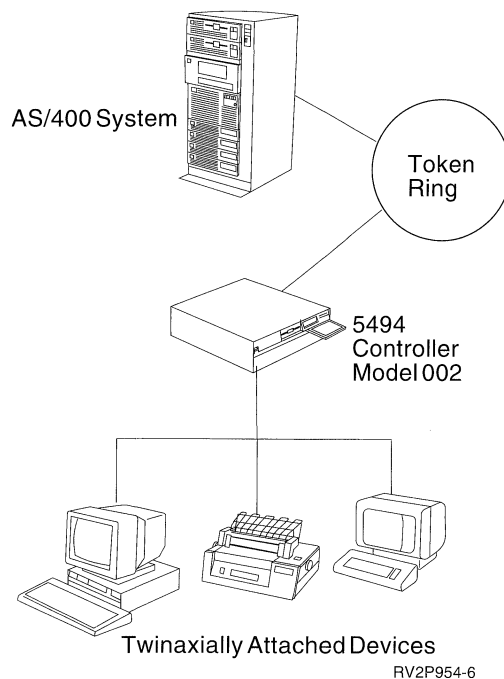


Figure 10-2. 5494 Remote Control Unit with AS/400 Token-Ring Attachment Configuration. Up to 56 devices may be attached to the 5494 controller.

- The 5494 Remote Control Unit is a logical unit 6.2 (LU 6.2) low-entry networking (LEN) node and, thus, can participate in any APPN network.
- The 5494 Remote Control Unit Release 2.0 supports AS/400 applications that bind LU 6.2 sessions on personal computer systems attached to the 5494. Earlier 5494 releases do not have this support.

Configuring the 5494 Remote Control Unit on the AS/400 System

The following information describes how to configure the line, controller, and device descriptions on the AS/400 system for a 5494 controller. For the 5494 controller, you need *two* controller descriptions.

- An APPC or SNA host controller description to support 5494 control functions and any local area network (LAN) attached devices.
- A remote work station controller description to control twinaxially attached devices.

To configure the AS/400 system, perform the following steps:

- ___ **Step 1.** Configure a line description to the network using the Create Line Description (CRTLINxxx) command where xxx is SDLC, X25, or TRN (described in "Step 1: Configuring a Line to the Network" on page 10-3).
- ___ **Step 2.** Configure an APPC controller description using the Create Controller Description (APPC) (CRTCTLAPPC) command if the next node in the network is another type 2.1 node.
or
Configure an SNA host controller description using the Create Controller Description (SNA Host) (CRTCTLHOST) command. Do this if the next node in the network is a System/370 host system (type 4 or type 5 node).
- ___ **Step 3.** Configure a 5494 controller description using the Create Controller Description (Remote Work Station) (CRTCTLRWS) command.

- ___ **Step 4.** Configure dependent device descriptions using the Create Device Description (Display) (CRTDEV DSP) and the Create Device Description (Printer) (CRTDEV PRT).

___ **Check the Mode Description** ___

The 5494 Remote Control Unit Release 1.1 or higher has a default mode of QRMTWSC. The AS/400 system automatically creates a QRMTWSC mode description that supports up to 57 sessions unless the QRMTWSC mode description already exists. If the QRMTWSC mode description already exists, change the following values using the Change Mode Description (CHGMODD) command:

- Maximum number of active sessions (MAXSSN) should be 57
- Maximum number of active conversations (MAXCNV) should be 57
- Minimum number of concurrent locally controlled sessions requested for this mode (LCLCTLSSN) should be 56

The sessions and conversations needed are: one for each possible dependent work station and one for a controller management session. (The twinaxially attached devices are the **dependent work stations**.)

Prior to 5494 Release 1.1, the 5494 controller had a default mode of BLANK. This mode description is automatically created by the AS/400 system, but it has only seven sessions. If seven sessions are not enough, use the Change Mode Description (CHGMODD) command to increase the number of sessions associated with mode BLANK. To make the change effective, vary off all of the APPC devices that are using the BLANK mode, then vary them back on.

Note: For information about which AS/400 configuration objects need to match which 5494 configuration fields, see the *Matching Parameters* sections on pages 10-9, 10-11, and 10-13.

Step 1: Configuring a Line to the Network

This may already be done if the AS/400 system had previous communications with the network.

The 5494 controller supports the following lines, which are created using the commands shown.

- SDLC (Create Line Description (SDLC) (CRTLINS DLC))
- X.25 (Create Line Description (X.25) (CRTLINX25))
- Token-ring (Create Line Description (Token-Ring) (CRTLINTRN))

If the 5494 controller is not adjacent to the target AS/400 system, you can use any line type that supports APPN traffic.

Step 2: Configuring a Controller Description

If the next node in the network is another type 2.1 node, configure an advanced program-to-program (APPC) controller description. See "Configuring an Advanced Program-to-Program Communications Controller" on page 10-4.

If the next node in the network is a System/370 host system (type 4 or type 5 node), configure an SNA host controller description. See "Configuring an SNA Host Controller" on page 10-4.

Configuring an Advanced Program-to-Program Communications Controller

Configure an advanced program-to-program communications (APPC) controller description using the Create Controller Description (APPC) (CRTCTLAPPC) command. This description is used to connect the 5494 controller to the AS/400 system.

Note: The APPC controller description automatically creates the APPC device description. To change the APPC device description, use the Change Device Description (APPC) (CHGDEVAPPC) command. For example, enter CHGDEVAPPC NYAPPC01, where NYAPPC01 is the name of the APPC device description.

```

                                Create Ctl Desc (APPC) (CRTCTLAPPC)

Type choices, press Enter.

Controller description . . . . . > NYAPPC      Name
Link type . . . . . > *SDLC 1             *FR, *IDLC, *LAN, *LOCAL...
Online at IPL . . . . . > *YES             *YES, *NO
Switched connection . . . . . > *NO         *NO, *YES
Switched network backup . . . . . > *NO       *NO, *YES
APPN-capable . . . . . > *YES             *YES, *NO
Attached nonswitched line . . . . . > NYLINE   Name
Maximum frame size . . . . . > *LINKTYPE    265-16393, 256, 265, 512...
Remote network identifier . . . . . > *NETATR  Name, *NETATR, *NONE, *ANY
Remote control point . . . . . > L5494 2      Name, *ANY
Exchange identifier . . . . . > 0730000A 3    00000000-FFFFFFFF
Data link role . . . . . > *NEG             *NEG, *PRI, *SEC
Station address . . . . . > 0A 4           00-FE
APPN CP session support . . . . . > *NO       *YES, *NO
APPN node type . . . . . > *LENNODE        *ENDNODE, *LENNODE...
APPN transmission group number . . . . . > 1    1-20, *CALC

F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys
                                More...
```

Figure 10-3. APPC Controller Description Example

Enter your choices for this display. The following information will help you fill in the prompts.

- 1** Link type: Use *SDLC, *X25, or *LAN. The value you use depends on the type of line you created in Step 1. Use *SDLC if you created an SDLC line and *X25 if you created an X.25 line. If you created a token-ring line, use the value *LAN.
- 2** Remote control point: Use the 5494 control point name.
- 3** Exchange identifier: Use 073000xx, where xx is the station address (which is explained in paragraph **4**).
- 4** Station address: Enter the value of the station address used when communicating with the controller. The value can be from 01 to FE.

Configuring an SNA Host Controller

Configure an SNA host controller description using the Create Controller Description (SNA Host) (CRTCTLHOST) command. This description is used to connect the 5494 controller to the AS/400 system. Figure 10-4 on page 10-5 shows an example of configuring an SNA host controller description.


```

                                Create Ctl Desc (SNA Host) (CRTCTHST)

Type choices, press Enter.

Controller description . . . . . > CTLHOST      Name
Link type . . . . . > *SDLC 1                *IDLC, *FR, *LAN, *SDLC, *X25
Online at IPL . . . . . > *NO                 *YES, *NO
Switched connection . . . . . > *NO         *NO, *YES
Switched network backup . . . . . > *NO       *NO, *YES
APPN-capable . . . . . > *YES               *YES, *NO
Attached nonswitched line . . . . . > IBMTPOUT  Name
Maximum frame size . . . . . > 2057          265-16393, 256, 265, 512...
Remote network identifier . . . . . > IBMMIN   Name, *NETATR, *NONE, *ANY
Remote control point . . . . . > L5494 2      Name, *ANY
SSCP identifier . . . . . >                 050000000000-05FFFFFFFFFFFF
Local exchange identifier . . . . . > *LIND    05600000-056FFFFFF, *LIND
Station address . . . . . > C1 3             01-FE
APPN CP session support . . . . . > *NO      *YES, *NO
APPN node type . . . . . > *LENNODE        *ENDNODE, *LENNODE...
APPN transmission group number . . . . . > 1    1-20, *CALC
                                           More...

F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

Figure 10-4. SNA Host Controller Description Example

Enter your choices for this display. The following information will help you fill in the prompts.

- 1** Link type: Use *SDLC, *X25, or *LAN. The value you use depends on the type of line you created in Step 1. Use *SDLC if you created an SDLC line and *X25 if you created an X.25 line. If you created a token-ring line, use the value *LAN.
- 2** Remote control point: Use the 5494 control point name.
- 3** Station address: Enter the value of the station address used when communicating with the controller. The value can be from 01 to FE.

Step 3: Configuring a Remote Work Station Controller

Using the Create Controller Description (Remote Work Station) (CRTCTLRWS) command, configure a remote work station controller description for the 5494 controller. Make sure the LINKTYPE parameter is specified *NONE, and the RMTLOCNAME, RMTNETID, and LCLLOCNAME parameters match the values specified on the 5494 controller.

Figure 10-5 shows an example of configuring a remote work station controller description.

```

                                Create Ctl Desc (Remote WS) (CRTCTLRWS)

Type choices, press Enter.

Controller description . . . . . > CTL5494      Name
Controller type . . . . . > 5494 1            3174, 3274, 5251, 5294...
Controller model . . . . . > 1 2              0, 1, 0001, 2, 0002, 12, 0012
Link type . . . . . > *NONE 3                *IDLC, *LAN, *NONE, *SDLC...
Online at IPL . . . . . > *YES               *YES, *NO
Remote location . . . . . > L5494 4          Name
Local location . . . . . > *NETATR 5        Name, *NETATR
Remote network identifier . . . . . > *NETATR 6  Name, *NETATR, *NONE
Text 'description' . . . . . > *BLANK

```

Figure 10-5. Remote Work Station Controller Description Example

- 1** Controller type: Use the value 5494.

- 2** Enter the model number of the 5494 controller. Enter 1 for a Model 001, or enter 2 for a Model 002. The Model 002 has a port and cable for a token-ring connection.
If you do not know the model number, enter either 1 or 2. This field is for reference only; the AS/400 system does not use it.
- 3** Link type: Enter the value *NONE to indicate LU 6.2 attachment. The controller description will not be physically attached to a line description.
- 4** Remote location: Enter the remote location value for this controller. The remote location must match the logical unit (LU) name of the 5494 controller.
- 5** Local location: Enter the local location value for this controller. The local location must match the AS/400 LU name on the 5494 controller. A value of *NETATR causes the local location name specified in the network attributes to be used.
- 6** Remote network identifier: Enter the remote network identifier for this controller. The remote network identifier must match the network identifier that is specified on the 5494 controller. A value of *NETATR causes the local network identifier specified in the network attributes to be used.

Step 4: Configuring Dependent Work Stations

Using the Create Device Description (CRTDEV DSP, CRTDEV PRT) commands, configure a device description for each dependent work station attached to the 5494 controller.

Note: Each independent work station is automatically configured as an APPC device attached to the APPC controller.

Determining the LOCADR Parameter Value

Before creating the display and printer device descriptions, determine the location addresses (LOCADR parameters) that need to be specified for each device.

The value specified for the LOCADR parameter on the CRTDEV DSP and CRTDEV PRT commands is based on the device address and 5494 port assignment. See Table 10-1.

Table 10-1. LOCADR Values for Devices Attached to 5494 Controllers

| Port Number | Device Address | | | | | | |
|-------------|----------------|----|----|----|----|----|----|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 0 | 00 | 01 | 02 | 03 | 04 | 05 | 06 |
| 1 | 07 | 08 | 09 | 0A | 0B | 0C | 0D |
| 2 | 0E | 0F | 10 | 11 | 12 | 13 | 14 |
| 3 | 15 | 16 | 17 | 18 | 19 | 1A | 1B |
| 4 | 1C | 1D | 1E | 1F | 20 | 21 | 22 |
| 5 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 6 | 2A | 2B | 2C | 2D | 2E | 2F | 30 |
| 7 | 31 | 32 | 33 | 34 | 35 | 36 | 37 |

Figure 10-6 on page 10-7 shows an example of creating a display device description using the CRTDEV DSP command.

```

Create Device Desc (Display) (CRTDEV DSP)

Type choices, press Enter.

Device description . . . . . > DSP5494      Name
Device class . . . . . > *RMT 1          *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 3179            3101, 3151, 3161, 3162...
Device model . . . . . > 2              0, 1, 2, 4, 11, 12, 23...
Local location address . . . . . > 0B      00-FE
Online at IPL . . . . . > *YES           *YES, *NO
Attached controller . . . . . > CTL5494 2   Name
Drop line at signoff . . . . . > *YES 3    *YES, *NO
Allow blinking cursor . . . . . > *YES     *YES, *NO
Printer . . . . . >                      Name
Text 'description' . . . . . > '3179 Device attached to 5494 controller'

```

Figure 10-6. Device Description Example

- 1** Device Class: Use the value *RMT to indicate that this device is attached to a remote controller.
- 2** Attached controller: Enter the name of the remote work station controller the device is attached to. This is the name of the controller you created in Step 3.
- 3** Drop line at signoff: If the lines between the 5494 and the AS/400 system are non-switched lines, use *NO for this field. This causes sign-on screens to be put back on the displays when users sign off.

If you have a switched line anywhere between your 5494 and your AS/400 system, use *YES. This causes the AS/400 system to drop the switched line when there is no activity.

Note: The maximum length of request unit (MAXLENRU) parameter is always specified with the value *CALC for devices attached to 5494 controllers. This parameter defaults to *CALC and can be viewed by pressing F9 (all parameters) on the Create Device Description display.

AS/400 Configuration Examples for the 5494 Remote Control Unit

Figure 10-7 on page 10-8 illustrates a programming example of an SDLC configuration with the 5494 controller. Figure 10-9 on page 10-10 illustrates an example of an X.25 configuration with the 5494 controller. Figure 10-11 on page 10-12 is an example of a token-ring attachment configuration with the 5494 controller. These examples assume the following program levels:

- OS/400 Version 2 Release 2 or higher for the AS/400 system.
- DOS, AS/400 PC Support Version 1 Release 2 or higher for the independent work station.

The *Matching Parameters* diagrams (Figure 10-8 on page 10-9, Figure 10-10 on page 10-11, and Figure 10-12 on page 10-13) show key parameters for configuring 5494 Remote Control Units. The diagrams repeat some of the key parameters from the AS/400 commands that are shown for creating the line, controller, and device descriptions. They expand the scope of the examples by showing the AS/400 network attributes, the 5494 parameters, PC Support/400 parameters, and the relationships among the parameters. The 5494 parameters are identified in two ways. The first is the dependent work station (DWS) configuration screen field (for example, 11). The second is the Utility program configuration text (for example, *Default Local Network Name*).

For more information about 5494 controller parameters, see *5494 Remote Control Unit Planning Guide, GA27-3936* or *5494 Remote Control Unit User's Guide, GA27-3960*. For more information about the PC Support/400 parameters, see the *PC Support/400: DOS Installation and Administration Guide, SC41-0006*.

Synchronous Data Link Control Configuration Example

The following programming example shows a synchronous data link control (SDLC) configuration to support the 5494 controller. Configure the SDLC line, controllers, and device:

```
CRTLINS DLC LIND(NYLINE) RSRNAME(LIN012) ONLINE(*NO) ROLE(*NEG) +  
TEXT('SDLC line to 5494')
```

```
CRTCTLAPPC CTLD(NYAPPC) LINKTYPE(*SDLC) ONLINE(*NO) +  
APPN(*YES) LINE(NYLINE) +  
MAXFRAME(521) RMTNETID(*NETATR) +  
RMTCPNAME(L5494) EXCHID(07300001) ROLE(*NEG) +  
STNADR(01) NODETYPE(*LENNODE) +  
TEXT(*BLANK)
```

```
CRTCLRWS CTLD(NYRWS) TYPE(5494) MODEL(1) LINKTYPE(*NONE) +  
ONLINE(*NO) RMTLOCNAME(L5494) +  
LCLLOCNAME(*NETATR) RMTNETID(*NETATR) +  
TEXT(*BLANK)
```

```
CRTDEV DSP DEVD(NYDSP00) DEVCLS(*RMT) TYPE(3477) MODEL(FC) +  
LOCADR(00) ONLINE(*NO) CTL(NYRWS) DROP(*NO) +  
TEXT(*BLANK)
```

Figure 10-7. SDLC Configuration Example

Note: Because APPN(*YES) is specified for the controller description, the APPC device descriptions are automatically created as needed by AS/400 APPN support.

SDLC Configuration Matching Parameters

The following diagram shows the 5494, DOS PC Support/400, and AS/400 parameters that need to match.

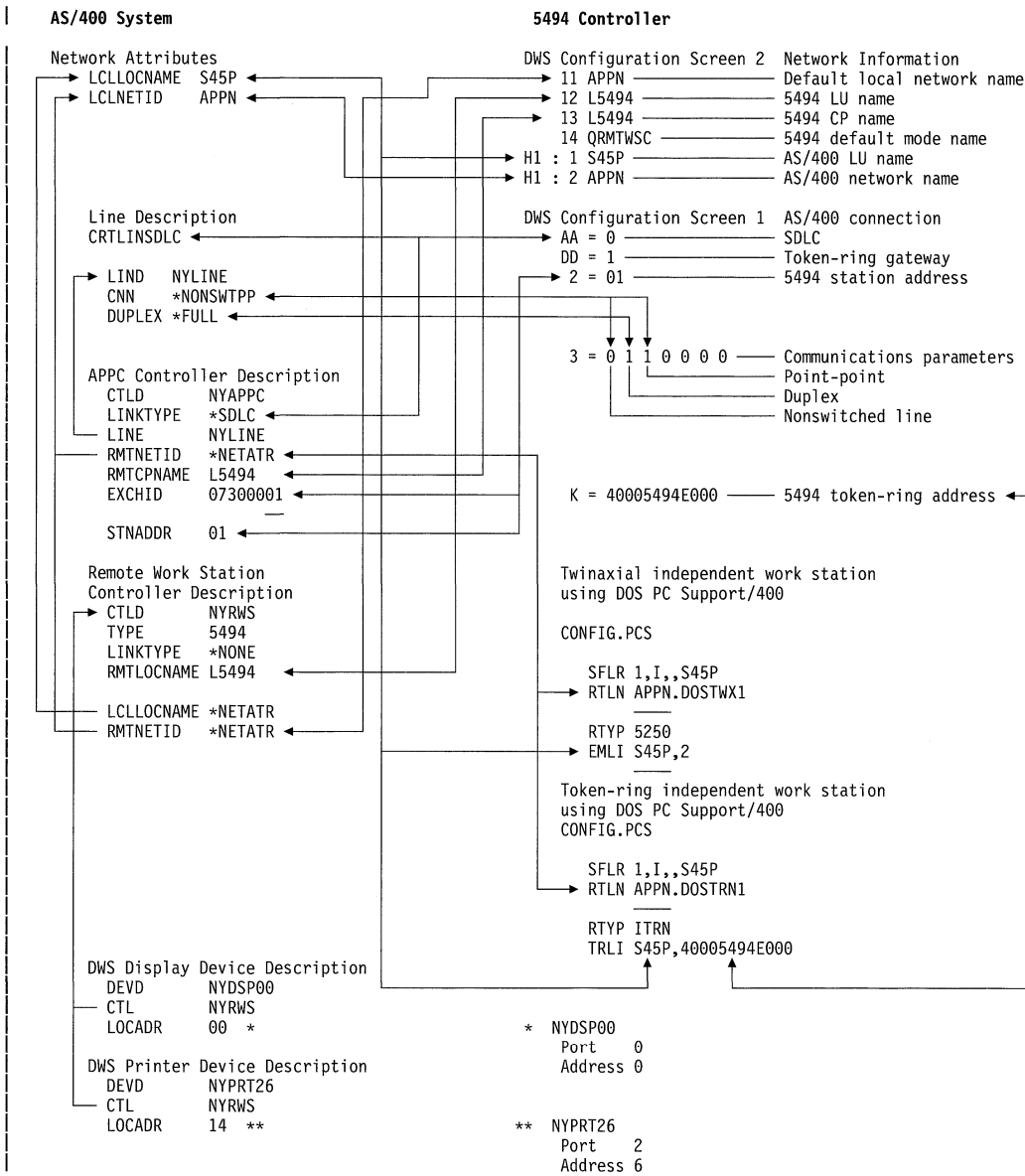


Figure 10-8. SDLC Configuration Matching Parameters

X.25 Configuration Example

The following programming example shows an X.25 configuration to support the 5494 controller. It configures the X.25 line, controllers, and device:

```
CRTLINX25 LIND(CHILINE) RSRNAME(LIN021) +
LGLCHLE((001 *PVC)(002 *PVC)(003 *SVCBOTH)) +
NETADR(1111111111111111) CNNINIT(*LOCAL) +
ONLINE(*NO) X25DCE(*YES) +
TEXT('X.25 line for 5494')

CRTCTLAPPC CTLD(CHIAPPC) LINKTYPE(*X25) ONLINE(*NO) +
APPN(*YES) LINE(CHILINE) +
RMTNETID(*NETATR) RMTCPNAME(LU5494) EXCHID(07300001) +
NETLVL(1984) LGLCHLID(002) +
NODETYPE(*LENNODE) +
TEXT('APPC controller for 5494')

CRTCTLRWS CTLD(CHIRWS) TYPE(5494) MODEL(1) LINKTYPE(*NONE) +
ONLINE(*NO) RMTLOCNAME(LU5494) +
LCLLOCNAME(*NETATR) RMTNETID(*NETATR) +
TEXT('Remote WS Controller for 5494')

CRTDEVDSP DEVD(CHDSP00) DEVCLS(*RMT) TYPE(5291) MODEL(2) +
LOCADR(00) ONLINE(*NO) CTL(CHIRWS) DROP(*NO) +
TEXT(' Device for 5494  ')
```

Figure 10-9. X.25 Configuration Example

Note: Because APPN(*YES) is specified for the controller description, the APPC device descriptions are created automatically by AS/400 APPN support.

X.25 Configuration Matching Parameters

The following diagram shows the 5494, DOS PC Support/400, and AS/400 parameters that need to match.

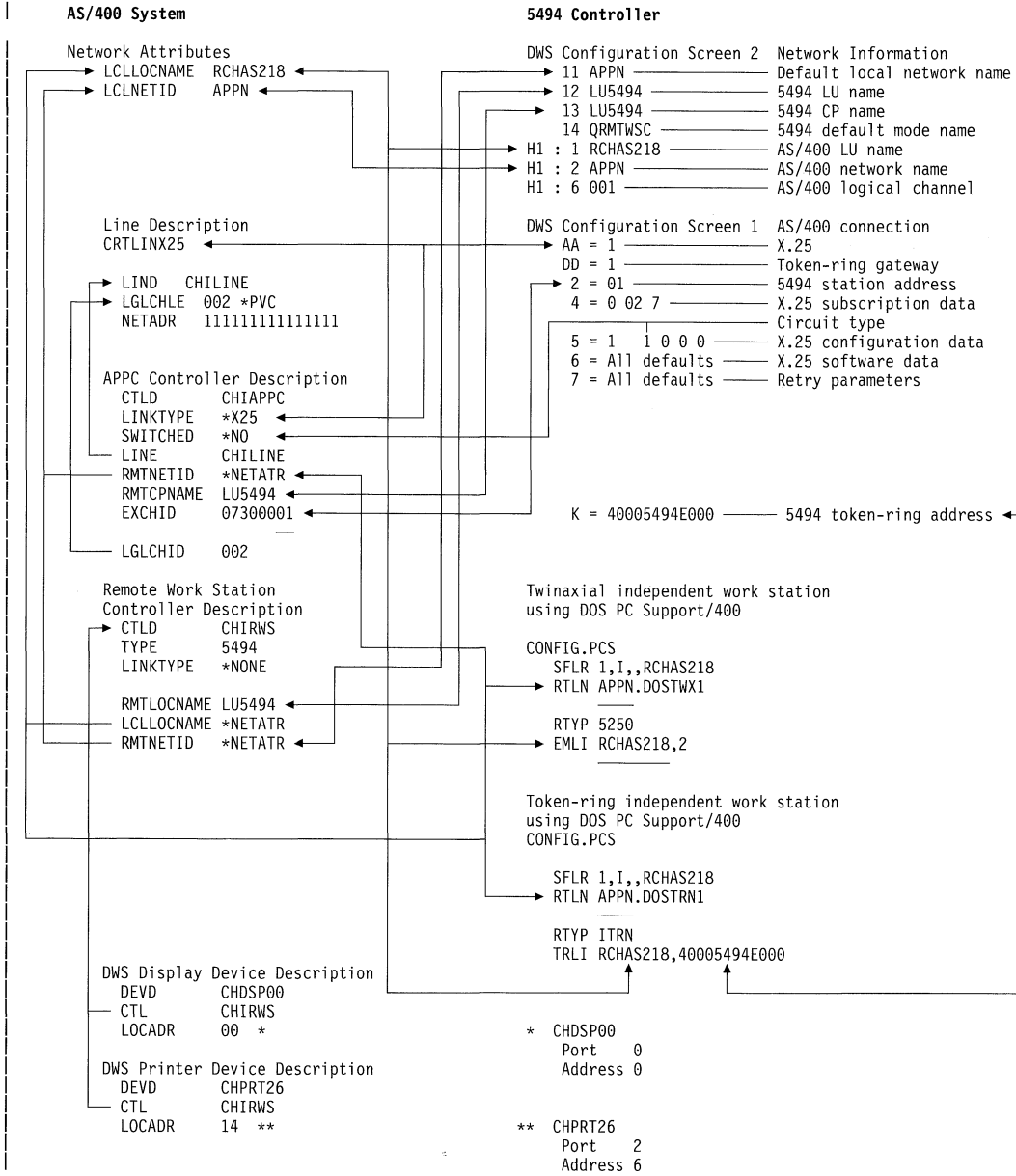


Figure 10-10. X.25 Configuration Matching Parameters

Token-Ring Attachment Configuration Example

The following programming example is for an AS/400 token-ring attachment configuration (the 5494 controller is attached to the AS/400 system through a token-ring network as in Figure 10-2 on page 10-2). It configures the token-ring line, controllers, and device:

```
CRTLINTRN LIND(DALTRLAN) RSRNAME(LIN061) +
          ONLINE(*NO) MAXFRAME(4060) +
          ADPTADR(400000000000) +
          AUTOCRTCTL(*YES) +
          TEXT('Token-ring line for 5494')

CRTCLRWS CTLD(DALRRWSCD) TYPE(5494) MODEL(2) LINKTYPE(*NONE) +
          ONLINE(*NO) RMTLOCNAME(L5494) +
          LCLLOCNAME(*NETATR) RMTNETID(*NETATR) +
          TEXT('Remote WS Controller for 5494')

CRTDEVDSV DEVD(DALDSP00) DEVCLS(*RMT) TYPE(5291) MODEL(2) +
          LOCADR(00) ONLINE(*NO) CTL(DALRRWSCD) DROP(*NO) +
          TEXT(' Device for 5494  ')
```

Figure 10-11. Token-Ring Attachment Configuration Example

Note: Because the autcreate controller (AUTOCRTCTL) parameter is set to ***YES**, the APPC controller will be created by the system. The *APPN Guide* has more information about automatic configuration.

Token-Ring Attachment Configuration Matching Parameters

The following diagram shows the 5494, DOS PC Support/400, and AS/400 parameters that need to match.

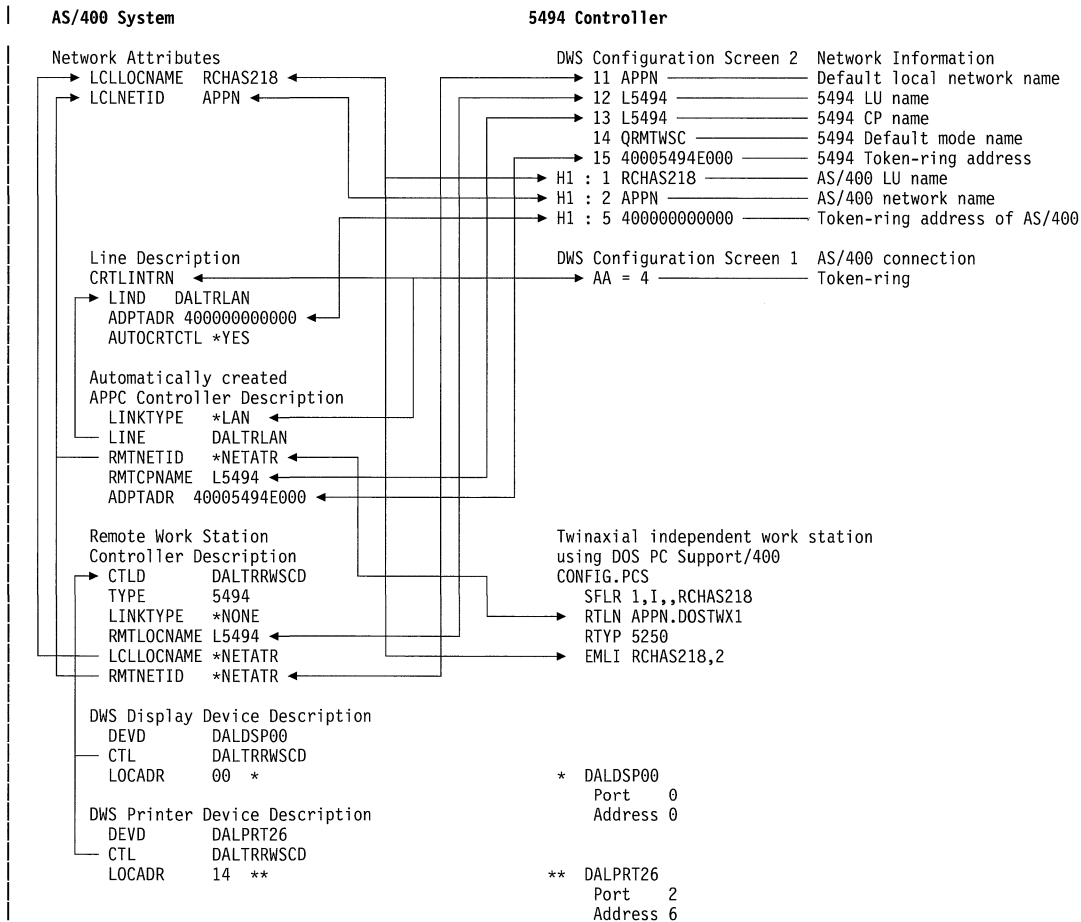


Figure 10-12. Token-Ring Attachment Configuration Matching Parameters

Managing the 5494 Remote Control Unit

This section describes how to manage your 5494 controller once it is active.

For easier retrieval, use a common prefix for every line, controller, and device description name you create that pertains to the 5494 Remote Control Unit. For example, a user in New York could name the line description NYLINE, the APPC controller description NYAPPC, the remote work station controller description NYRWS, and the dependent work station description NYDWS.

By naming configuration descriptions with the prefix NY throughout, the user can easily check the status of the configuration through the Work with Configuration Status (WRKCFGSTS) command. By entering the command WRKCFGSTS *LIN NY* the user can check the status of the line, APPC controller, and APPC devices. For example, if "Synchronous Data Link Control Configuration Example" on page 10-8 was used to create the configuration for your 5494 and you used the Work With Configuration Status command as suggested, the following display is shown:

```

Work with Configuration Status                                WASHSYS
                                                           03/17/93 17:38:30
Position to . . . . . _____ Starting characters
Type options, press Enter.
 1=Vary on   2=Vary off   5=Work with job   8=Work with description
 9=Display mode status ...

Opt  Description      Status      -----Job-----
---  NYLINE           ACTIVE
---  NYAPPC           ACTIVE
---  L5494            ACTIVE
---  QRMTWSC         ACTIVE/TARGET   L5494   QUSER   005832

```

To check which controller descriptions are related to the 5494 Remote Control Unit, the user can enter WRKCFGSTS *CTL NY*. From this display, the user can check the status of 5494 controller descriptions and work with related configuration descriptions down to the APPC and remote work station devices.

```

Work with Configuration Status                                WASHSYS
                                                           03/17/93 18:49:16
Position to . . . . . _____ Starting characters
Type options, press Enter.
 1=Vary on   2=Vary off   5=Work with job   8=Work with description
 9=Display mode status ...

Opt  Description      Status      -----Job-----
---  NYAPPC           ACTIVE
---  L5494            ACTIVE
---  QRMTWSC         ACTIVE/TARGET   L5494   QUSER   005832
---  NYRWS           ACTIVE
---  NYDSP00         SIGNON DISPLAY

```

You can see the APPC device description that is associated with the device description of the dependent work station. Do this by pressing F15 on the display of the Display Device Description (DSPDEVD) command. Likewise, you can see the APPC device description that is associated with a Remote Work Station controller description. Do this by pressing F15 on the display of the Display Controller Description (DSPCTLD) command.

Active APPC Subsystem Required

For APPC sessions between the 5494 controller and the AS/400 system, an APPC subsystem (QCMN or QBASE) must be active. Furthermore, QBASE must not be in restricted mode.

System Reference Codes and the 5494 Remote Control Unit

System reference codes (SRCs) are alphanumeric error messages that may appear on your remote work station display or on the liquid crystal display (LCD) of the 5494 controllers. On your remote work station display, these codes contain four to six characters, and appear flashing in a corner of the display. For a list of SRCs, their causes, and the action they require, refer to the *5494 Remote Control Unit User's Guide, GA27-3960*.

Part 3. Configuring for 3270 Remote Work Station Controllers

This part discusses the 3270 remote work station controller attachment support and the SNA pass-through support. Included in the discussion is information about defining devices, configuring keyboards, and understanding error messages for the 3270 remote work station controller. Also included is information about configuring and using 3270 remote attachment support and the SNA pass-through support.

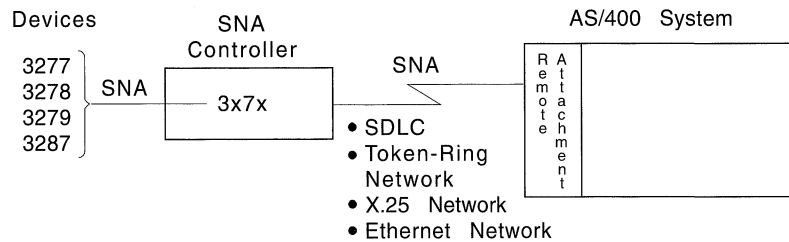
| | |
|---|-------|
| Chapter 11. Using 3270 Remote Attachment | 11-1 |
| Defining Device Capabilities | 11-2 |
| Configuring Keyboard Changes | 11-2 |
| 3270 and 5250 Keyboards | 11-2 |
| Keyboard Differences | 11-2 |
| Field Mark Key | 11-3 |
| Field Exit Fields | 11-3 |
| Numeric-Only Field | 11-3 |
| Reset Key | 11-3 |
| Clear, System Request, and Test Keys | 11-3 |
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| Corresponding 3270 Keys and 5250 Functions | 11-4 |
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| Display Differences | 11-5 |
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| Printing Locally | 11-7 |
| Messages | 11-7 |
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|---|-------|
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Chapter 11. Using 3270 Remote Attachment

This chapter discusses how the AS/400 system uses Systems Network Architecture (SNA) communications to support remote attachment for 3174 and 3274 controllers and attached 3270 display stations and printers. Because the 3270 data streams are translated into 5250 data streams, the controller and attached printer appear to the AS/400 system and application programs as a remote 5251 display and 5250-family remote work station printer.

Figure 11-1 shows a network configuration using the AS/400 remote attachment support.



3270 Remote Attachment

RV2P105-0

Figure 11-1. Configuration Example of 3270 Remote Attachment Support

The 3270 remote attachment function supports the following devices:

- 3174 Establishment Controller
- 3274 Control Unit
- 3270 display stations and printers
- All emulators conforming to 3274 Control Unit Model 31C protocol
- 3287 Printer

Note: Double-byte character set (DBCS) capable devices are supported.

The 3270 remote attachment uses the following **communications protocols** (rules controlling the communication and transfer of data between devices in a communications system):

- Synchronous data link control (SDLC)
- IBM Token-Ring Network
- X.25 Network
- Ethernet Network

Note: When starting a session after processing the start-data traffic signal, the AS/400 system cannot support a device that sends data first. The AS/400 system must send data to the device first.

For a configuration example for remotely attached 3270 devices, see Chapter 12 on page 12-1.

For changing and setup instructions for the 3274 Control Unit, see the *3270 Information Display System—3274 Control Unit Description and Programmer's Guide*, and the *3274 Configuration Level D Support*. For customizing and setup instructions about the 3174 Establishment Controller, see the *3174 Establishment Controller Planning Guide*.

For more information about using 3270 display station pass-through, see the topic "Using 3270 Display Station Pass-Through" on page 11-9.

For other 3270 remote attachment information, see the *DDS Reference* manual and the *3270 Device Emulation Guide*.

Defining Device Capabilities

Use the following figure to determine the capabilities to specify when configuring a 3270 device:

Table 11-1. 3270 Device Capabilities

| Device Type | Device Capabilities |
|-------------|---|
| 3277 | This display station supports generic 3270 data stream. Extended attributes, such as underlining, blink, reverse image, or color are not supported. |
| 3278 | This display station supports extended attributes, such as blink, reverse image, and underlining if requested by the OS/400 DDS (data description specifications) keywords. The 3278 Model 4 supports a 43 x 80 display size for no translation operations. |
| 3279 | This display station supports color attributes and the extended data stream attributes sent for a 3278 device. The color attributes are determined (in the same manner as a 5292 Full Color Display) by interpreting the DDS attributes as blink, high intensity, or the DDS color keywords. For more information about these attributes, see the topic "Field Attributes" on page 11-8 and the <i>DDS Reference</i> manual. |
| 3287 | This printer supports SNA character string (SCS) commands and orders. Note: Character options that cannot be printed are accepted but ignored. The <i>Copy to printer</i> option is not supported. In addition, feature 9660 must be installed to support the SCS commands and orders. |

Configuring Keyboard Changes

AS/400 utilities, source entry utility (SEU), and screen design aid (SDA), and some user application programs for the 3270 may require operator keystroke changes on the AS/400 system.

As an operator at a 3277, 3278, or 3279 keyboard, you can use most of the features and functions available on a similarly configured and authorized 5250 work station. You can also configure the keyboard to support the 5250 function and command (CMD) keys. For a list of 5250 functions and their corresponding 3270 keys, refer to Table 11-2 on page 11-4.

3270 and 5250 Keyboards

This topic discusses the similarities and differences between the keyboards of the 5250 and 3270 display stations. Compensating for these keyboard differences is also discussed.

3270 typewriter keyboards are fully supported. All other keyboards may be used, but with limited function support. 3270 devices do not support magnetic stripe reader and a selector light pen.

For more information about the 3270 and 5250 keyboards, see the *3270 Device Emulation Guide*.

Keyboard Differences

Specifically requested locking and unlocking of the 5250 keyboard cannot be done. The 3270 keyboard is restored on each write operation to the display if a change-of-direction command indicator is used for that write operation.

The locations of some keys on the 3277, 3278, and 3279 keyboards are different than those of the 5251 keyboard. The online help information shows the differences between the 5250 and 3270 keyboard layouts. To view a 3270 Help display at any time, press PF2 (the default). Any data on the display is saved and then restored at the end of the help procedure.

Field Mark Key

The 3270 Field Mark key is displayed as a semicolon with a line above it but is printed as an asterisk (*). On the 5250 keyboard, this key is both displayed and printed as a backslash (\).

Field Exit Fields

To emulate the field exit function required on the 5250 keyboard using the 3270 keyboard, specify that the ending attribute should not skip automatically. Then, press the End of Field (EOF) key followed by the Field Advance or Forward Tab keys.

The 3270 devices do not have Field Exit + or Field Exit- keys that will right-justify the field and add the sign. Therefore, 3270 devices present a plus sign (+) in the first position of the field.

If necessary, replace the plus sign with a minus sign (-), and type the numeric value of the field. When the Enter key is pressed, the field is right-justified and filled with necessary blanks.

Numeric-Only Field

The 3277 display station does not support the numeric lock feature. The 5250 numeric-only fields, allowing characters 0 through 9, period (.), plus sign (+), minus sign (-), and space characters, have numeric and unprotected attributes on the 3270 device. If the numeric lock feature is installed on a 3278 or 3279 display station, the combination of numeric and unprotected attributes causes the NUM symbol to appear on these displays, and the only acceptable keys are the characters 0 through 9, period (.), plus sign (+), minus sign (-), and Dup. Any other character keys lock the keyboard, requiring it to be reset. Command keys (such as the Tab and Enter keys) do not lock the keyboard. If either the + or space character is required in a field, you can override the numeric lock by pressing the Shift key.

Reset Key

The 5250 Reset key functions cannot be performed by the 3270 Reset key. However, you can specify a PF key to be assigned to the 5250 reset function. You can also use the Enter key for the reset function.

When a message is sent requiring the Reset key to be pressed, the message contains the 3 characters b** in columns 76, 77, and 78 of the message line. (The three characters are: 1 blank followed by 2 asterisks.) These 3 characters indicate that the PF key assigned to the 5250 reset function must be pressed before processing can continue. For example, on a 5250 display, the user might see the message Command key not valid. The same message appears on a 3270 display as:

```
Command key not valid      b**b
```

Clear, System Request, and Test Keys

The 3270 Clear, System Request (Sys Req), and Test keys all cause the loss of all data on the display. Therefore, if the AS/400 3270 support detects the 3270 Clear key, the system restores the display to the data on the last display sent by the system.

To perform the 5250 system request function, press F11 (the default). You will return to the previous display after the system request function ends.

The 5250 Sys Req key cannot be locked. However, if the 3270 keyboard is locked, you cannot press the 3270 PF11 key for the 5250 system request function. For example, if the application program is in a loop, the system operator must manually cancel the job from another work station rather than use the 5250 system request option. The 3270 keyboard does not acknowledge the PF11 key if pressed while a command is running for an indefinite period of time.

Home and Erase Keys

The 3270 Home key places the cursor in the first unprotected position of the display. If the display has no unprotected position, the 5250 Home key places the cursor in row 1, column 1 unless there is an insert cursor (IC) address remaining from the last write operation.

The 3270 Erase Input key clears all unprotected positions on the display to null characters and places the cursor in the first unprotected position. The 5250 Erase Input key clears only changed fields to null characters. The cursor is placed in row 1, column 1 unless there is an insert cursor (IC) address.

If an input field does not exist, the 5250 Tab, Back Tab, and New Line keys place the cursor in row 1, column 2. This position is the home address.

Corresponding 3270 Keys and 5250 Functions

The following figure shows how to perform various 5250 functions with the corresponding 3270 default PF keys:

Table 11-2. Various 5250 Functions

| 5250 Key Function | Default 3270 Keys to Select Function |
|-----------------------------|---|
| Help | PF1 |
| 3270 Help | PF2 |
| Clear | PF3 |
| Print | PF4 |
| Display Embedded Attributes | PF5 |
| Test Request | PF6 |
| Roll Down | PF7 |
| Roll Up | PF8 |
| Error Reset | PF10 (System/38), PF10 or the Enter key (System/36 and AS/400 system) |
| Sys Req | PF11 |
| Record Backspace | PF12 |
| F1 through F12 | PA1, then PF1 through PF12 ¹ |
| F13 through F24 | PA2, then PF1 through PF12, or PF13 through PF24 (if present) |
| Field Exit | Erase EOF, then Field Tab |
| Attention | 3277 use Test Request then PA1 3278/3279 use Attn key |

Note:

¹ For example, to start F3, press PA1, wait for the system to respond, and then press PF3.

To display the active PF key assignments for your work station, issue the Display Keyboard Map (DSPKBDMAP) command or press the PF key assigned the 3270 help function.

To specify different PF key defaults use the Set Keyboard Map (SETKBDMAP) or the Change Keyboard Map (CHGKBDMAP) command. The key assignments that you specify are in effect until you use these commands to specify key assignments again or until you sign off the work station.

3270 and 5250 Displays

This topic discusses the similarities and differences of the 3270 and 5250 display attributes and characters. Both types support extended binary-coded decimal interchange code (EBCDIC) and American National Standard Code for Information Interchange (ASCII) transmissions.

Error messages always appear on line 24 of the display. The cursor is placed in the field where the error occurred. If the error is located on line 24, the cursor is placed in the error field.

For more information about error messages, see “Operator Error Messages” on page 11-7.

Display Differences

A display having less than 1920 character positions (a minimum of 80 columns by 24 rows) cannot be supported by the 3270 remote attachment function.

The 3270 remote attachment function does not support the 3274 response time monitor.

Characters and Symbols

The shift-out and shift-in characters associated with double-byte data streams are passed as they are, if the display is a double-byte character set (DBCS) display connected to a DBCS system.

Note: 3270 remote attachment does not provide 3270 display stations with graphic data type support.

Depending on model and feature, the 3270 displays present different symbols for undefined characters created by code in the range of hexadecimal 40 through FE.

Characters with a hexadecimal value less than 40 that are not display commands, orders, or nulls (hexadecimal 00) are displayed as question marks (?).

When an application program running on a System/36 includes the hexadecimal number FF in a 3270 data stream, the System/36 support for the 3270 data stream changes the hexadecimal FF to a hexadecimal 40. In contrast to this, the AS/400 system support for the 3270 data stream does not change the hexadecimal FF. Therefore, application programs that migrate from a System/36 to an AS/400 system need to be changed because not all 3270 display stations support hexadecimal FF.

Fields

There are two types of fields: signed-numeric and numeric-only. Signed-numeric fields used for negative numbers act differently on the 3270 than on the 5250. On the 3270, if the operator types a negative number in the field, the sign occupies the first position of the field followed by the number. This decreases the maximum size of the field by one and should be considered when designing the displays and fields. The data in a signed-numeric field is adjusted to appear to the application program as if it were typed from a 5250 work station.

When data is typed in an input field that is included in a roll command and if any lines included in the roll command are not the same type of field attributes and location, results that cannot be predicted can occur.

Monocase, right-justify, and duplicate (Dup) fields appear on the 3270 display as they are typed, but appear to the application program as if they were typed from a 5250 work station.

Field marks in the 3270 data stream are changed to blanks.

All nulls are suppressed by the 3270 when sending data to the primary or controlling computer, called the **host system**. Be aware that data may be different if the cursor movement keys are used inside a field.

For example, if the operator enters character A in column 1 and then uses the cursor key to move to column 8 of field 1 to enter character B, field 1 would be returned to the application program as:

ABbbbbbb

if blank-fill was specified by the user. In other words, the AB would have 6 blank characters after it. Otherwise,

AB

is returned as field 1. In other words, the AB would not have any blank characters after it.

The 5250 I/O and self-check field format functions are not supported on the 3270 display station. A message informs you that an unsupported function negative response or an LU status (LUSTAT) is returned to the OS/400 licensed program.

The 5250 automatic cursor advance to the next input field that allows you to automatically enter text is not supported on the 3270. You must press the Enter key each time you want to advance to the next input field.

A 3270 with remote attachment cannot use the text assist function of PC Support/400 with Systems Application Architecture* (SAA*) OfficeVision/400* functions.

Extended Attributes

Some 3279 work stations capable of graphics present the second and following lines of a field that have extended attributes specified in reverse image when that field spans more than one line.

No display attributes are shown on a 3270 when the field is defined as a nondisplay field.

For more information about field attributes, see the topic "Field Attributes" on page 11-8.

Embedded Attributes

To view the embedded attributes, press the PF key assigned the display embedded attributes (DSPATR) function. The display attributes cannot be changed.

The 5250 display allows the creation, movement, or overwriting of embedded attributes; the 3270 device does not.

Duplicate Characters: If embedded attributes are found in an input-capable field, the following occurs on the 3270 device:

- All embedded attributes are replaced with duplicate (Dup) characters, which normally appear as an overscore (an asterisk with a line above it). The Dup characters indicate the location of the display attributes. The actual characters displayed are determined by the device and the configuration. Because the Dup characters are used to hold the attribute position in the data stream, do not use the Dup key in a field of this type. Differences could occur between 3270 and 5250 displays when running AS/400 utilities and some user programs.
- By pressing any Attention Identifier (AID) key (for example, a function key or the Enter key), you can restore the display with the Dup characters replacing the attributes. Now the attributes can be changed, or you can delete, insert, or change text in the fields.
- Depending on the application program, you can have the changes sent to the application program. When the display is shown again, the Dup characters rather than the embedded attributes appear.
- When the same number of Dup characters are received from the 3270 as were sent, the Dup characters are replaced with the saved attributes in a left-to-right sequence. The offset character in the input field of the attribute is also changed at this time.
- When fewer Dup characters are received from the 3270 than were sent to the 3270 and if Dup characters are returned at the same offset in the field as the attributes were originally, the attributes replace the Dup characters. This continues until all Dup characters have been replaced or until a Dup character is found at an offset in the current field.

where no attribute was before. If this occurs, any remaining Dup characters are replaced in a left-to-right sequence.

- When more Dup characters are received from the 3270 than were sent to the display, and if the Dup-enabled attribute is on for the field, the Dup characters are replaced by saved attributes from left to right and any trailing Dup characters are left in the data stream.
- If the Dup-enabled attribute is not on for the field, the operator receives error code 0019 indicating the Dup key is not enabled for that field.

Printing Locally

For printers shared between systems (or for printers that are the system printer) 3270 remote attachment may not fully support the local print function. This could occur if the local print key was pressed while the printer was already printing a job.

Messages

This topic discusses break and operator error messages, as well how to access them, and operator error message codes.

Break Messages

When the work station is in break mode (you must specify *BREAK), messages appear on the 3270 device exactly as they appear on the 5250 display. When you are not in break mode, message CPD4011 sends you this message on line 24: A message has arrived on a message queue. To continue, press the function key assigned the help function or the function key assigned the error reset function. Then use the Display Message (DSPMSG) command or the function key assigned the system request function followed by option 4 (Display message) to view the waiting message. Set the work station message queue to break mode to see the messages as they arrive. For more information about messages requiring the Reset key to be pressed, see "Reset Key" on page 11-3.

Operator Error Messages

Operator error messages are created by the 3270 support on the AS/400 system. If more than one error exists on a display, only the first error is detected and its message is displayed. You must correct the first error before the other errors are detected and their messages displayed. The error message replaces the contents, if any exist, of line 24 of the display. The error line is restricted to line 24, regardless of where it is specified by DDS or the program.

After viewing the error message, you can continue your task by pressing either the function key assigned the reset function, the function key assigned the help function, or the Enter key.

Note: During a write operation to the error line, the Enter key is defined as a Reset key and cannot be mapped to any other function.

In addition, if a write operation is requested by the user application to display an error message, a read operation should immediately follow the write operation in order for the remote 3270 display to allow resetting of the error message. A read operation following a write operation of an error message should be used by all applications regardless of the type of target display. If a read operation does not immediately follow the write error message requested by the user application, remote 3270 displays may overlay the error message before it can be read by the user.

When the Reset key is pressed, the cursor moves to the error field and allows correction. Press the Help key to view the help information. Then press the Enter key, followed by the Reset key to correct the error field. After either action, the previous contents of line 24 can be displayed again by pressing the Reset key.

Operator Error Message Codes

The 3270 error codes appear as existing 5250 operator error codes.

Table 11-3. 3270 Error Code Descriptions

| Error Code | Description |
|------------|---|
| 0003 | Incorrect key followed the PA key. |
| 0006 | Only the Reset key (PF10) or the Enter key can follow the Sys Req (PF11) key. |
| 0007 | Entry missing from a mandatory entry field. |
| 0008 | Nonalphabetic character is in an alphabetic field. |
| 0009 | Nonnumeric character is in a numeric-only field. |
| 0010 | Nonsigned numeric character is in a signed numeric field. |
| 0011 | Incorrect character is in the sign position of a signed numeric field. |
| 0014 | Unfilled mandatory fill field. |
| 0019 | A Dup key was pressed in a non-Dup field. |
| 0024 | Only characters 0 through 9 are allowed. |

Field Attributes

The 3270 field attributes are supported by the AS/400 system. The 3278 and 3279 extended attributes (blink, reverse image, underline, and color) are supported with the following limitations:

- The 3279 displays white and the 3287 prints normally (black) for the same attribute.
- Blinking characters appear on the 3279 only if the red attribute is set on.
- Blinking cursor cannot be set by using the DDS keywords.
- Color keywords specified in OS/400 DDS are supported for 3279 Display Stations. For more information about DDS color keywords, refer to the *DDS Reference* manual.

The following figure shows the attribute combinations for the 5251 display stations and the corresponding color attributes for the 3279 display stations. For example, if the 5251 display station uses the high intensity attribute, the corresponding color appearing on the 3279 is white.

Table 11-4. Attribute Combinations on the 5251 and the 3279 Display Stations

| 5251 Column Separator (CS) | 5251 High Intensity (HI) | 5251 Blink (BL) | 3279 Color Attributes |
|----------------------------|--------------------------|-----------------|-----------------------|
| No | No | No | Green |
| No | Yes | No | White |
| Yes | No | No | Turquoise |
| Yes | Yes | No | Yellow |
| No | No | Yes | Red |
| No | Yes | Yes | Blinking Red |
| Yes | No | Yes | Pink |
| Yes | Yes | Yes | Blue |

Notes:

- ¹ On 3278 and 3279 display stations, the 3270 underline character replaces the 5250 column separator if no conflict exists with other attributes.
- ² DDS color keywords such as COLOR(RED) can be used to create colors on a 3279 in a manner consistent with a 5292 Model 1 Display Station.

Blink, Reverse Image, and Underline Attributes

Blink, reverse image, and underline attributes appear only if nondisplay is not selected. These attributes are mutually exclusive and are set on in the following order:

1. Blink (only 3278)
2. Reverse image
3. Underscore

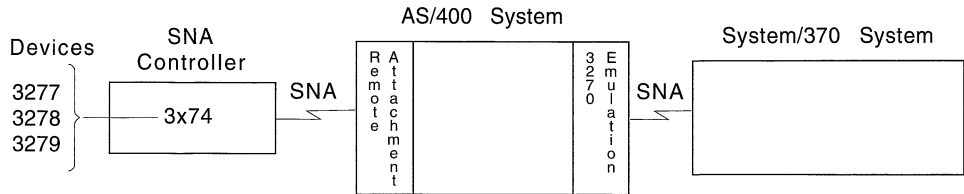
For example, if both reverse image and underline attributes are selected, only the reverse image attribute is used.

Blink, underline, and reverse image attributes are not supported by 3277, 3278, or 3279 devices without an extended attributes feature.

Using 3270 Display Station Pass-Through

3270 display station pass-through provides an end-point for two separate SNA sessions. One session exists from the host system to the AS/400 system and the other session exists from the AS/400 system to the 3270 display station. These sessions run at the same time and move data between the host system and the 3270 display station.

Figure 11-2 shows a network configuration using the 3270 display station pass-through support.



3270 Display Station Pass-Through

RSLN726-2

Figure 11-2. Configuration Example of 3270 Display Station Pass-Through

Using Start 3270 Emulation Command

Use the Start 3270 Emulation (STREML3270) command to begin 3270 display station pass-through to an SNA host system. Type the STREML3270 command on the Command Entry display and press F4 (Prompt) to receive prompting displays.

```

Start 3270 Display Emulation (STREML3270)

Type choices, press Enter.

Emulation controller, or . . . . . _____ Name
Emulation device, or . . . . . _____ Name
Emulation location . . . . . _____ Name
Display device, batch only . . . *CURRENT Name, *CURRENT
Page Up (Roll Down) key . . . *PA2 *PA2, *PA1, *PA3, *NONE...
Page Down (Roll Up) key . . . *PA1 *PA1, *PA2, *PA3, *NONE...
Test Request key . . . . . *DFT *DFT, *CLEAR, *ERASEINP
Cursor Select key . . . . . *NONE *NONE, *F1, *F2, *F3, *F4...
    
```

After you enter your choices and press the Enter key, the following 3270 Emulation display appears for a few seconds to tell you that emulation is in progress, how to obtain help information, and how to end the emulation session.

```
3270 Emulation

3270 emulation initialization in progress

Press the Attn key during emulation
to do the following:

o Display help
o Display emulation options
o End 3270 emulation

(C) COPYRIGHT IBM CORP. 1983, 1988.
```

Selecting SNA 3270 Pass-Through Option

During an emulation session, when using a 3270 remote attachment display, the Select 3270 Data Stream Pass-Through Option for SNA display appears after you press the Attn key.

```
Select 3270 Data Stream Pass-Through Option for SNA

Emulation device . . . . . : EMLDEVNAME

Select one of the following:

1. Transfer to secondary job
2. 3270 Attn key - Request for permission to send

99. End 3270 emulation

Selection
—
F3=Exit F12=Cancel Attn=Interrupt current task
```

As an AS/400 user of the 3270 display station pass-through, you can move between the AS/400 application and the host application. To suspend the 3270 session, press the Attention (Attn) key, wait until the AS/400 display appears, select option 1 (Transfer to secondary job), and press the Enter key.

To end a 3270 display station pass-through session, press the Attn key, wait for the Select 3270 Data Stream Pass-Through Option for SNA display to appear, and select option 99 (End 3270 emulation). The session appears to the host system as if the 3270 display station were turned off. This is the normal way to end 3270 emulation. The system display is restored to the display that was shown when you requested the emulation session.

Because the Attn key is used to suspend and end the emulation session, data received from the host system on the system services control point-secondary logical unit (SSCP-SLU)

data flow is sent to the 3270 display station on the logical unit-to-logical unit (LU-LU) data flow. Thus, the Virtual Telecommunications Access Method (VTAM) logon display will be emulated rather than passed to the display without translation. The most noticeable effect of this emulation is a change in the connection status symbol in the operator information area of the display.

Figure 11-3 shows the connection status symbol as it appears on the 3278 and 3279 display stations when you are attached directly to the host system. This symbol shows the SSCP-SLU system connection status.



Figure 11-3. System Connection Status Symbol for 3270 Display Station

Figure 11-4 shows the connection status symbol as it appears on the 3278 and 3279 display stations when you are attached to the host system by the AS/400 system. This symbol shows the primary logical unit-secondary logical unit (PLU-SLU) job connection status.



Figure 11-4. Job Connection Status Symbol for 3270 Display Station

While in STREML3270 emulation, you also receive any *BREAK messages that may arrive from the AS/400 system.

The contents of the display are saved and restored for you when you are ready to resume your session. When a STREML3270 session is suspended by a *BREAK message or the user has switched to the AS/400 system, the STREML3270 session does not respond to the 3270 host system. To return to the display you were using when the *BREAK message interruption occurred, press the Enter key.

Note: Because *BREAK messages can arrive at unexpected times, host applications should not use SNA or 3270 data stream capabilities beyond what the AS/400 system can restore. If you have a blank display when you want to resume your session, or if you lose the color and extended highlighting attributes during the suspend-resume time, press the Clear or Enter key. Most host applications respond to these keys by refreshing the display.

For more information about *BREAK messages, see the topic “Break Messages” on page 11-7 and the *3270 Device Emulation Guide*.

Chapter 12. 3270-Type Remote Work Station Configuration Examples

This chapter provides examples of using a 3174 controller to attach 3270-type devices to the AS/400 system, including considerations for DBCS-capable devices. See the *OS/400* Communications Configuration Reference* manual for more information about matching parameters between the AS/400 system and these remote controllers.

3270-Type Remote Controllers to a Token-Ring Network

Coaxial, 3270-type remote controllers (3174 and 3274) can be used to remotely attach display stations and printers to the AS/400 system. The following example describes the configuration of a 3174 controller with attached 3270 devices and an AS/400 system on a token-ring network. A **token-ring network** is a local area network that sends data in one direction throughout a specified number of locations by using the symbol of authority for control of the transmission line, called a token, to allow any sending station in the network (ring) to send data when the token arrives at that location.

The following display shows the token-ring network configuration display for a 3174 controller.

```

_____ Token-Ring Network _____
                                           53R/TOKN

106 - 4000 3174 0004   107 - 4000 0324 0001   108 - Q324000
110 - 0                116 - 0
121 - 01              125 - 00000000        127 - 0 0
132 - 0 0 0 0         136 - 1 1 1 1         137 - 0 0 0 0   138 - 0
141 - A                165 - 1                166 - C         168 - 0
173 - 00000000        175 - 000000        178 - 0
213 - 1                215 - 00000        220 - 3
380 - 1994            381 - 7                382 - 1994     383 - 4

PF: 3=Quit   4=Default   7=Back   8=Fwd
```

On the 3174 configuration display, configuration questions 106 and 107 must match values specified in the AS/400 configuration:

- 106** Token-Ring Network Address of the 3174 must match the adapter address (ADPTADR parameter) specified on the AS/400 controller description (CRTCTLRWS command).
- 107** Token-Ring Network Address of the Gateway must match the adapter address (ADPTADR parameter) specified on the AS/400 line description (CRTLINTRN command).

The following displays show the prompts for creating the line, controller, and device descriptions on the AS/400 system. Each display is shown by typing the name of the command, then pressing F4 (Prompt).

Create Line Desc (Token-Ring) (CRTLINTRN)

Type choices, press Enter.

```
Line description . . . . . > TRNLINE      Name
Resource name . . . . . > LIN031      Name, *NWID
Online at IPL . . . . . > *NO      *YES, *NO
Vary on wait . . . . . > *NOWAIT  *NOWAIT, 15-180 (1 second)
Maximum controllers . . . . . > 40      1-256
Line speed . . . . . > 4M      4M, 16M, *NWI
Maximum frame size . . . . . > 1994    265-16393, 265, 521, 1033...
Local adapter address . . . . . > 400003240001 400000000000-7FFFFFFFFF...
Exchange identifier . . . . . > *SYSGEN  05600000-056FFFFF, *SYSGEN
SSAP list:
  Source Service Access Point . . . . . > *SYSGEN  02-FE, *SYSGEN
  SSAP maximum frame . . . . . > _____ *MAXFRAME, 265-16393
  SSAP type . . . . . > _____ *CALC, *NONSNA, *SNA
  + for more values
Text 'description' . . . . . > 'Token-ring network line'
```

Bottom

F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display F24=More keys

Create Ctl Desc (Remote WS) (CRTCLRWS)

Type choices, press Enter.

```
Controller description . . . . . > TULSA      Name
Controller type . . . . . > 3174      3174, 3274, 5251, 5294...
Controller model . . . . . > 0          0, 1, 0001, 2, 0002, 12, 0012
Link type . . . . . > *LAN      *IDL, *LAN, *NONE, *SDLC...
Online at IPL . . . . . > *NO      *YES, *NO
Switched line list . . . . . > TRNLINE    Name
  + for more values
Maximum frame size . . . . . > *LINKTYPE  265-1994, 256, 261, 265...
Exchange identifier . . . . . > _____ 00100000-FFFFFFF
Initial connection . . . . . > *DIAL     *DIAL, *ANS
Dial initiation . . . . . > *LINKTYPE *LINKTYPE, *IMMED, *DELAY
LAN remote adapter address . . . . . > 400031740004 000000000001-FFFFFFFFF
Text 'description' . . . . . > '3174 Controller on token-ring line'
```

Bottom

F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display F24=More keys

Create Device Desc (Display) (CRTDEVDP)

Type choices, press Enter.

```
Device description . . . . . > TULSADSP  Name
Device class . . . . . > *RMT      *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 3279     3101, 3151, 3161, 3162...
Device model . . . . . > 0        0, 1, 2, 4, 11, 12, 23...
Local location address . . . . . > 02      00-FE
Online at IPL . . . . . > *NO      *YES, *NO
Attached controller . . . . . > TULSA    Name
Keyboard language type . . . . . > *SYSVAL   *SYSVAL, AGB, AGI, BLI...
Drop line at signoff . . . . . > *YES      *YES, *NO
Application type . . . . . > *NONE     *NONE, *NRF, *CTLSSN...
Text 'description' . . . . . > 'Tulsa 3279 display station'
```

```

Create Device Desc (Printer) (CRTDEVPRT)

Type choices, press Enter.

Device description . . . . . > TULPRT      Name
Device class . . . . . > *RMT          *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 3287          3287, 3812, 4019, 4201...
Device model . . . . . > 0            0, 1, 2, 3, 4, 10, 13, 301...
Local location address . . . . . > 03      00-FE
Online at IPL . . . . . > *NO          *YES, *NO
Attached controller . . . . . > TULSA      Name
Separator program . . . . . > *NONE        Name, *NONE
Library . . . . . > _____      Name, *LIBL, *CURLIB
Printer error message . . . . . > *INQ      *INQ, *INFO
Message queue . . . . . > QSYSOPR      Name, QSYSOPR
Library . . . . . > *LIBL          Name, *LIBL, *CURLIB
Application type . . . . . > *NONE      *NONE, *NRF, *DEVINIT...
Text 'description' . . . . . > 'Tulsa 3287 printer'

-----

F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

Bottom

```

Attaching DBCS-Capable Devices to 3270 Controllers

Some DBCS-capable display stations can be remotely attached to 3270-type (coaxial) controllers by configuring the device as a 3279 Model 0 and specifying a DBCS feature code (IGCFEAT parameter on the CRTDEVDSPP command).

Table 12-1 shows the DBCS feature (IGCFEAT parameter) values that should be specified for DBCS-capable work stations attached to 3174 and 3274 controllers.

Table 12-1. DBCS Feature Values for DBCS-Capable Devices Attached to 3270 Controllers

| Language/Device | DBCS Device Type | IGCFEAT Parameter Value |
|---------------------|---------------------------|-------------------------|
| Japanese | PS/55 running 3270PC | 2424J0 |
| | 5578-001 | |
| | 3472-J Kanji work station | |
| Korean | PS/55 running 3270PC | 2424K0 |
| Traditional Chinese | PS/55 running 3270PC | 2424C0 |
| Simplified Chinese | PS/55 running 3270PC | 2424S0 |

The following display shows the prompt display for configuring a PS/55 attached to a 3270 controller. The PS/55 is configured as a 3279-0 display station with a DBCS feature code specified.

Create Device Desc (Display) (CRTDEV DSP)

Type choices, press Enter.

```
Device description . . . . . > PS55DSP      Name
Device class . . . . . > *RMT          *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 3279         3101, 3151, 3161, 3162...
Device model . . . . . > 0           0, 1, 2, 4, 11, 12, 23...
Local location address . . . . . > 04       00-FE
Online at IPL . . . . . > *NO         *YES, *NO
Attached controller . . . . . > CTL3174    Name
Keyboard language type . . . . . > *SYSVAL    *SYSVAL, AGB, AGI, BLI...
Drop line at signoff . . . . . > *YES       *YES, *NO
Application type . . . . . > *NONE       *NONE, *NRF, *CTLSSN...
DBCS feature:
  Device features . . . . . > 2424J0    Character value
  Last code point . . . . . >          4141-FFFF
Text 'description' . . . . . > 'DBCS display attached to 3270 controller'
```

Bottom

F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display F24=More keys

Chapter 13. Configuring SNA Pass-Through

This chapter contains instructions on using Systems Network Architecture (SNA) pass-through. SNA pass-through support is allowed for devices that are attached to an AS/400 system with connections to an SNA backbone network (boundary-attached). Users working on a 327x device or a retail or finance device can pass through the AS/400 system and access primary applications on a System/370 or System/390* host computer. SNA pass-through support can also be configured to pass through intermediate AS/400 systems to reach the host application.

The AS/400 system where the device is attached is referred to as the **source system**. Attached to it are the display, printer, retail, and finance devices used to pass through to the host application. The **target system** contains the host applications the devices need to reach. In a configuration with two or more AS/400 systems, any AS/400 systems between the source and the target systems are referred to as **intermediate nodes**.

An SNA pass-through session is activated by configuring and varying on SNA pass-through devices on the AS/400 systems.

Upstream and Downstream Devices

For each SNA pass-through session, you must configure two devices. There must be a line, controller and device description created from the AS/400 system upstream to the target system. In addition, line, controller, and device descriptions need to be created from the AS/400 system downstream to the source devices. Intermediate AS/400 systems require additional line, controller, and device descriptions.

The following examples show the different relationships between upstream and downstream devices. The arrows in the examples indicate the direction that a session may be initiated. The arrows also show which SNA pass-through device is associated with another device. In the basic method of connecting upstream and downstream devices, there is one (and only one) upstream device for every downstream device. This simplifies the tasks of managing the network and correcting problems.

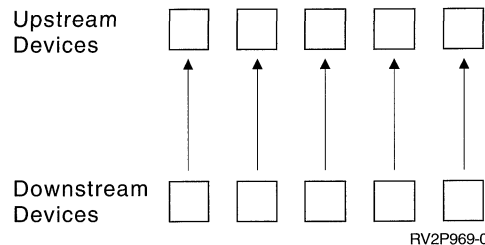


Figure 13-1. SNA Pass-Through. One upstream device for each downstream device.

In addition, upstream devices may be grouped together by configuring them in a configuration list. Users can then request to communicate with the first available upstream device on the list. Grouping upstream devices may be done to reduce the number of logical unit (LU) definitions required in the System/370 network. Also, grouping may be done to provide an alternate line to the System/370 network. If one of the upstream lines goes down, another line might be available.

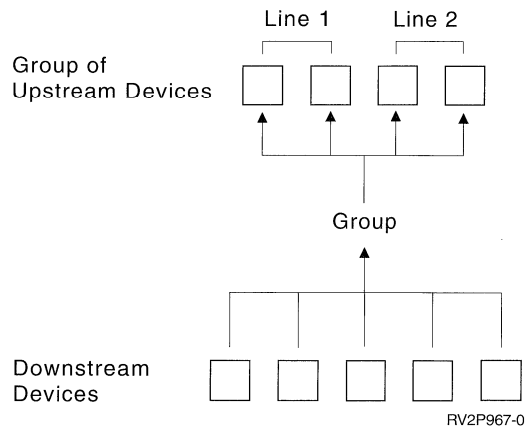


Figure 13-2. Grouping SNA Pass-Through Devices. Several upstream devices are grouped together to support a number of downstream devices.

Note: Only upstream devices may be grouped together. Grouping downstream devices is not supported.

If there are no upstream devices available when a downstream device tries to connect, an error message could be displayed stating that the group requested is not available. If this is a frequent occurrence, the following should be considered:

- Increase the number of upstream devices configured in the group list. With more upstream devices in the group list, there are more opportunities for an upstream device to be available.
- Change the inactivity timer to a lower number. When no activity is detected on a device, the connection is broken quicker.

It is also possible to configure more than one upstream device to connect to a single downstream device. For example, there might be several spool functions on a System/370 network that need to share a single remote printer. In this case, each upstream device must be capable of initiating a conversation with the downstream device.

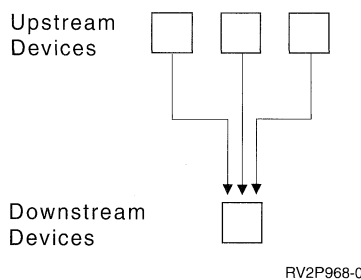


Figure 13-3. Upstream Devices Sharing a Downstream Printer

An upstream spool function may try to connect to a downstream printer that is already connected to an upstream device. When this occurs, the printer is allocated to the upstream spool function when it is no longer connected with the upstream device.

When configuring your upstream devices and associated downstream devices, consider which device can initiate a session. If an upstream device can initiate a conversation with a downstream device, then the downstream device needs to be listed as an associated SNA pass-through device for the upstream device. In the same manner, if a downstream device can initiate a conversation, then the upstream device needs to be listed as an associated SNA pass-through device for the downstream device.

It is not necessary for an upstream or downstream device to list an associated SNA pass-through device. The upstream or downstream device must either have an associated SNA pass-through device or be an associated SNA pass-through device. In addition, the

upstream or downstream device can both have an associated SNA pass-through device and be an associated SNA pass-through device. Problems can occur when you cross configurations.

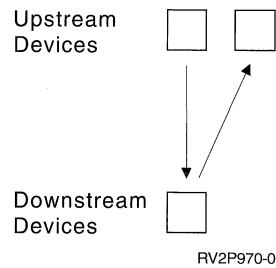


Figure 13-4. Crossing Configurations. A downstream device associates a different upstream device than the one that is associated with it.

Figure 13-4 shows an example of crossing configurations. In this example, an upstream device associates with a downstream device. The downstream device however, associates with a different upstream device. This crossing of configurations can lead to difficulty in network management and create potential problems in session initiation and routing.

Configuring a Single AS/400 System for SNA Pass-Through Support

In Figure 13-5, the letters *A* and *B* illustrate a connection you need to configure for the SNA pass-through function. Connection *A* represents the upstream connection to the target system, while connection *B* represents the downstream connection to the source devices. These connections are described in “Connection A: Configuring Upstream to the Target System” on page 13-4 and “Connection B: Configuring Downstream to the Source Devices” on page 13-4.

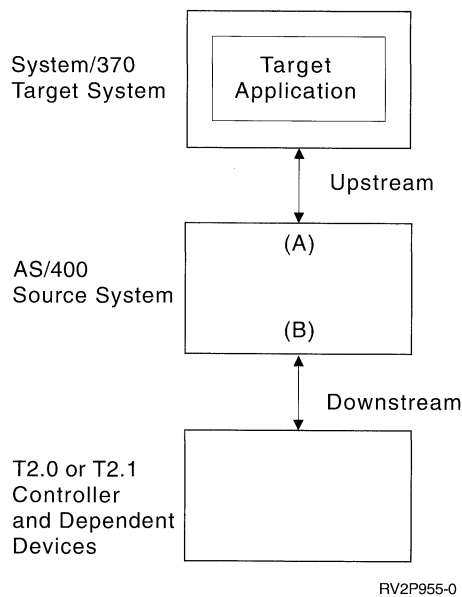


Figure 13-5. SNA Pass-Through with Single AS/400 System

Connection A: Configuring Upstream to the Target System

To configure the connection from the AS/400 system upstream to the target system, configure a line, controller, and device description:

1. Configure a line using the Create Line Description (CRTLINxxx) command.
2. Configure a T2.0 or a T2.1 host controller using the Create Controller Host Description (CRTCTLHOST) command.
3. Configure the SNA pass-through devices using the Create Device Description (SNPT) (CRTDEVSNPT) command. For each device you configure, specify an SNA pass-through class of *UP. Configure an SNA pass-through device for each SNA pass-through session you need.

The following display shows an example of an upstream device description that can be created in step 3. Some of the parameters are explained following the example.

```
                                Create Device Desc (SNPT) (CRTDEVSNPT)
Type choices, press Enter.
Device description . . . . . > UPDEVICE      Name
Local location address . . . . . > 0A         00-FE
SNA pass-through class . . . . . > *UP 1      *UP, *DOWN
Online at IPL . . . . . > *YES             *YES, *NO
Attached controller . . . . . > HOSTCTL 2      Name
Activation timer . . . . . > 170 3         1-2550
SNA pass-through device desc . . . > DOWNDEVICE 4 Name, *NONE
Text 'description' . . . . . > 'Upstream device description for SNA pass-th
rough'
```

- 1** SNA pass-through class: Enter *UP to indicate that this device is an upstream SNA pass-through device.
- 2** Attached controller: Enter the name of the host controller that you created in the previous step.
- 3** Activation timer: This parameter, used only with switched lines, sets the amount of time SNA pass-through support waits for an upstream device to respond to an activation request. If the upstream device does not respond within this amount of time, it is considered unavailable. The SNA pass-through downstream device then becomes available to other upstream requester devices, and a message regarding the activation attempt failure is issued to the QSYSOPR message queue. The default for this parameter is 170 seconds. In networks with intermediate nodes, additional time is required to activate all links and each AS/400 system has the activate timer parameter configured. With no intermediate nodes in this example, the default is used.
- 4** SNA pass-through device description: Specify the name of a downstream SNA pass-through device with which the upstream SNA pass-through device wants to establish a connection. In the example, the downstream device is called DOWNDEVICE. The downstream device is configured in “Connection B: Configuring Downstream to the Source Devices”

Connection B: Configuring Downstream to the Source Devices

To configure the downstream connection from the AS/400 system to its dependent devices:

1. Configure a line using the Create Line Description (CRTLINxxx) command.
2. Configure a T2.0 or T2.1 APPC controller using the Create Controller Description APPC (CRTCTLAPPC) command. Configure an APPC controller even if the downstream physical unit (PU) does not support an XID 3 exchange or LU 6.2 SNA sessions. For example, configure an APPC controller even if the downstream PU attached to the AS/400 system is a PU type 2.0 node.
3. Configure display, printer, retail, or finance devices with a device class of *SNPT, using the Create Device Description (CRTDEVxxx) command. For finance devices, specify a type of *FNCICF.

The following display shows an example of a downstream device description (called DOWNDEVICE) that can be created in step 3. Some of the parameters are explained following the example.

```

Create Device Desc (Display) (CRTDEV DSP)

Type choices, press Enter.

Device description . . . . . > DOWNDEVICE      Name
Device class . . . . . > *SNPT 1             *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 3279                   3101, 3151, 3161, 3162...
Device model . . . . . > 0                       0, 1, 2, 4, 11, 12, 23...
Local location address . . . . . > 0B           00-FE
Online at IPL . . . . . > *YES                 *YES, *NO
Attached controller . . . . . > _____      Name
Keyboard language type . . . . . > *SYSVAL      *SYSVAL, AGB, AGI, BLI...
Activation timer . . . . . > 170                1-2550
Inactivity timer . . . . . > *ATTACH 2         1-30, *ATTACH, *NOMAX...
SNA Pass-through device desc . . > UPDEVICE 3   Name, *NONE
SNA Pass-through group name . . . > *NONE 4     Name, *NONE
Host signon/logon command . . . > 'LOGON APPLID(CICS) LOGMODE(SD82) DATA(USERD
ATA)' 5

-----
F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys
More . . .

```

- 1** Device class: Enter the value *SNPT to indicate that this device is an SNA pass-through device.
- 2** Inactivity timer: Specify the amount of time for which a downstream device remains connected to a host device in an unbound state before it is considered inactive. The default is *NOMAX for retail and finance devices, and *ATTACH for display and printer devices. In each case, the device is considered active until it (or the upstream device associated with it) is varied off or powered off. Change this value if you are:
 - Using switched lines. The lines should drop soon after no activity is detected.
 - Using group devices. Make the limited number of upstream devices available as soon as possible.
 - Sharing one downstream device between multiple upstream devices.

In these cases, change the default value for the inactivity timer. When this period of time elapses and no activity is detected, the session is ended and the host device is made available to other downstream devices. A message is logged in QSYSOPR or at the display, indicating that the inactivity timer has expired.

Note: On switched lines, the line-drop timer may be shorter than the inactivity timer. The line may drop before the inactivity timer elapses.

- 3** SNA pass-through device description: Specifies the name of an upstream device with which this SNA pass-through device wants to establish a session. In this example, the device with which a connection is to be established is the same upstream device created in the previous example, UPDEVICE.

Note: The SNA pass-through device description parameter cannot be specified on the same command as the SNA pass-through group name parameter.
- 4** SNA pass-through group name: Specifies the name configured for a group of upstream devices in a configuration list. If specified, this parameter indicates that this device is attached to the first available device in the group name configuration list. Priority is given to devices attached to nonswitched lines.

Note: The SNA pass-through group name parameter cannot be specified on the same command as the SNA pass-through device name parameter.

- 5** Host signon/logon command: This parameter is used only with display and printer devices. When logon text is configured in the downstream device, that text is sent to a host application after the downstream device is paired with a host device. If configured, logon text is sent when the device is powered on, or, if the device is already on, by pressing the Enter key. This parameter is allowed only when *SNPT is specified for the DEVCLS parameter. You should specify text that is sent to the host system after starting SNA pass-through support. The text must be enclosed in apostrophes if it contains blanks or other special characters. All apostrophes in the text must be represented by two apostrophes. A maximum of 256 characters can be specified.

Additional Controllers

The controller attached to connection B can act as a gateway to other controllers. The gateway controller requires the AS/400 system to activate any downstream controllers and devices attached to the downstream controller. In this environment, you configure the multiple controllers off the same line (multipoint line).

Configuring SNA Pass-Through with an Intermediate AS/400 Node

SNA pass-through support can be configured so that an end user on an AS/400 system can pass through to a System/370 host system, by way of an intermediate AS/400 system. In this case, there are four connections that need to be configured:

- Upstream connections from the source AS/400 system to the intermediate AS/400 system
- Upstream connections from the intermediate AS/400 system to the target system
- Downstream connections from the intermediate AS/400 system to the source AS/400 system
- Downstream connections from the source AS/400 system to the dependent devices

For each connection, you need to configure a line, controller, and device description. When you create your device description, be sure you associate your downstream devices with upstream devices and that you associate your upstream devices with downstream devices. If you associate a downstream device with another downstream device, or associate an upstream device with another upstream device, a connection is not established. In Figure 13-6 on page 13-7, letters A through D each illustrate a connection you need to configure to use the SNA pass-through function with an intermediate AS/400 system.

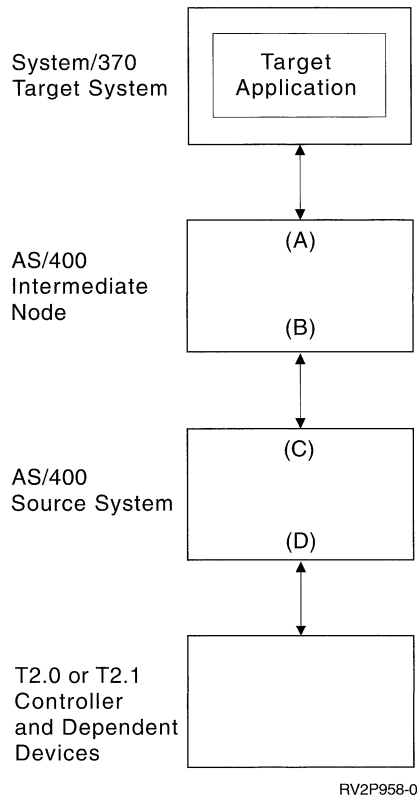


Figure 13-6. SNA Pass-Through Environment with an Intermediate AS/400 System

Connection A: Configuring Upstream to Target System

The upstream configuration for the intermediate AS/400 system to the target system is the same as the configuration needed for configuring a single AS/400 system for SNA pass-through support, except for the SNA pass-through device description parameter. In the example, INTERMDOWN is specified instead of DOWNDEVICE for this parameter. The INTERMDOWN description is created in the next step.

The following display shows an example of an upstream device description that can be created.

```

Create Device Desc (SNPT) (CRTDEVSNPT)

Type choices, press Enter.

Device description . . . . . > INTERMUP      Name
Local location address . . . . . > 0A         00-FE
SNA pass-through class . . . . . > *UP         *UP, *DOWN
Online at IPL . . . . . > *YES           *YES, *NO
Attached controller . . . . . > HOSTCTL      Name
Activation timer . . . . . > 170          1-2550
SNA pass-through device desc . . . > INTERMDOWN  Name, *NONE
Text 'description' . . . . . > 'Intermediate node upstream.'
  
```

Some of the parameters for this display are described in “Connection A: Configuring Upstream to the Target System” on page 13-4.

Connection B: Configuring Downstream to the Source AS/400 System

The steps for configuring the downstream connection from the intermediate node to the source node are:

1. Configure the line using the Create Line Description (CRTLINxxx) command.
2. Configure a T2.1 APPC controller using the CRTCLTAPPC command.
3. Configure SNA pass-through devices with an SNA pass-through class of *DOWN. Use the Create Device Description (SNPT) command:

```

                                Create Device Desc (SNPT) (CRTDEVSNPT)

Type choices, press Enter.

Device description . . . . . > INTERMDOWN      Name
Local location address . . . . . > 0B           00-FE
SNA Pass-through class . . . . . > *DOWN        *UP, *DOWN
Online at IPL . . . . . > *YES                 *YES, *NO
Attached controller . . . . . > CTLNAME         Name
Activation timer . . . . . > 170              1-2550
SNA Pass-through device desc . . . > INTERMUP     Name, *NONE
SNA Pass-through group name . . . > *NONE         Name, *NONE
Text 'description' . . . . . > 'Intermediate node downstream.'

```

Connection C: Configuring Upstream to the Intermediate AS/400 System

The steps for configuring upstream to the intermediate node from the source node are:

1. Configure the line using the Create Line Description (CRTLINxxx) command.
2. Configure a T2.1 APPC controller using the CRTCLTAPPC command.
3. Configure SNA pass-through devices with an SNA pass-through class of *UP:

```

                                Create Device Desc (SNPT) (CRTDEVSNPT)

Type choices, press Enter.

Device description . . . . . > SOURCEUP        Name
Local location address . . . . . > 0B 1         00-FE
SNA Pass-through class . . . . . > *UP          *UP, *DOWN
Online at IPL . . . . . > *YES                 *YES, *NO
Attached controller . . . . . > CTLNAME         Name
Activation timer . . . . . > 170              1-2550
SNA Pass-through device desc . . . > SOURCEDOWN   Name, *NONE
Text 'description' . . . . . > 'Source AS/400 System upstream.'

```

- 1** Local location address: When creating SNA pass-through device descriptions for devices that communicate between AS/400 systems, the local location addresses of the device descriptions must match. In this example, the SNA pass-through devices for connection B and C must use the same local location address.

Connection D: Configuring Downstream to Dependent Devices

The steps for configuring the dependent devices on the source system with an intermediate node are the same as the steps for configuring a single system for SNA pass-through support, except for the SNA pass-through device description parameter. Specify SOURCEUP instead of UPDEVICE for this parameter. The SOURCEUP description is created in the previous step.

```

Create Device Desc (Display) (CRTDEV DSP)

Type choices, press Enter.

Device description . . . . . > SOURCEDOWN   Name
Device class . . . . . > *SNPT             *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 3279              3101, 3151, 3161, 3162...
Device model . . . . . > 0                0, 1, 2, 4, 11, 12, 23...
Local location address . . . . . > 0B      00-FE
Online at IPL . . . . . > *YES            *YES, *NO
Attached controller . . . . . _____   Name
Keyboard language type . . . . . > *SYSVAL  *SYSVAL, AGB, AGI, BLI...
Activation timer . . . . . > 170         1-2550
Inactivity timer . . . . . > *ATTACH      1-30, *ATTACH, *NOMAX...
SNA Pass-through device desc . . . > SOURCEUP   Name, *NONE
SNA Pass-through group name . . . > *NONE     Name, *NONE
Host signon/logon command . . . > 'LOGON APPLID(CICS) LOGMODE(SD82) DATA(USERD
ATA)'

-----
F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
F13=How to use this display   F24=More keys
More...

```

Some of the parameters for this display are described in “Connection B: Configuring Downstream to the Source Devices” on page 13-4.

Several Intermediate AS/400 Systems

SNA pass-through support can be configured so that an end user on an AS/400 system can pass through to a System/370 host system, by way of several intermediate AS/400 systems. In each case, a line, controller, and device must be configured for each upstream and each downstream connection.

Configuring a Mixture of Supported and Nonsupported Devices

An SNA pass-through configuration can support a mixture of 5250 and 327x devices. In networks with intermediate nodes, 5250 display users typically use display station pass-through up to the boundary between an AS/400 system and the System/370 system. 3270 device emulation is then used to communicate with the System/370 system. This could create performance problems at the boundary AS/400 system.

SNA pass-through support, however, can be configured so that the devices attached to the host controller (such as emulated devices, SNA upline facility devices, and remote job entry devices) can be moved downstream to other AS/400 systems. This is done by creating a host device description at connection C for the downstream devices to communicate. Figure 13-7 on page 13-10 illustrates this, with the translation for the 5250 devices moved downstream to the source node. Letters A through E illustrate connections that must be configured to use such support.

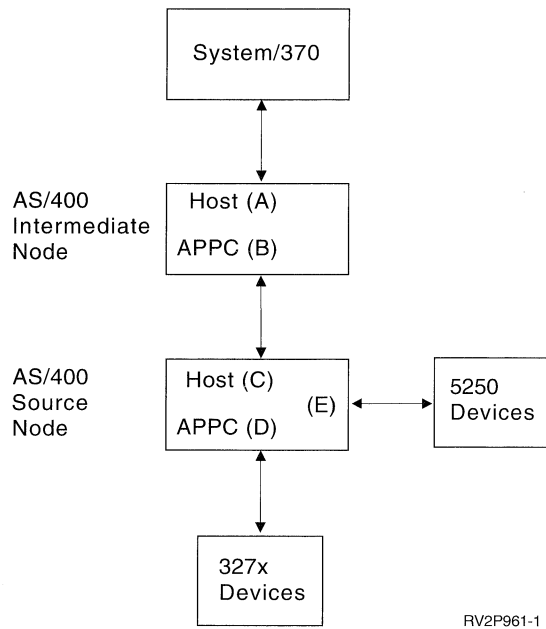


Figure 13-7. SNA Pass-Through Configured for a Mixture of Supported and Unsupported Devices

Connection A: Configuring Upstream to the Target System

The steps for configuring the connection to the target system are the same as the steps for configuring a connection from the source node to the target system. For specific instructions, see “Connection A: Configuring Upstream to Target System” on page 13-7.

Connection B: Configuring Downstream to the Source System

The steps for configuring the connection downstream from the intermediate node to the source node are:

1. Configure the line using the Create Line Description (CRTLINxxx) command.
2. Configure a T2.1 APPC controller using the CRTCTLAPPC command.
3. Using the Create Device Description (SNA Pass-through) (CRTDEVSNPT) command, configure SNA pass-through devices with an SNA pass-through class of *DOWN (SNPTCLS parameter is *DOWN) on location addresses communicating with downstream AS/400 SNA pass-through devices.
4. Using the Create Device Description (CRTDEVxxx) command, configure display, printer, retail, or finance devices with a device class of *SNPT. The device descriptions you create here are used to communicate with device descriptions that will be created in “Connection C: Configuring Upstream to the Intermediate System,” step 4.

Connection C: Configuring Upstream to the Intermediate System

The steps for configuring the connection from the source node to the intermediate node are:

1. Configure the line using the Create Line Description (CRTLINxxx) command.
2. To move the translation and emulation processes out to this source AS/400 system, configure a T2.0 or a T2.1 host controller using the Create Controller Host Description (CRTCTLHOST) command.
3. Using the Create Device Description (SNA Pass-through) (CRTDEVSNPT) command, configure SNA pass-through devices with an SNA pass-through class of *UP (SNPTCLS parameter is *UP) for sessions to 327x devices attached to APPC controller D. The devices you configure here are associated with the upstream devices you configured in step 3 of “Connection B: Configuring Downstream to the Source System.”

- Using the Create Device Description (Host) (CRTDEVHOST) command, create host device descriptions that will be used by the various application types. For example, you could be using remote job entry (RJE) or program-to-program communications.

The following display shows an example of configuring an SNA host device description. The value *EML is used for the application type parameter to move the emulation processes out to the target AS/400 system. To move remote job entry (RJE) or program-to-program communications out to the target AS/400 system, use the value *RJE or *PGM.

```

                                Create Device Desc (SNA Host) (CRTDEVHOST)

Type choices, press Enter.

Device description . . . . . > DEVSNAHST      Name
Local location address . . . . . > 0A          01-FF
Remote location . . . . . > UPLC            Name
Online at IPL . . . . . > *YES             *YES, *NO
Attached controller . . . . . > UPDEV        Name
Application type . . . . . > *EML           *RJE, *EML, *PGM
Maximum length of request unit . . . . . > *CALC *CALC
Emulated device . . . . . > 3278          3278, 3284, 3286, 3287...
Emulated keyboard . . . . . > *UPPER       *UPPER, *LOWER
Emulated numeric lock . . . . . > *NO        *NO, *YES
Emulation work station . . . . . > *ANY      Name, *ANY
End session with host . . . . . > *UNBIND   *UNBIND, *RSHUTD
Text 'description' . . . . . > *BLANK

```

Connection D: Configuring Downstream to Dependent Devices

The steps for configuring connection D, from the source AS/400 system downstream to the dependent devices are:

- Configure the line using the Create Line Description (CRTLINxxx) command.
- Configure a T2.0 or T2.1 APPC controller using the Create Controller Description (APPC) (CRTCTLAPPC) command.
- Configure display, printer, retail, or finance devices with a device class of *SNPT, using the Create Device Description (CRTDEVxxx) command.

See “Connection D: Configuring Downstream to Dependent Devices” on page 13-8 for information about configuring these dependent devices.

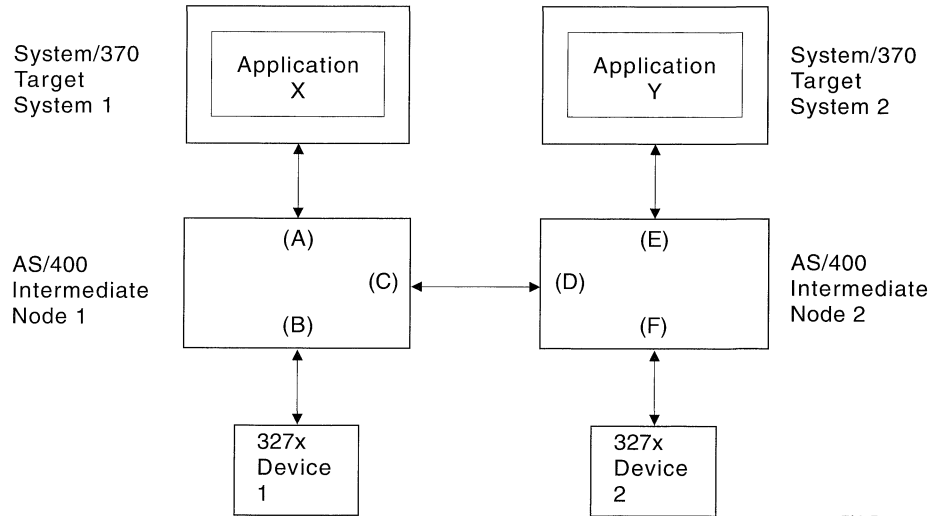
Connection E: Configuring Downstream to 5250 Devices

The steps for configuring connection E, from the source AS/400 system downstream to the 5250 devices are:

- Configure the line using the Create Line Description (CRTLINxxx) command.
- Configure a local or remote work station controller using the Create Controller Description (Local Work Station) (CRTCTLLWS), or the Create Controller Description (Remote Work Station) (CRTCTLRWS) command.
- Configure 5250 devices using the Create Device Display (CRTDEVDSP) command. The descriptions you create here are associated with the host device descriptions you configured in step 4 of “Connection C: Configuring Upstream to the Intermediate System” on page 13-10.

Configuring SNA Pass-Through to Support Several Source AS/400 Systems

SNA pass-through support can be configured to support several source AS/400 systems attached to an SNA backbone network in different places. The dependent devices attached to the AS/400 systems can be configured to access applications on any target system on the network. For example, in Figure 13-8, 327x Device 1 can use Application Y on the Target System 2. The AS/400 System 2 is treated as an intermediate node. Device 2 can use Application X on the Target System 1, where AS/400 System 1 is treated as an intermediate node. The letters A through F show the connections required to configure this support.



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Figure 13-8. SNA Pass-Through Support of Multiple-Source AS/400 Systems

Connection A: Configuring Upstream to Target System

The steps for configuring AS/400 Intermediate Node 1 to the target system are the same as the steps for configuring a boundary-attached node to a target system. For specific instructions, see “Connection A: Configuring Upstream to the Target System” on page 13-4.

Connection B: Configuring Downstream to Dependent Device 327x 1

The steps for configuring the connection from Intermediate Node 1 to 327x Device 1 are the same as the steps for configuring the connection between a source node and its dependent devices. For specific instructions, see “Connection B: Configuring Downstream to the Source Devices” on page 13-4.

Connection C: Configuring Attachment to Intermediate Node 2

The steps to configure the connection from AS/400 Intermediate Node 1 to AS/400 Intermediate Node 2 are:

1. Configure the line using the Create line (CRTLINxxx) command.
2. Configure a T2.1 APPC controller using the CRTCTLAPPC command.
3. Using the CRTDEVSNT command, configure SNA pass-through devices with an SNA pass-through class of *DOWN (SNPTCLS parameter is *DOWN) on location addresses communicating with upstream devices attached to APPC controller D. These devices will help the communications between 327x Device 2 and Target Application X.
4. Using the CRTDEVSNT command, configure SNA pass-through devices with an SNA pass-through class of *UP (SNPTCLS is *UP) on location addresses communicating with downstream devices attached to APPC controller D. These devices will help the communications between 327x Device 1 and Target Application Y.

Connection D: Configuring Attachment to Intermediate Node 1

The steps for configuring Intermediate Node 2 to Intermediate Node 1 are as follows:

1. Configure the line using the Create line (CRTLINxxx) command.
2. Configure a T2.1 APPC controller using the CRTCTLAPPC command.
3. Using the CRTDEVSNPT command, configure SNA pass-through devices with an SNA pass-through class of *UP (SNPTCLS is *UP) on location addresses communicating with downstream devices attached to APPC controller C. These devices will help the communications between 327x Device 2 and Target Application X.
4. Using the CRTDEVSNPT command, configure SNA pass-through devices with an SNA pass-through class of *DOWN (SNPTCLS is *DOWN) on location addresses communicating with upstream devices attached to APPC controller C. These devices will help the communications between 327x Device 1 and Target Application Y.

For a list of SNA pass-through specific parameters that apply to this connection, see “Connection B: Configuring Downstream to the Source Devices” on page 13-4.

Connection E: Configuring Upstream to Target System 2

The steps for configuring Intermediate Node 2 upstream to Target System 2 are the same as the steps to configure Intermediate Node 1 to Target System 1. For specific instructions, see “Connection A: Configuring Upstream to the Target System” on page 13-4.

Connection F: Configuring Downstream to Dependent 327x Device 2

The steps for configuring Intermediate Node 2 to 327x Device 2 are the same as “Connection B: Configuring Downstream to Dependent Device 327x 1” on page 13-12. For specific instructions, see “Connection B: Configuring Downstream to the Source Devices” on page 13-4.

SNA Pass-Through Messages

SNA pass-through support issues informational messages to the QSYSOPR message log. If the active downstream device is a display, SNA pass-through support also issues a single-byte message ID in the form of AS/400 CPIXXXX to the display. When one of these messages is received, the user should search the QSYSOPR message log for the appropriate informational message with the same message ID.

Messages are issued for:

- Downstream devices only when
 - A downstream display sends data but has no associated device or group name configured to receive the data
 - A downstream display requests a host device that is unavailable
- Upstream and downstream devices when
 - A configuration error is detected
 - An inactivity timer expires on a display
 - An activation timer expires
 - A session between two pass-through devices is abnormally ended

In environments with intermediate nodes, a message (CPI58E6) is sent to the source system QSYSOPR message queue, indicating the system where the error occurred.

Messages are not issued for the normal activating and ending of sessions.

Part 4. Configuring for X.21 Short Hold Mode

This part contains examples on configuring X.21 short hold mode (SHM) configuration.

- Chapter 14. X.21 Short-Hold Mode Configuration Example** 14-1
- Multiple Port Sharing Configuration Example 14-1
 - Configuring the AS/400 Line Description for Multiple Port Sharing 14-1
 - 3274 Control Unit Configuration 14-3
 - Configuring AS/400 Controller and Device Descriptions for the 3274 14-3
 - 5294 Remote Control Unit Configuration 14-5
 - Configuring AS/400 Controller and Device Descriptions for the 5294 14-6
 - 5394 Remote Control Unit Configuration 14-7
 - Configuring AS/400 Controller and Device Descriptions for the 5394 14-7

Chapter 14. X.21 Short-Hold Mode Configuration Example

This chapter contains an example configuration for X.21 short-hold mode (SHM). It describes multiple port sharing with the AS/400 system serving as a primary station managing a 2-port group with 3274, 5294, and 5394 remote work station controllers as secondary stations. Detailed descriptions of the commands and parameters used in this example can be found in the *OS/400* Communications Configuration Reference* manual.

Multiple Port Sharing Configuration Example

The following example shows remote controller and AS/400 configurations for X.21 SHM using multiple port sharing. The AS/400 line description is shown first, followed by the remote control unit configuration and the associated AS/400 controller and device descriptions for each of the three (3274, 5294, and 5394) remote control units.

Command prompt displays are used to show the AS/400 configuration objects. These displays are shown by typing the name of the command, then pressing F4. Only those displays required to specify nondefault values are shown.

Configuring the AS/400 Line Description for Multiple Port Sharing

The following prompt displays use the CRTLINSDLC command to create an AS/400 line description for X.21 SHM with multiple port sharing.

```
                                Create Line Desc (SDLC) (CRTLINSDLC)

Type choices, press Enter.

Line description . . . . . > SHMRWS      Name
Resource names . . . . . > LIN091      1 Name
      + for more values > LIN092      1
Online at IPL . . . . . > *NO          *YES, *NO
Data link role . . . . . > *PRI 2      *NEG, *PRI, *SEC
Physical interface . . . . . > *X21     3 *RS232V24, *V35, *X21, ...
Connection type . . . . . > *SHM      3 *NONSWTTP, *SWTTP, *MP, *SHM
SHM node type . . . . . > *T20 2      *T21, *T20
Vary on wait . . . . . > *NOWAIT      *NOWAIT, 15-180 (1 second)
Exchange identifier . . . . . > *SYSGEN 05600000-056FFFFF, *SYSGEN
NRZI data encoding . . . . . > *NO     *YES, *NO
Maximum controllers . . . . . > 3      4 1-254
Line speed . . . . . > 9600           600, 1200, 2400, 4800...
Modem type supported . . . . . > *NORMAL *NORMAL, *V54, *IBMWRAP...
Switched connection type . . . . . > *BOTH *BOTH, *ANS, *DIAL
Autoanswer . . . . . > *YES          *YES, *NO

F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

More...
```

Create Line Desc (SDLC) (CRTLINS DLC)

Type choices, press Enter.

```

Autodial . . . . . > *YES          *NO, *YES
Dial command type . . . . . *NONE        *NONE, *V25BIS
SHM call timer . . . . . *NONE        *NONE, 1-60 (minutes)
SHM maximum connect timer . . . 8            *NOMAX, 1-254 (seconds)
SHM answer delay timer . . . . 11           *NOMAX, 1-254 (0.1 seconds)
Calling number . . . . . > 9764520          5
Short timer . . . . . 50                10-600 (0.1 seconds)
Long timer . . . . . 600                100-6000 (0.1 seconds)
Short retry . . . . . 7                 0-254
Long retry . . . . . 1                 0-254
Call progress signal retry . . .    _____ *CPS41, *CPS42, *CPS43...
      + for more values
Maximum frame size . . . . . 521        265, 521, 1033, 2057
Duplex . . . . . > *FULL              *HALF, *FULL
Nonproductive receive timer . . . 320    160-4200 (0.1 seconds)
Idle timer . . . . . 30                5-300 (0.1 seconds)

```

More...

F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display F24=More keys

Create Line Desc (SDLC) (CRTLINS DLC)

Type choices, press Enter.

```

Connect poll timer . . . . . 30        2-300 (0.1 seconds)
Poll cycle pause . . . . . 0          0-2048 (0.0001 seconds)
Frame retry . . . . . 7              0-64
Data Set Ready drop timer . . . 6      3-60 (seconds)
Autoanswer type . . . . . *DTR        *DTR, *CDSTL
Remote answer timer . . . . . 60      30, 35, 40, 45 (seconds)...
Text 'description' . . . . . > 'Short hold mode SDLC line'

```

Notes:

- 1** Two *Resource names* (RSRCNAME parameter) are specified to indicate to the system which ports are used for multiple port sharing.
- 2** The *Data link role* (ROLE parameter) and *SHM node type* (SHM parameter) must be specified as shown for lines used with remote work station controllers.
- 3** *Physical interface* (INTERFACE parameter) and *Connection type* (CNN parameter) must be specified as shown for an X.21 SHM line.
- 4** The maximum number of controllers (MAXCTL parameter) is set to three (for the attached 3274, 5294, and 5394 controllers).
- 5** The *Calling number* (CALLNBR parameter) represents the connection number of the AS/400 system.

3274 Control Unit Configuration

The following displays show the configuration for a 3274 control unit with the 3274 X.21 short-hold mode RPQ 7H0497 installed.

```
033                                     0100
 1  9812 836F FFFF FFFF
    FFFF FFFF FFFF FFFF          903 - 0

999                                     0110
111 - 00    112 - 16    113 - DA    114 - 0    115 - 0    116 - 0
121 - 01    125 - 00100000    127 - 0 0
136 - 0 0 0    137 - 0 0 0 0    138 - 0    139 - 0
141 - A          151 - 61C
160 - 1    161 - 1    165 - 0    166 - B
170 - 0    173 - 00000000    175 - 000000
          213 - 1 2 215 - 000C3    220 - 0
          302 - C3 3
310 - 0    311 - 0    313 - 0    314 - 0    317 - 0    318 - 0
331 - 1    342 - 0    343 - 03    345 - 0    347 - 0
351 - 1    352 - 0 4 360 - 15    361 - 7    362 - 11111011
                                     900 - 0
```

Figure 14-1. 3274 Control Unit Configuration Displays

Notes:

- 1 Item 033 is used to enter RPQ information and specifies the connection number of the 3274. The connection number (C>NNNBR parameter) must be matched in the AS/400 controller description.
- 2 Item 215 specifies the system name of the 3274. This value must match the last 5 digits of the exchange identifier (EXCHID parameter) specified for the AS/400 controller description.
- 3 Item 302 specifies the station address of the 3274. This value must match the station address (STNADR parameter).
- 4 Items 360 and 361 set the retry limit to 15 with a 7-second delay.

Configuring AS/400 Controller and Device Descriptions for the 3274

The following prompt displays use the CRTCTLRWS and CRTDEVDSR commands to create AS/400 controller and device descriptions for the 3274 control unit and one attached 3278 display station.

```

                                Create Ctl Desc (Remote WS) (CRTCTLRWS)

Type choices, press Enter.

Controller description . . . . . > SHM3274      Name
Controller type . . . . . > 3274              3174, 3274, 5251, 5294...
Controller model . . . . . > 0                 0, 1, 0001, 2, 0002, 12, 0012
Link type . . . . . > *SDLC                   *IDLC, *LAN, *NONE, *SDLC...
Online at IPL . . . . . > *NO                 *YES, *NO
Switched connection . . . . . > *YES 1        *NO, *YES
Short hold mode . . . . . > *YES 1           *NO, *YES
Switched line list . . . . . > SHMRWS 2        Name
+ for more values
Exchange identifier . . . . . > 017000C3 3     00100000-FFFFFFF
Initial connection . . . . . > *DIAL          *DIAL, *ANS
Dial initiation . . . . . > *LINKTYPE        *LINKTYPE, *IMMED, *DELAY
Connection number . . . . . > 9812836 4
SHM disconnect limit . . . . . > 10          1-254, *NOMAX
SHM disconnect timer . . . . . > 50          2-3000 (0.1 seconds)
Station address . . . . . > C3 5              01-FE

F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys
More...

```

Figure 14-2. Prompt Display for SHM3274 Controller Description

Notes:

- 1** Both *Switched connection* (SWITCHED parameter) and *Short hold mode* (SHM parameter) must be specified as *YES for X.21 SHM controller descriptions.
- 2** The *Switched line list* (SWTLINLST parameter) must include the name of the line description to which the controller is attached (LIND parameter on the CRTLINSDLC command).
- 3** The *Exchange identifier* must include the correct block number used for the controller type (017 for 3274 control units) plus the 5-digit system name specified in item 215 of the 3274 configuration.
- 4** The *Connection number* (C>NNNBR parameter) specifies the connection number for the remote control unit. This value must match that specified in item 033 of the 3274 configuration.
- 5** The *Station address* (STNADR parameter) must match the station address specified in item 302 of the 3274 configuration.

```

                                Create Device Desc (Display) (CRTDEVDSPP)

Type choices, press Enter.

Device description . . . . . > SHM3274      Name
Device class . . . . . > *RMT              *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 3278              3101, 3151, 3161, 3162...
Device model . . . . . > 0                 0, 1, 2, 4, 11, 12, 23...
Local location address . . . . . > 02 1      00-FE
Online at IPL . . . . . > *NO                 *YES, *NO
Attached controller . . . . . > SHM3274 2     Name
Keyboard language type . . . . . > *SYSVAL    *SYSVAL, AGB, AGI, BLI...
Drop line at signoff . . . . . > *NO         *YES, *NO
Application type . . . . . > *NONE          *NONE, *NRF, *CTLSSN...
Text 'description' . . . . . > '3278 display station attached to 3274 ctl'

```

Figure 14-3. Prompt Display for SHM3274 Display Device Description

Notes:

- 1** The *Local location address* (LOCADR parameter) must match the device address set at the 3278 display station.
- 2** The *Attached controller* (CTL parameter) must specify the name of the controller description to which the device is attached (CTLD parameter on the CRTCTLRWS command).

5294 Remote Control Unit Configuration

The following display shows the configuration for a 5294 Remote Control Unit with one attached 5291 display station at address 00.

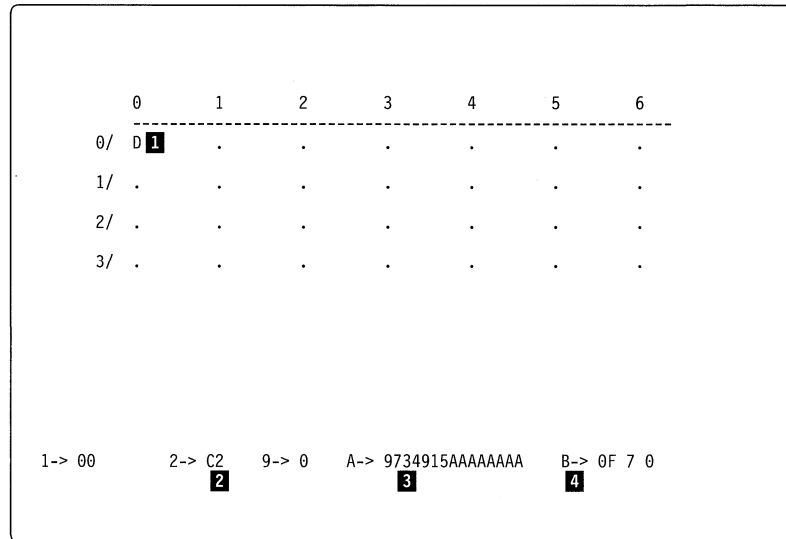


Figure 14-4. 5294 Remote Control Unit Configuration Display

- 1** The device address of the attached display station (00) must be matched by the *Local location address* (LOCADR parameter) specified on the CRTDEVDSR command. See “Configuring the Remote Devices and 5394 Remote Control Units” on page 8-2 for more information about determining device addresses from the 5x94 configuration displays.
- 2** Field 2 specifies the station address of the 5x94. This value must match the station address (STNADR parameter).
- 3** Field A specifies the connection number of the 5x94. This value must match the *Connection number* (CANNBR parameter) specified in the AS/400 controller description.
- 4** Field B sets the retry limit to 15 (hex 0F) with a 7-second delay.

Configuring AS/400 Controller and Device Descriptions for the 5294

The following prompt displays use the CRTCTRLWS and CRTDEVDSP commands to create AS/400 controller and device descriptions for the 5294 Remote Control Unit and one attached 5291 display station.

```

Create Ctl Desc (Remote WS) (CRTCTRLWS)

Type choices, press Enter.

Controller description . . . . . > SHM5294      Name
Controller type . . . . . > 5294              3174, 3274, 5251, 5294...
Controller model . . . . . > 1                0, 1, 0001, 2, 0002, 12, 0012
Link type . . . . . > *SDLC                  *IDL, *LAN, *NONE, *SDLC...
Online at IPL . . . . . > *NO                *YES, *NO
Switched connection . . . . . > *YES 1        *NO, *YES
Short hold mode . . . . . > *YES 1          *NO, *YES
Switched line list . . . . . > SHMRWS 2      Name
      + for more values
Exchange identifier . . . . . > 045000C2 3    00100000-FFFFFFF
Initial connection . . . . . > *DIAL         *DIAL, *ANS
Dial initiation . . . . . > *LINKTYPE       *LINKTYPE, *IMMED, *DELAY
Connection number . . . . . > 9734915 4
SHM disconnect limit . . . . . > 10         1-254, *NOMAX
SHM disconnect timer . . . . . > 50        2-3000 (0.1 seconds)
Station address . . . . . > C2 5           01-FE
                                           More...

F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

Figure 14-5. Prompt Display for SHM5294 Controller Description

Notes:

- 1 Both *Switched connection* (SWITCHED parameter) and *Short hold mode* (SHM parameter) must be specified as *YES for X.21 SHM controller descriptions.
- 2 The *Switched line list* (SWTLINLST parameter) must include the name of at least one line description to which the controller can be attached (LIND parameter on the CRTLINS DLC command).
- 3 The *Exchange identifier* must be an 8-digit hexadecimal value including the correct block number used for the controller type (045 for 5294 Remote Control Units, 05F for 5394s), followed by 3 zeros and the station address specified in field 2 of the 5x94 configuration (045 + 000 + C1, or 045000C1).
- 4 The *Connection number* (CNNNBR parameter) specifies the connection number for the remote control unit. This value must match that specified in field A of the 5x94 configuration.
- 5 The *Station address* (STNADR parameter) must match the station address specified in field 2 of the 5x94 configuration.

```

Create Device Desc (Display) (CRTDEV DSP)

Type choices, press Enter.

Device description . . . . . > SHM5294      Name
Device class . . . . . > *RMT             *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 5291             3101, 3151, 3161, 3162...
Device model . . . . . > 1               0, 1, 2, 4, 11, 12, 23...
Local location address . . . . . > 00 1    00-FE
Online at IPL . . . . . > *NO            *YES, *NO
Attached controller . . . . . > SHM5294 2   Name
Drop line at signoff . . . . . > *NO     *YES, *NO
Allow blinking cursor . . . . . > *YES   *YES, *NO
Printer . . . . . >                    Name
Text 'description' . . . . . > '5291 display station attached to 5294 ctl'

```

Figure 14-6. Prompt Display for SHM5294 Display Device Description

Notes:

- 1 The *Local location address* (LOCADR parameter) must match the device address set at the display station.
- 2 The *Attached controller* (CTL parameter) must specify the name of the controller description to which the device is attached (CTLD parameter on the CRTCTLRWS command).

5394 Remote Control Unit Configuration

The following display shows the configuration for a 5394 Remote Control Unit with one 5292 display station attached at address 06. See “5294 Remote Control Unit Configuration” on page 14-5 for information about configuration considerations for both the 5294 and 5394 controllers.

```

      0      1      2      3      4      5      6
-----
0/  .      .      .      .      .      .      D
1/  .      .      .      .      .      .      .
2/  .      .      .      .      .      .      .

AA-> 2    BB-> 0
1-> 00    2-> C1    A-> 9732978 _____    B-> 0F 7 0
C-> _____

P-> _ _

```

Figure 14-7. Configuration Display for 5394 Remote Control Unit

Configuring AS/400 Controller and Device Descriptions for the 5394

The following prompt displays use the CRTCTLRWS and CRTDEV DSP commands to create AS/400 controller and device descriptions for the 5394 Remote Control Unit and one attached 5292 display station.

See “Configuring AS/400 Controller and Device Descriptions for the 5294” on page 14-6 for information about specifying these commands for controller and device descriptions associated with 5x94 controllers.

```

                                Create Ctl Desc (Remote WS) (CRTCTLRWS)

Type choices, press Enter.

Controller description . . . . . > SHM5394      Name
Controller type . . . . . > 5394              3174, 3274, 5251, 5294...
Controller model . . . . . > 1                0, 1, 0001, 2, 0002, 12, 0012
Link type . . . . . > *SDLC                 *IDL, *LAN, *NONE, *SDLC...
Online at IPL . . . . . > *NO                *YES, *NO
Switched connection . . . . . > *YES         *NO, *YES
Short hold mode . . . . . > *YES            *NO, *YES
Switched line list . . . . . > SHMRWS        Name
                                + for more values
Maximum frame size . . . . . > *LINKTYPE     265-1994, 256, 261, 265...
Exchange identifier . . . . . > 05F000C1     00100000-FFFFFFFF
Initial connection . . . . . > *DIAL        *DIAL, *ANS
Dial initiation . . . . . > *LINKTYPE       *LINKTYPE, *IMMED, *DELAY
Connection number . . . . . > 9732978
SHM disconnect limit . . . . . > 10         1-254, *NOMAX
SHM disconnect timer . . . . . > 50         2-3000 (0.1 seconds)
                                More...

F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

Figure 14-8. Prompt Display for SHM5394 Controller Description

```

                                Create Device Desc (Display) (CRTDEV DSP)

Type choices, press Enter.

Device description . . . . . > SHM5394      Name
Device class . . . . . > *RMT              *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 5292             3101, 3151, 3161, 3162...
Device model . . . . . > 1                0, 1, 2, 4, 11, 12, 23...
Local location address . . . . . > 06       00-FE
Online at IPL . . . . . > *NO              *YES, *NO
Attached controller . . . . . > SHM5394    Name
Drop line at signoff . . . . . > *NO       *YES, *NO
Allow blinking cursor . . . . . > *YES     *YES, *NO
Printer . . . . . > _____            Name
Text 'description' . . . . . > '5292 display station attached to 5394 ctl'

                                Bottom

F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

Figure 14-9. Prompt Display for SHM5394 Display Device Description

Part 5. Distributed Host Command Facility, Network Routing Facility, and SNA Primary LU2 Support

This part discusses the distributed host command facility (DHCF), the network routing facility (NRF), and SNA Primary LU2 Support (SPLS). DHCF, NRF, and SPLS can be used for remote work station networks on the AS/400 system. This information includes the following discussions:

- Configuring systems to use DHCF, NRF, and SPLS
- Using DHCF, NRF, and SPLS
- Starting and ending DHCF, NRF, and SPLS sessions
- Commands required to use DHCF, NRF, and SPLS
- Configuring 3270 and 5250 keyboards for DHCF, NRF, and SPLS
- DHCF differences between an AS/400 system and System/36
- DHCF differences between an AS/400 system and System/38

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Chapter 15. Distributed Host Command Facility

This chapter discusses the OS/400 distributed host command facility (DHCF) support as part of a Host Command Facility (HCF) network. With OS/400 DHCF support, one or more HCF host system users, using **3270 display stations**¹, can remotely operate and control the AS/400 system as though they were using remote **5250 display stations**² attached to the AS/400 system. Without additional hardware or special application programming, the host system users can:

- Interactively operate and control any AS/400 system that is in the HCF-DHCF network. Several host system users can perform different operations on the same AS/400 system at the same time. Each user can:
 - Access and control applications that are on each AS/400 system in the network. They can use any application program for which they have the proper authority.
 - Display, with the proper authority, any of the user files and libraries on any AS/400 system.
 - Look at and respond to unique system messages from the AS/400 system.
- Use the operations and service functions of any AS/400 system in the HCF-DHCF network to do problem analysis on any AS/400 system in the network. This includes interactive examination of the system's error log, and running and displaying storage dumps and traces.

Using the AS/400 System in an HCF Environment

The host system (a System/370 or System/390 system, or a 43xx or 30xx processor) for an HCF network must be operating under VTAM/NCP, or under the Network Communications Control Facility (NCCF) if it has the Terminal Access Facility (TAF) feature, with which VTAM/NCP is also used. The host system must be using at least Version 2 of HCF (Program 5668-985). The use of any earlier version or release of HCF with the AS/400 system may produce inaccurate results.

HCF is a VTAM application program that operates with Release 3.8 or later releases of OS/VS2 Multiple Virtual Storage (MVS), Release 7.0 or later of OS/VS1, or Release 35 or later releases of DOS/VSE.

For host system considerations when preparing for and starting a DHCF session on the AS/400 system, see "Host System Programming Considerations for DHCF."

Using HCF, host system users can perform remote management activities on the AS/400 systems or other systems in the network. HCF allows the host system to access at the same time different AS/400 systems, System/36s, System/38s, Series/1* systems, and 8100 Information Systems that are defined as nodes in the host system's HCF network.

Types of Nodes in an HCF Network

An HCF network consists of the host system and one or more of the following nodes (systems):

- An AS/400 system with DHCF support
- System/36 with DHCF support
- Series/1 system with host system operator support
- System/38 with DHCF support
- 8100 DPPX or DPCX with DHCF support

¹ Any display station, attached by coaxial cable, that uses 3270 data streams.

² Any display station, attached by twinaxial cable, that uses 5250 data streams.

Figure 15-1 illustrates an HCF host system with these types of systems as nodes in an HCF network.

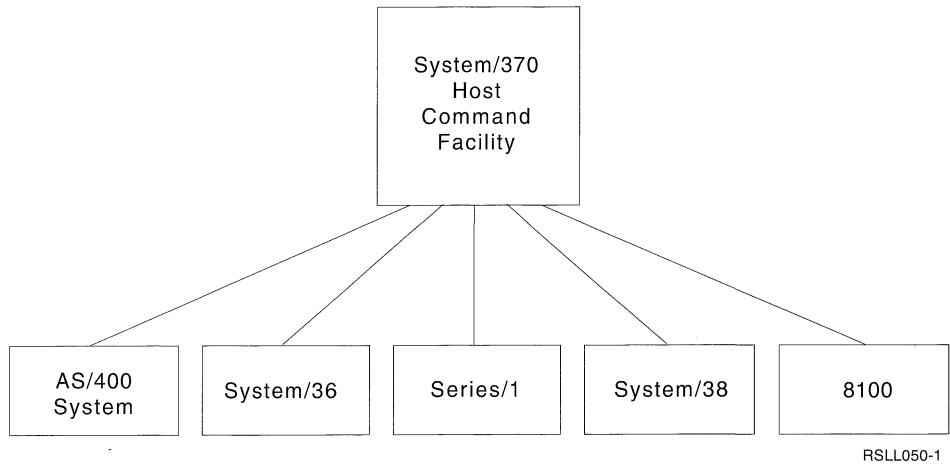


Figure 15-1. Types of Systems in an HCF Network

Remote Management with OS/400 DHCF

With OS/400 DHCF support, one or more host system users, using 3270 display stations, can remotely operate and control the AS/400 system as though they were using remote 5250 display stations attached to the AS/400 system.

Each AS/400 system must be connected to the host system through a Systems Network Architecture (SNA) communications line that uses either synchronous data link control (SDLC) or CCITT Recommendation X.25 or is part of a local area network. (**CCITT Recommendation X.25** is a document that outlines standards for the connection of processing equipment to a packet-switching data network.) Each 3270 display station that is to use DHCF on the AS/400 system can be attached to the HCF host system directly as a locally attached device (either SNA or non-SNA) or remotely using either Binary Synchronous Communications (BSC) or SNA/SDLC. Figure 15-2 on page 15-3 illustrates several HCF system users operating an AS/400 system with DHCF at the same time.

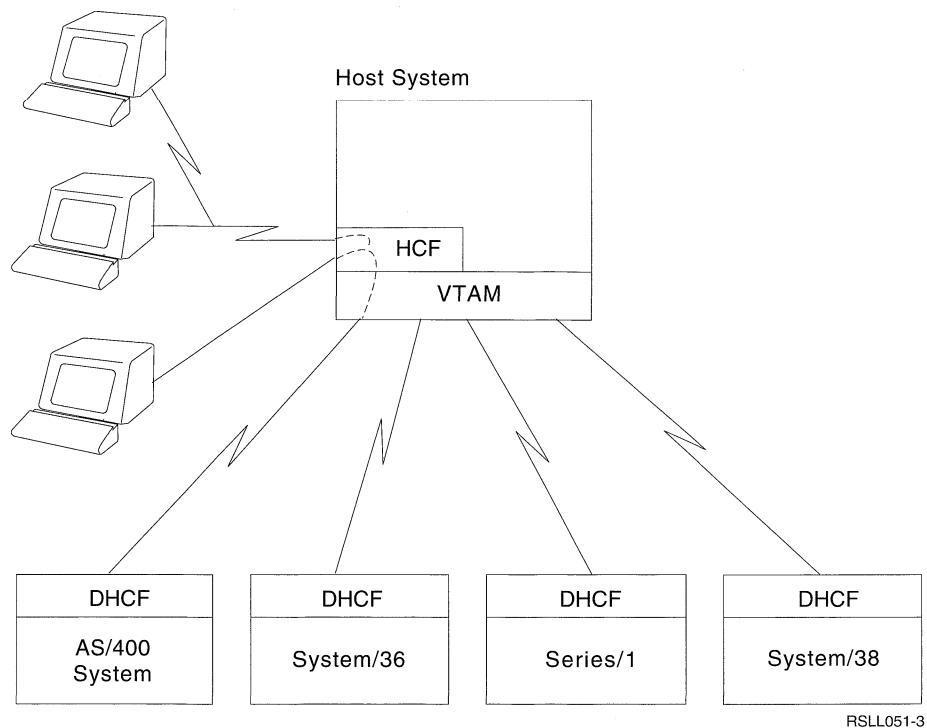


Figure 15-2. Several Host Users Remotely Operating an AS/400 System

The following diagram illustrates the logical attachment of a 3270 display station (using HCF) to an AS/400 system that is using DHCf.

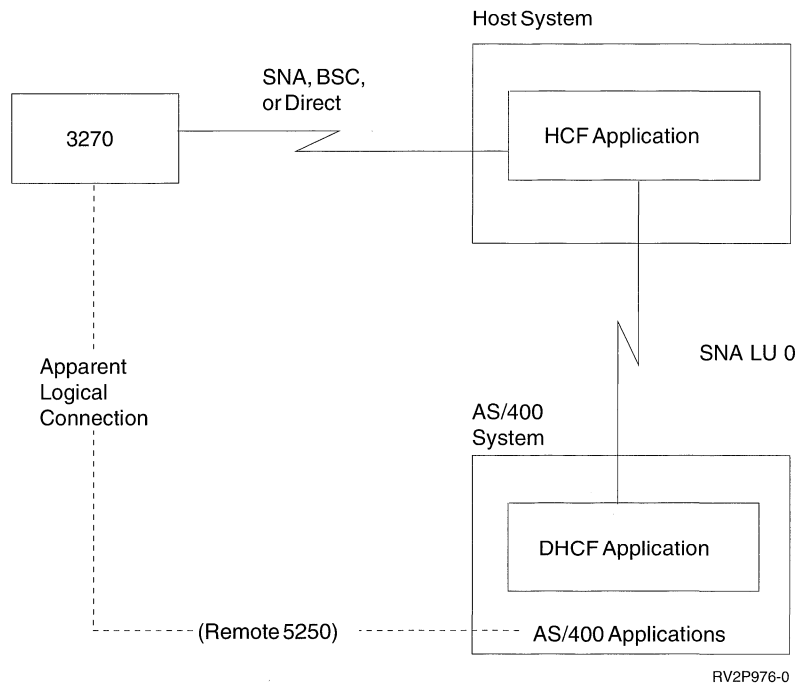


Figure 15-3. Logical Connection to OS/400 DHCf

OS/400 DHCf can support as many as 254 DHCf sessions on each host controller.

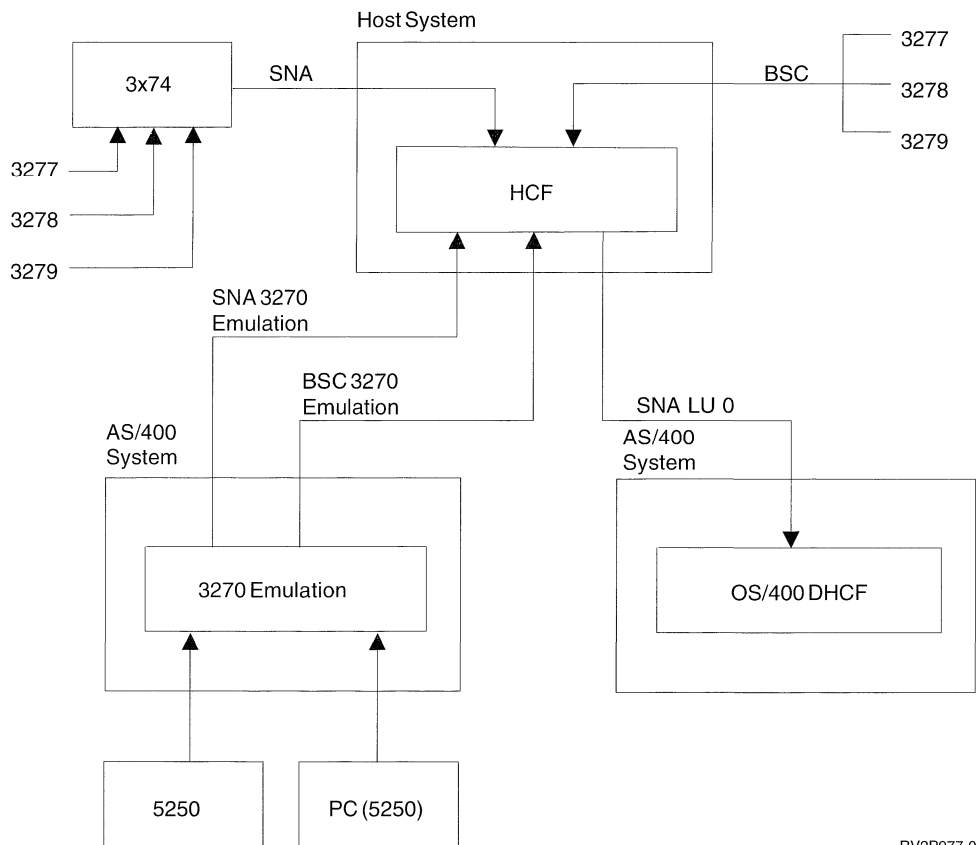
The HCF display stations function as 3277, 3278, or 3279 display stations attached to the host system and as remote 5250 display stations to OS/400 DHCf. The operating requirements for such display stations are described under "3270 and 5250 Keyboards" on page 11-2 and "3270 and 5250 Displays" on page 11-5.

Additional information about HCF on the host system can be obtained from the HCF manuals listed in the “Bibliography” on page H-1.

Multiple System Interconnection with OS/400 DHCF

OS/400 DHCF support also allows an AS/400-to-AS/400 interconnection. One AS/400 system uses either 3270 emulation for SNA or 3270 emulation for BSC to control, through HCF at the host system, another AS/400 system that is connected to the host system with DHCF. That is, 3270 emulation is used on the source AS/400 system, and DHCF is used on the target AS/400 system.

The arrows in Figure 15-4 indicate the direction (of control) from which DHCF sessions are started. Whether from 5250 users on the AS/400 system using 3270 emulation, or from 3270 users using SNA or BSC at the host system, all of the users’ input must first go through the host system HCF support before it goes to the AS/400 system being controlled.



RV2P977-0

Figure 15-4. Using AS/400 3270 Emulation with OS/400 DHCF

In the same manner, 5250 display station users on other systems (such as a System/38, Series/1 system, System/34, or System/36) that can use 3270 emulation can also operate an AS/400 system that has DHCF and is connected to an HCF host system. Before you can use DHCF to communicate with a host system, you must configure for DHCF.

Host System Programming Considerations for DHCF

The host system programmer should read the following summary of programming considerations. This information should not be needed by the AS/400 programmer. When the support is configured, the AS/400 programmer must be provided with certain parameter values that were specified during host system generation.

Additional information about HCF and VTAM can be obtained from the manuals listed in the *Publications Guide*.

VTAM/NCP Programming Considerations

Before communications can occur between the HCF host system and OS/400 DHCf, VTAM/NCP generation must be done on the host system. All AS/400 systems to be included in the network must be defined during the VTAM/NCP generation. Each AS/400 host controller represents a physical unit (PU) to VTAM/NCP. Therefore, each AS/400 host controller that DHCf uses requires a PU definition in the VTAM/NCP generation. Because the DHCf session is considered an SNA logical unit (LU), the session also requires an LU definition.

A description of all the parameters affecting DHCf definition types follows.

Physical Unit Definition Parameters

The following parameters on the physical unit (PU) macroinstruction definition apply to the DHCf support:

ADDR = xx

Specifies the station address.

DISCNT = NO/YES

Specifies whether VTAM/NCP is to disconnect the physical unit when the last logical unit session is ended. DISCNT=NO allows the AS/400 system to remain connected when no sessions are active; the physical unit is deactivated when the last device on the line is varied off. DISCNT=YES disconnects the AS/400 system when the last session ends; the DHCf support remains active until the device is varied off. DISCNT=YES also causes VTAM to ignore the AS/400 vary off request. If **switched lines** (a connection between computers or devices established by dialing) and multiple locations are configured, specify DISCNT=YES.

IDBLK = 056

IDBLK must be specified as 056 for an AS/400 system. This parameter is specified only for a switched line.

IDNUM = number

The IDBLK and IDNUM parameters make up the SDLC exchange identifier. This parameter is specified only for a switched line.

ISTATUS = ACTIVE/INACTIVE

Specifies whether the physical unit should be activated when its major node is activated.

MAXDATA = 2057

Specifies the maximum amount of data, including the transmission header and request/response header, that the physical unit can receive. This value must match the maximum frame size (MAXFRAME) parameter of the line description on the AS/400 system.

MAXOUT = 7

Specifies the number of path information units (PIUs) that VTAM/NCP will send to the AS/400 system before requesting a response. For best performance, 7 should be specified.

PUTYPE = 2

The physical unit type must be 2.

SSCPFM = USSSCS

Specifies that the AS/400 logical units associated with this physical unit use character-coded messages for communications with VTAM/NCP. The AS/400 system requires character-coded messages.

USSTAB = name

Specifies the name of a USS definition table.

Logical Unit Definition Parameters

The following parameters on the logical unit (LU) macroinstruction definition apply to the DHCF support:

ENCR = NONE

Specifies the type of encryption to be used. Encryption is not supported by the AS/400 system for DHCF support, so NONE must be specified.

LOCADDR = address

Specifies the local address of the session. The local address is equivalent to a logical unit number and corresponds to the LOCADR parameter on the device description of the AS/400 system. The host LOCADDR parameter is a decimal value. The AS/400 LOCADR parameter is a hexadecimal value.

ISTATUS = ACTIVE/INACTIVE

Specifies whether the logical unit is to be activated when the physical unit is activated.

PACING = count

Specifies the way pacing is to be handled between VTAM/NCP and the logical unit. **Pacing** is used to control the rate of data flow between the OS/400 program and the host system. Pacing allows the receiver to control the rate at which the sender sends requests.

Each OS/400 logical unit has both a sending and a receiving pacing value. The AS/400 system supports all valid values for sending and receiving pacing from 0 to 63. A value of 0 indicates pacing will not be enforced.

DLOGMOD = name

Specifies the logon mode table entry to be used in the bind command to this LU.

Note: Devices configured for DHCF return an SNA negative response if they receive user-defined logon messages defined by the USSMSG macroinstruction with the MSG=10 operand.

Host System Work Sheet

The following work sheet should be used to coordinate the AS/400 subsystem configurations and the VTAM/NCP host system generation.

It is recommended that you use this work sheet in one of the following ways:

- Have the host system personnel fill out the work sheet and then use those values to configure an AS/400 system for DHCF.
- You configure the AS/400 system, fill out the work sheet, and then give the work sheet to the host system personnel.

Table 15-1. AS/400 Support VTAM/NCP Configuration Work Sheet

| Generation Parameter Description | AS/400 Value | Host Configuration Entry |
|--|---|--------------------------|
| The value specified for the IDNUM parameter of the PU macro during VTAM/NCP generation. | Line parameter EXCHID first 3 characters=056 for an AS/400 system | |
| The value specified for the ADDR parameter of the PU macro during VTAM/NCP generation. | Controller STNADR | |
| The value specified in the START procedure for VTAM/NCP as the SSCPID (system services control point identifier). | Controller SSCPID | |
| The values specified for the LOCADDR parameters of the LU macros during VTAM/NCP generation. Up to 255 LU addresses can be assigned to an AS/400 system under one physical unit (but only 254 DHCF devices can be configured on an AS/400 system). | Device LOCADR | |

Describing a Configuration for DHCF

The configuration of the AS/400 system for DHCF requires a line description, a controller description, and a device description. A summary of each configuration operation follows. For information on using the configuration displays and commands, see the *OS/400* Communications Configuration Reference* manual.

Line Description

Either an SNA SDLC line, a local area network line, or an X.25 data link line using LU 1 must be created for DHCF. You can create the line descriptions for DHCF by using the following commands:

- Create Line Description (SDLC) (CRTLINS DLC) command
- Create Line Description (Token-Ring) (CRTLINTRN) command
- Create Line Description (Ethernet) (CRTLINETH) command
- Create Line Description (X.25) (CRTLINX25) command

The DHCF line type can be either secondary or negotiable for SDLC on the line description.

Controller Description

Configure your controller using the Create Controller Description (SNA Host) (CRTCTLHOST) command. DHCF allows attachment of HCF-DHCF sessions on the same SDLC secondary communications line, X.25 communications line, or local area network line with the following sessions:

LU 0 (SNUF)
LU 1 (NRF, SPLS, and SRJE)
LU 2 (NRF and SPLS)
LU 2 and 3 (3270 emulation for SNA)
LU 6.2 (APPC)

There can be a total of 254 devices under a host controller. These 254 devices can be any combination of the above device types.

Device Description

The device description should be created after the associated line and controller descriptions have been created. This sequence is not required; however, the system rejects any commands referring to names of descriptions not yet created. The Create Device Description (Display) (CRTDEV DSP) command, with the parameter DEVCLS(*RMT) specified, creates a device description for a remote display device.

The DHCF device type must be a 3270-type device with a model of *DHCF. 3277, 3278, and 3279 devices can all use this controller attachment. The actual distinction of device type is made by HCF with the **ACQUIRE. command. The **addressing** (the way the sending or control station selects the station to which it is sending data) of *DHCF devices is a unit address of 01-FE (digits 1-2).

The DHCF device description (DEV D) can be mixed on the controller with APPC, SNUF, and host device descriptions (including 3270 emulation).

Configuring the System

The following control language (CL) commands are used to define the configuration for the system in a program called CRTDHCF. This example shows these commands used in a CL program; the configuration can also be defined using the configuration menus.

```

/*****/
/*
/* MODULE: CRTDHCF LIBRARY: RMTLIB */
/*
/* LANGUAGE: CL */
/*
/* FUNCTION: Configures an SDLC nonswitched line to a host with an
/* attached host controller and attached DHCF display. */
/*
/* SDLC nonswitched line MVSLIN */
/* 3274 Controller MVSCTL */
/* 3279 Display MVSDSP */
/*
/*****/
PGM
/* Create the line description for the nonswitched SDLC line to the
/* host system
CRTLINS DLC LIND(MVSLIN) + /* Call the line MVSLIN */
RSRCNAME(LIN011) + /* LIN011 assign by this system */
ONLINE(*NO) + /* Do not vary on automatically */
ROLE(*SEC) /* System is secondary station */
/* Create the controller description for the host controller */
CRTCTHOST CTLD(MVSCTL) + /* Call the controller MVSCTL */
LINKTYE(*SDLC) + /* The line will be SDLC */
ONLINE(*NO) + /* Do not vary on automatically */
APPN(*NO) + /* Functions of APPN not needed */
LINE(MVSLIN) + /* The line will be MVSLIN */
STNADR(C1) + /* Primary polls secondary as C1 */
MAXFRAME(521) + /* Max frame size is 521 bytes */
RMTNETID(*NONE) /* ID not needed when not APPN */
/* Create the device description for the DHCF display */
CRTDEV DSP DEVD(MVSDSP) + /* Call display device MVSDSP */
DEVCLS(*RMT) + /* Remote (not local or virtual) */
TYPE(3279) + /* DHCF type 3277, 3278, or 3279 */
MODEL(*DHCF) + /* The model is *DHCF */
ONLINE(*NO) + /* Device should match CTL */
LOCADR(01) + /* The device location address */
MAXLENRU(*CALC) + /* Max frame size is *CALC bytes */
CTL(MVSCTL) /* Controller to which the
/* device is attached */
ENDPGM

```

Figure 15-5. SDLC Nonswitched Line Configuration

Using DHCF for Remote Management

You are ready to log on if you have completed the following:

- Established a physical connection between the host system and the AS/400 system.
- Performed the proper configuration requirements at the HCF host system and DHCF nodes.
- Started the OS/400 DHCF support using the Vary On Configuration (VRYCFG) command.

Logging on the Host System

The HCF host system obtains the parameters for the bind command it sends to the node from an entry in the logon mode table. The logon mode table in which the entry is found is identified by the MODETAB parameter on the LU or PU macroinstruction for the node. An entry within the logon mode table is defined by using the MODEENT macroinstruction.

DHCF Logon Modes (via HCF)

Although various logon modes are valid on the host system, only two are recommended for use when communicating with an AS/400 system using DHCF:

- Use logon mode entry FPS1920 when the user display stations are communicating with the host system across an SNA link (the host-to-HCF connection). (In SNA, a **link** is the combination of the link connection (the transmission medium) and two link stations.)

- Use logon mode entry HCX3270 when the user display stations are directly attached to the host system (non-SNA) or are communicating with the host system across a BSC link (the host-to-HCF connection).

Notes:

1. These SNA and BSC links are not to be confused with the SNA-LU0 link that must exist between the AS/400 system and the host system. However, LOGMODE=FS1920 can also be specified on the LU macroinstruction for the DHCF device-to-HCF connection.
2. When user display stations are non-SNA (directly or BSC-attached) to the host system, extended data streams (reverse image, blink, underscore, or color) are not supported to this display.

The following are examples of the two types of DHCF logon modes (identified by the FPS1920 and HCX3270 logon mode tables).

SNA and Emulation Device Logon Modes

```
FPS1920  MODEENT  LOGMODE=FS1920,FMPROF=X'03',TSPROF=X'03',
          PRIPROT=X'B1',SECPROT=X'90',
          COMPROT=X'3080',RUSIZES=(see note),
          PSERVIC=X'020000000000000000000200'
```

BSC-attached Device Logon Mode

```
HCX3270  MODEENT  LOGMODE=CX3270,FMPROF=X'02',TSPROF=X'02',
          PRIPROT=X'71',SECPROT=X'40',
          COMPROT=X'2000',RUSIZES=X'A8A8',
          PSERVIC=X'020000000000000000000200'
```

Note: The recommended value for the RUSIZES parameter when using remotely connected SNA terminals is X'A8A8'. The recommended value for locally connected SNA terminals is X'C7C7'.

The LOGMODE parameter value (FS1920 or CX3270 in these tables) is specified on the HCF LOGON command by the HCF user at a host terminal:

```
User:          LOGON APPLID(HCF) LOGMODE(CX3270)
```

```
HCF message:  CHF0004I  HCF LOGON SUCCESSFUL
```

Starting DHCF

HCF starts DHCF by sending a bind command. The parameters for this bind are defined in the host PU or LU macroinstruction, in this example LU023A10, using the DLOGMOD parameter. The HCF user at a host terminal specifies the logical unit on which transmission is started on the HCF **ACQUIRE. command.

```
**ACQUIRE., LU023A10,3277
```

The AS/400 sign-on display appears. The HCF user then types a user ID and password (if required). The DHCF session is then active on the AS/400 system and treats the user as a remote 5250.

The LU name specified in the **ACQUIRE. command is the name as configured in the host Network Control Program (NCP) generation. The LOCADDR parameter of the host macroinstruction that applies to that LU name correlates with the LOCADR parameter in the corresponding device description on the AS/400 system.

Ending DHCF

Three distinct sessions are activated when a user on a System/370 host uses HCF and DHCF to run an application on the AS/400 system. These sessions are activated in the following sequence:

1. The user starts a session between the host terminal and HCF by using the HCF LOGON command.
2. The user starts a session between HCF on the host system and DHCF on the AS/400 system by using the ****ACQUIRE.** command.
3. The user starts a third session between DHCF and the AS/400 application by signing on to the AS/400 system.

The sessions are ended in the reverse order:

1. The user ends the session between DHCF and the AS/400 application by typing the AS/400 Sign Off (SIGNOFF) command. The AS/400 sign-on display appears.
2. From the sign-on display, the user ends the session between the host system and the AS/400 system by using the ****DROP.** command. When that OS/400 DHCF session is ended, the user still has a session with HCF and can start other DHCF sessions by using the HCF ****ACQUIRE.** command again.

AS/400: Sign-on display

User: ****DROP.**

HCF message: CHF0002I SESSION WITH LU023A10 HAS TERMINATED

User: ****ACQUIRE.,Luname,327x** (begins another HCF-DHCF session)

3. If no other DHCF sessions are desired, the user ends the HCF session by entering the ****LOGOFF.** command.

Note: You may also use the end connection (ENDCNN) parameter of the SIGNOFF command. For example, type:

SIGNOFF ENDCNN(*YES)

and press the Enter key. This is equivalent to using the AS/400 SIGNOFF command followed by the HCF ****DROP.** command (as explained in step 1 and step 2).

Summary of HCF Session Commands Relating to the AS/400 System

The following are the HCF commands to be used by a person at a 3270 display station to start and end DHCF sessions, or to request help during a session.

Table 15-2. HCF Command Descriptions

| Command | Description |
|---|--|
| **ACQUIRE., lu-name, terminal type | Connects the HCF terminal user at the host system to a specific AS/400 system. Valid terminal types are 3277, 3278, and 3279. |
| **DROP. | Disconnects the HCF terminal user at the host system from the AS/400 system, but maintains the logical connection between the terminal and the HCF application on the host system. |
| **LOGOFF. | Disconnects the AS/400 system from the HCF host system, if connected, and ends the user's HCF session. |
| **HELP. | Provides help to the HCF terminal user at the host system. |

Changing HCF Commands, Online Help Information, and Messages

HCF commands, online help information, and messages can be changed at the host system to adapt to different situations and computer systems. The HCF commands, online help information, and messages are discussed in the HCF manuals listed in the “Bibliography” on page H-1.

HCF Host System 3270 Terminal Requirements

The HCF host system display stations can be either locally attached to the System/370 system through a channel, or remotely attached through a controller.

The OS/400 DHCF support requires that the host display stations be IBM 3277, 3278, and 3279 devices (or devices able to emulate one of these models), with 1920-character display, typewriter keyboard, and at least 12 function keys. Severe limitations exist with the use of a data entry keyboard if it does not have at least 12 function keys.

User-defined keyboard assignments are supported by DHCF. For information regarding assignable keys, see “3270-to-5250 Keyboard Mapping.”

Printers are *not* supported by HCF.

Extended Display Attributes

The AS/400 system and its host system can send the extended attributes of 3278 and 3279 display stations (color, blink, reverse image, and underscore) by sending the extended data stream for those display stations.

Display Station Considerations for DHCF

Because the host system and the AS/400 system have different types of display stations attached to them, there are two major areas of consideration.

- When DHCF is being used, the 3277, 3278, and 3279 display stations on the host system must have their keyboards mapped to different values for some of their function keys. These values are changed so that the 3270 keyboards can appear to be 5250 keyboards when remotely attached to OS/400 DHCF.
- Other differences in the way that the keys and data in a 3270 data stream are handled also exist.

Note: In this section, 3270 refers to the keyboards used by any 3277, 3278, or 3279 display station. Where there are specific differences among these types, the correct number is used instead.

3270-to-5250 Keyboard Mapping

A 3270 display station being used to do work on an AS/400 system using DHCF appears to be a 5250 display station to an AS/400 system. The 3270 display station keyboard has a 5250-equivalent keyboard map associated with it to do the 5250-equivalent functions on the AS/400 system.

When a host system user first signs on OS/400 DHCF, the AS/400 system automatically assigns the DHCF *default* keyboard map to the user's 3277, 3278, or 3279 keyboard (unless a user-defined keyboard map has been set up to be automatically included in the user's DHCF sign-on procedure). This supplies the mapping (or translation) needed for the 3270 keyboards to do most of the same functions as their 5250 keyboard equivalents. This same support is also supplied for any other display devices that are attached to the host system through BSC or SNA 3270 **device emulation**, which is the operating system support that allows an AS/400 system to appear as a 3274 Control Unit in a BSC multipoint network or an SNA network. (A **multipoint** network allows two or more stations to communicate with a single system on one line.)

If satisfied with the default keyboard mapping supplied at DHCF sign-on, the host system user of DHCF may skip the remainder of this section and go on to “3270 and 5250 Keyboard and Display Differences” on page 15-15, which describes other differences between 3270 and 5250 display devices when DHCF is used.

Displaying a Keyboard Map

To see the keyboard values currently in effect, the 3270 user should type the Display Keyboard Map (DSPKBDMAP) command (after signing onto DHCF) or press the 3270 Help (HLP3270) key.

Note: The type of processing for the DSPKBDMAP command should be limited to MODE(*INTERACT *IPGM *EXEC).

To see a list of the keyboard mapping commands, you can select option 9 (Display a menu) from the AS/400 Main Menu, type in CMDKBD (Keyboard Commands) for the menu name from the GO display, and press the Enter key. A display similar to the following is shown:

```

CMDKBD                                Keyboard Commands

Select one of the following:

Commands
  1. Change Keyboard Map                CHGKBDMAP
  2. Display Keyboard Map              DSPKBDMAP
  3. Set Keyboard Map                  SETKBDMAP
  
```

A display similar to the following appears when you select the DSPKBDMAP command:

```

                                Help for 3270 Keyboard Mapping

3270 Key                               3270 Key
Sequence  Function                      Sequence  Function
PF1       5250 help text                PF13     F13
PF2       3270 help text                PF14     F14
PF3       F3                            PF15     F15
PF4       F4                            PF16     F16
PF5       F5                            PF17     F17
PF6       F6                            PF18     F18
PF7       Page up (Roll down)          PF19     F19
PF8       Page down (Roll up)         PF20     F20
PF9       F9                            PF21     F21
PF10     F10                            PF22     F22
PF11     F11                            PF23     F23
PF12     F12                            PF24     F24

Display attributes = display imbedded attributes

Press Enter to continue.

F3=Exit    F12=Previous

                                More...
```

Only the keyboard mapping member currently being used can be displayed; no other members can be specified. You can press the Page or Roll key to see additional information.

Help for 3270 Keyboard Mapping

| 3270 Key Sequence | Function | 3270 Key Sequence | Function |
|-------------------|----------|-------------------|----------|
| PA1 PF1 | F1 | PA2 PF1 | F13 |
| PA1 PF2 | F2 | PA2 PF2 | F14 |
| PA1 PF3 | F3 | PA2 PF3 | F15 |
| PA1 PF4 | F4 | PA2 PF4 | F16 |
| PA1 PF5 | F5 | PA2 PF5 | F17 |
| PA1 PF6 | F6 | PA2 PF6 | F18 |
| PA1 PF7 | F7 | PA2 PF7 | F19 |
| PA1 PF8 | F8 | PA2 PF8 | F20 |
| PA1 PF9 | F9 | PA2 PF9 | F21 |
| PA1 PF10 | F10 | PA2 PF10 | F22 |
| PA1 PF11 | F11 | PA2 PF11 | F23 |
| PA1 PF12 | F12 | PA2 PF12 | F24 |

Display attributes = display imbedded attributes

Press Enter to continue.

F3=Exit F12=Previous

More...

Help for 3270 Keyboard Mapping

| Function | 3270 Key Sequence | 5250 Key Sequence |
|-----------------------------------|-------------------|-------------------|
| Erase all input fields | Not supported | Erase Input |
| Field plus | Not supported | Field+ |
| Field minus | Not supported | Field- |
| Erase end-of-field and exit field | Erase EOF,--> | Field Exit |

To use the attention function (ATTN), do one of the following:

- Press Test Request, then press PA1 if using a 3277 display attached to an SNA 3274 controller.
- Press ATTN if using a 3278 or 3279 display attached to an SNA 3274 controller.
- Press the 3270 Key Sequence set by the user if using a distributed host command facility, network routing facility, or SNA Primary LU2 Support device.

Press Enter to continue.

F3=Exit F12=Previous

Bottom

You can specify different PF key assignments by using the Change Keyboard Map (CHGKBDMAP) command or the Set Keyboard Map (SETKBDMAP) command. Table 11-2 on page 11-4 shows the default PF key assignments to perform the various 5250 functions.

Changing a Keyboard Map

The Change Keyboard Map (CHGKBDMAP) and Set Keyboard Map (SETKBDMAP) commands can be used to change the DHCF-supplied keyboard map used by 3270 display station users. Key assignments made using these commands remain in effect until the display station is signed off.

A CL program such as the one shown in Figure 15-6 can also be used to set up a keyboard map for each DHCF user. To use the keyboard map described by the program, use the Change User Profile (CHGUSRPRF) command to specify the qualified name of the program as the initial program for each DHCF user profile that will use the keyboard map. The keyboard map described by the program will then be set each time a DHCF user signs on.

```

/*****
/*
/* PROGRAM NAME:  DHCFCMAP                LIBRARY:  DHCFLIB  */
/*
/* LANGUAGE:  CL                          */
/*
/* FUNCTION:  SETS A MORE USABLE KEYBOARD MAP FOR USERS OF 3270 */
/*           DEVICES ATTACHED TO AS/400 SYSTEMS USING HCF,    */
/*           3270 REMOTE ATTACH, NRF, OR SPLS.                 */
/*
/*****
BEGIN:      PGM
/*
/* CHANGE THE KEYBOARD MAP.
/*
A1:         SETKBDMAP  DEV(*REQUESTER) +
            PF1(*F1) PF2(*F2) PF3(*F3) +
            PF4(*F4) PF5(*F5) PF6(*F6) +
            PF7(*DOWN) PF8(*UP) PF9(*F9) +
            PF10(*F10) PF11(*F11) PF12(*F12) +
            PF13(*F13) PF14(*F14) PF15(*F15) +
            PF16(*F16) PF17(*F17) PF18(*F18) +
            PF19(*F19) PF20(*F20) PF21(*F21) +
            PF22(*F22) PF23(*F23) PF24(*F24) +
            PA1PF1(*HELP) PA1PF2(*HLP3270) +
            PA1PF3(*CLEAR) PA1PF4(*PRINT) +
            PA1PF5(*DSPATR) PA1PF6(*TEST) +
            PA1PF7(*F7) PA1PF8(*F8) +
            PA1PF9(*ATTN) PA1PF10(*RESET) +
            PA1PF11(*SYSREQ) PA1PF12(*BCKSPC) +
            PA2PF1(*F13) PA2PF2(*F14) +
            PA2PF3(*F15) PA2PF4(*F16) +
            PA2PF5(*F17) PA2PF6(*F18) +
            PA2PF7(*F19) PA2PF8(*F20) +
            PA2PF9(*F21) PA2PF10(*F22) +
            PA2PF11(*F23) PA2PF12(*F24)

/*
/* MONITORS FOR CPF8701 MESSAGE TO CHECK FOR NON-3270 DEVICE.
/* IF NOT A 3270 DEVICE, PROGRAM ENDS.
/*
B1:         MONMSG      MSGID(CPF8701) EXEC(GOTO CMDLBL(NOMAP))
/*
NOMAP:      RETURN
            ENDPGM
/*****

```

Figure 15-6. CL Program to Set Keyboard Map for DHCF Sessions

For example, to change the user profile for user DHCFCJOE to use the keyboard map program shown in Figure 15-6, use the following command:

```
CHGUSRPRF USRPRF(DHCFCJOE) INLPGM(DHCFLIB/DHCFCMAP)
```

Keyboard Mapping Considerations for DHCF

Following are other considerations that affect how DHCF keyboard mapping is used.

- The user must have successfully logged on the HCF host system *and* signed on the AS/400 system.
- The keyboard map that is activated at a particular DHCF display station is in effect for *all* the sessions that are active for that display station.
- The PA1 and PA2 keys *cannot* be assigned a different value. These keys are used for the special sequences PA1/PF1 through PF12 and PA2/PF1 through PF12. The PA keys always signify that a PF key will follow, and that the two-key sequence is to be interpreted as a group. The only exception is when the keyboard has 24 PF keys and the PA1 or PA2 key is pressed, followed by PF13 through PF24. In that case, the PA key is ignored and only the PF key is interpreted.
- The PF13 through PF24 keys are definable on all DHCF display stations. However, because DHCF on the AS/400 system has no way of determining whether the remote device actually has 24 PF keys, no function from the minimum function set of four keys (HELP, HLP3270, ATTN, or SYSREQ) can be assigned to PF13 through PF24 unless that function is also assigned to PF1 through PF12, PA1/PF1 through PF12, or PA2/PF1 through PF12.

- If desired, a DHCF user can assign the 3270 PF keys to map to function keys that are defined to have specific meanings for his application programs. For example, one function key could be defined to mean EOJ (end of job).

The application programs in which the special meanings are to be used must be written so that they support the special function; that is, assigning the EOJ function to a particular function key does not mean that DHCF will handle the EOJ function when that key is pressed. DHCF will interpret the PF key and return the appropriate command key function to the application. The application must interpret any function key that is specific to the program and provide that function. For more information about user-defined function keys, see the appropriate programming language manual.

- A 3270 attention identifier (AID) generating key does not allow the generation of a subsequent AID request until the first AID request is processed. A 3270 **attention identifier (AID)** is a character in a data stream indicating that the display station user pressed a key (such as the Enter key) to request an action by the system.

3270 and 5250 Keyboard and Display Differences

Most of the features that are available on a 5250 display station are also available on a 3270 host system display station. There are, however, a number of differences that the 3270 user should know about, such as how OS/400 DHCF handles the key values and data field attributes sent in a 3270 data stream.

For information about the differences between the 3270 and 5250 keyboards and displays, see “3270 and 5250 Keyboards” on page 11-2.

Messages in DHCF Sessions

When a message arrives for the DHCF work station, you see a Message waiting message on line 24. To continue, you must press one of the following keys: ATTN (PF9), Reset (PF10), Sys/Req (PF11), or the Enter key, all of which have reset capability, or the Help (PF1). After this, you can review the waiting message by entering the Display Message (DSPMSG) command or by pressing the Sys/Req key (PF11), then selecting option 6 (Display system operator message).

Note: Sys/Req (PF11) and Help (PF1) reset the line but send another message to line 24, which requires that you press the Reset key again.

For additional information on error messages, see “Messages” on page 11-7.

DHCF Differences

Following are the differences in DHCF support between the AS/400 system and the System/36 and System/38.

Differences from System/36 DHCF Support

To specify a different arrangement of 3270-to-5250 keyboard mapping during a System/36 DHCF session, you use the KEYS procedure to define and then select the keyboard mapping version. On the AS/400 system, you use the Set Keyboard Map (SETKBDMAP), Change Keyboard Map (CHGKBDMAP), and Display Keyboard Map (DSPKBDMAP) commands. The AS/400 system does not support the KEYS procedure.

When an application program running on a System/36 includes the hexadecimal number FF in a 3270 data stream, the System/36 support for the 3270 data stream changes the hexadecimal FF to a hexadecimal 40. In contrast to this, the AS/400 system support for the 3270 data stream does not change the hexadecimal FF. Therefore, application programs that migrate from a System/36 to an AS/400 system need to be changed because not all 3270 display stations support hexadecimal FF.

Differences from System/38 DHCf Support

The System/38 supports the Define Keyboard Map (DEFKBDMAP) command. On the AS/400 system, the Set Keyboard Map (SETKBDMAP) command replaces the DEFKBDMAP command.

Chapter 16. Network Routing Facility

Network routing facility (NRF) support in the OS/400 licensed program enables 3270 display station to AS/400 system connections. OS/400 NRF support requires the Network Routing Facility (NRF) licensed program to be operating under the Network Control Program (NCP) licensed program. NCP runs Systems Network Architecture (SNA) communications controllers such as the IBM 3720 and 3745, providing controller support for single-domain, multiple-domain, and interconnected network capabilities. SNA includes the logical structure, formats, protocols, and operational sequences for transmitting information units through networks, and controlling the configuration and operation of networks.

NRF performs in much the same way as the host command facility (HCF). In both NRF and HCF, users attached to the System/370 host computer can access an AS/400 system as if they were 5250 display station users. NRF, however, differs from HCF in that NRF supports printers and does not use System/370 host-system processing unit time.

NRF allows a 3270 display station user or 3287-type printer to access an AS/400 system through an SNA communications controller. In performing this function, NRF acts as a pair of SNA logical units (LU) in a System/370 SNA Virtual Telecommunications Access Method (VTAM) network. A **VTAM network** is a set of programs that maintains control of the communication between terminals and application programs running under DOS/VS, OS/VS1, and OS/VS2 operating systems.

To perform this function, NRF is installed (under NCP) on an SNA communications controller with network connections to both the AS/400 system and the display and printer devices. NRF acts as the **primary logical unit (PLU)**, which contains the primary half-session for a logical unit to logical unit session. Both the AS/400 application and the 3x74 controller act as **secondary logical units (SLUs)**. SLUs contain secondary half-sessions for a logical unit to logical unit session.

Primary logical units are normally associated with applications running under VTAM, such as the CICS* product. Secondary logical units are normally associated with devices attached to the network, such as sessions with displays. When NRF is the primary logical unit, however, all other devices attached to it become secondary logical units.

NRF appears as application PLU to SNA 3270 users. However, unlike traditional VTAM PLUs, it resides in the SNA communications controller and not in the System/370 host computer.

Network Routing Facility Sessions

During the operation of NRF sessions in this application, VTAM is involved in only starting and ending the session. Once a pair of LUs are in session with each other, VTAM is aware of only the session. Data flows between the two LUs across the NCP backbone without going to the VTAM hosts. VTAM will now have only session awareness and will not be able to monitor or be involved with the session data. Once in session, NRF will no longer require the hosts to be active.

VTAM is involved in starting and ending the session for the LU-to-LU session that connects the application to NRF and is also involved in starting and ending the LU-to-LU session that connects NRF to the display or printer. For the simplest connection between an application and a device, VTAM must configure four LUs and NRF must configure a connection between two LUs.

Note: AS/400 systems will only support Version 1 Release 5 or later models of NCP/NRF.

For additional information about NRF session definitions, session setup, and session endings, refer to the manual *Network Routing Facility Migration, Resource Definition, and Customization*, SC31-6203.

Network Routing Facility Applications

NRF adds flexibility to a network and reduces overall line costs by giving the user more options in accessing applications. The following are ways NRF can be used.

Passing Through an SNA Network to an AS/400 System

Basic network routing facility operation is used by a user working on a 327x display attached to a System/370 backbone network through a 3x74 controller. The user can pass through the SNA network and access an AS/400 system. In addition, applications on the AS/400 system are able to print information on printers that are attached to the System/370 backbone network through a 3x74 controller.

For an illustration of a user passing through a System/370 network to access an AS/400 system, see Figure 16-1.

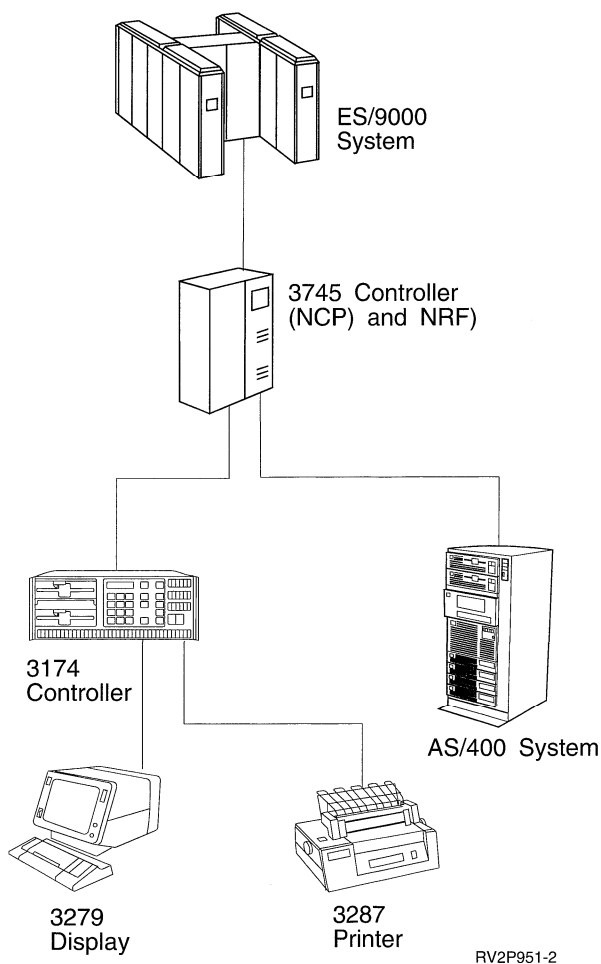


Figure 16-1. Passing through a System/370 Network to Access an AS/400 System

Adding Flexibility to an SNA Backbone Network

An SNA backbone network may consist of many System/370 host computers, to which an even larger number of controllers, AS/400 systems, displays, and printers are attached. Because of this complexity, display and printer devices that are physically very close together (for example, in the same building) may be signed on to applications in different parts of the network.

In Figure 16-2 on page 16-3, NRF provides the connection between display DSP01 (or DSP02) and Application C or between Application C and printer PRT01. Also, a single

display (for example, DSP02) may access different applications on the various systems at different times.

Note: Figure 16-2 shows one copy of NRF on the network. Only one copy of NRF is required on the network. All sessions using NRF will be routed through that SNA communications controller. Consider installing additional copies of NRF on other SNA communications controllers to provide possible improvements in performance.

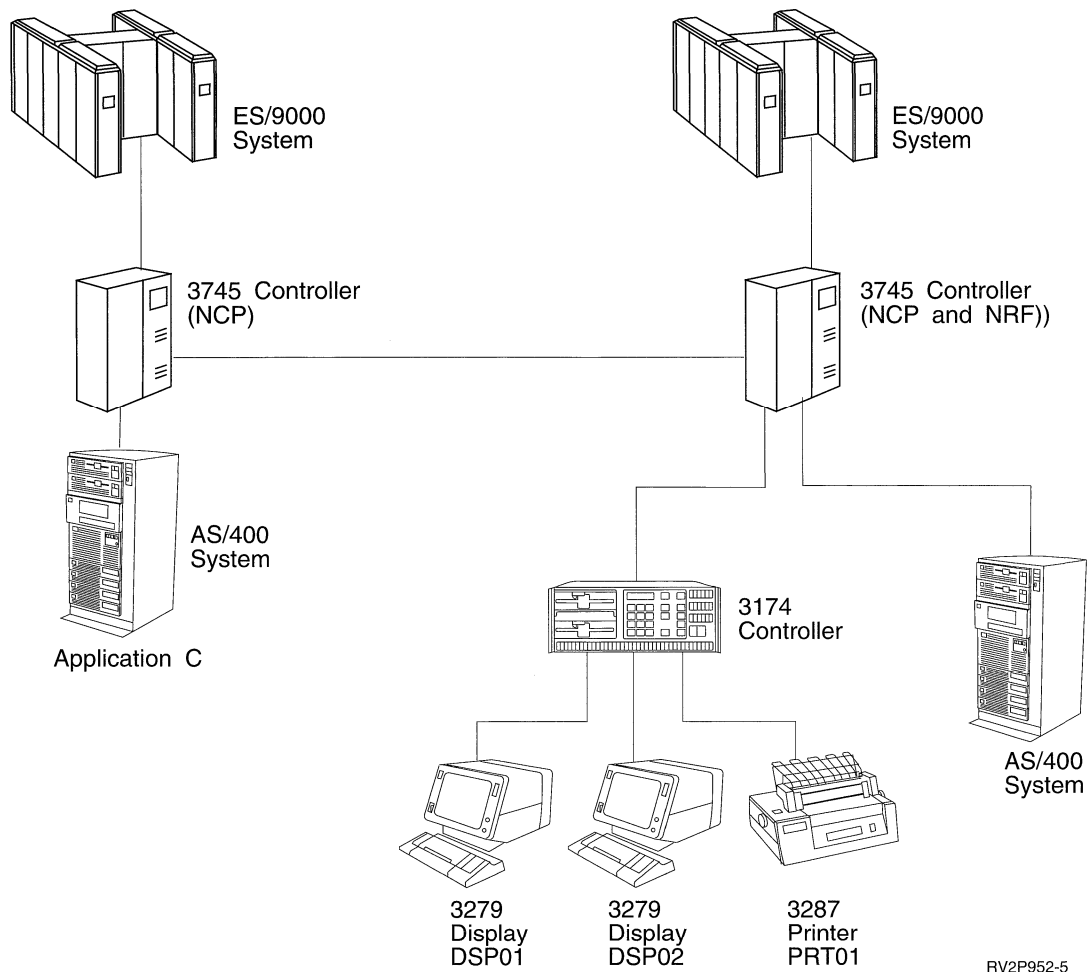


Figure 16-2. NRF within an SNA Backbone Network

Configuring the AS/400 System to Support Network Routing Facility

To configure the AS/400 system to communicate with NRF, perform these steps:

- ___ **Step 1.** Configure a line description to the System/370 host network (see “Step 1: Configuring the Line to the Host Network” on page 16-4).
- ___ **Step 2.** Configure a host controller description (see “Step 2: Configuring the Host Controller to Support Network Routing Facility” on page 16-5).
- ___ **Step 3.** Configure a 32xx *NRF device description (see “Step 3: Configuring the Device” on page 16-6).

For information on how to configure the System/370 host to support NRF, refer to the System/370 documentation.

Specifying Parameters for Network Routing Facility Support

The following parameters and values apply to AS/400 support of NRF for the commands Create Device Description (Display) (CRTDEV DSP), Create Device Description (Printer) (CRTDEV PRT), Change Device Description (Display) (CHGDEV DSP) and Change Device Description (Printer) (CHGDEV PRT).

Device description (DEV D)

Specifies the name of the device description.

Device class (DEVCLS)

Specifies the class of the configured device. The value to use for the DEVCLS parameter to support NRF is:

*RMT

The device is considered a remote device.

Device type (TYPE)

Specifies the type of remote 32xx printer or display device being configured.

Device model (MODEL)

Specifies the model number of the device being configured to support NRF. For 32xx display devices, valid values are 0 or 4. For 3287 printer devices, only 0 is valid.

*DHCF should *not* be used as a value for the MODEL parameter.

Application type (APPTYPE)

Specifies the type of application for which this device is being used. Valid values for the APPTYPE parameter can be:

*NONE

The device is not being used for any special applications.

*NRF

The device is being used for the network routing facility application.

Host signon/logon command (LOGON)

Specifies the logon string that will be sent to the system services control point (SSCP) on the host network at file open time. Valid values for the LOGON parameter can be:

*NONE

No logon string is specified.

logon string

A logon string of up to 256 characters. For more information on the logon string, see "Step 3: Configuring the Device" on page 16-6 and "Using Network Routing Facility" on page 16-7.

Step 1: Configuring the Line to the Host Network

Use one of the following commands to configure a line to the host system that will support NRF:

- Create Line Description (SDLC) (CRTLINSDLC)
- Create Line Description (Token-Ring) (CRTLINTRN)
- Create Line Description (Ethernet) (CRTLINETH)
- Create Line Description (X.25) (CRTLINX25)

This step may already have been performed if the AS/400 system has been communicating with the System/370 host for such functions as 3270 emulation or Host Command Facility and distributed host command facility (HCF-DHCF).

Figure 16-3 is an example of an SDLC line configured to the System/370 host to support NRF. In this example, the user has chosen a line description name of HOSTLINE and a resource name of LIN012 to describe the line to the host network. Note that the data link role parameter describes the AS/400 system as *SEC, a secondary logical unit.

```

                                Create Line Desc (SDLC) (CRTLINSDLC)

Type choices, press Enter.

Line description . . . . . > HOSTLINE      Name
Resource names . . . . . > LIN012         Name
      + for more values
Online at IPL . . . . . > *NO             *YES, *NO
Data link role . . . . . > *SEC          *NEG, *PRI, *SEC
Physical interface . . . . . > *RS232V24  *RS232V24, *V35, *X21, ...
Connection type . . . . . > *NONSWTTP    *NONSWTTP, *SWTTP, *MP, *SHM
Switched network backup . . . . . > *NO      *NO, *YES
Exchange identifier . . . . . > *SYSGEN    05600000-056FFFFFF, *SYSGEN
NRZI data encoding . . . . . > *YES       *YES, *NO
Line speed . . . . . > 9600             600, 1200, 2400, 4800...
Modem type supported . . . . . > *NORMAL    *NORMAL, *V54, *IBMWRAP...
Maximum frame size . . . . . > 521       265, 521, 1033, 2057
Duplex . . . . . > *HALF             *HALF, *FULL
Inactivity timer . . . . . > 300        *NOMAX, 150-4200 (0.1 sec)
Poll response delay . . . . . > 0         0-2048 (0.0001 seconds)
                                                    More...
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

```

Figure 16-3. Step 1: Configuring the Line to the System/370 Host Network

Step 2: Configuring the Host Controller to Support Network Routing Facility

Using the Create Controller Description (SNA Host) (CRTCTHHOST) command, enter the controller description and the link type. Again, this may already have been done if the AS/400 system has been communicating with the System/370 host for such functions as 3270 emulation or Host Command Facility and distributed host command facility (HCF-DHCF).

Figure 16-4 on page 16-6 is an example of a host controller description that supports NRF. Note that the attached nonswitched line parameter specifies the line description (HOSTLINE) that was created in “Step 1: Configuring the Line to the Host Network” on page 16-4. The user chose to name the controller description HOSTCTL and the link type *SDLC to designate that the line is an SDLC line.

```

                                Create Ctl Desc (SNA Host) (CRTCTLHOST)

Type choices, press Enter.

Controller description . . . . . > HOSTCTL      Name
Link type . . . . . > *SDLC          *IDLC, *FR, *LAN, *SDLC, *X25
Online at IPL . . . . . > *NO          *YES, *NO
Switched connection . . . . . > *NO          *NO, *YES
Switched network backup . . . . . > *NO          *NO, *YES
APPN-capable . . . . . > *NO          *YES, *NO
Attached nonswitched line . . . . . > HOSTLINE      Name
Maximum frame size . . . . . > *LINKTYPE      265-16393, 256, 265, 512...
Remote network identifier . . . . . > *NETATR      Name, *NETATR, *NONE, *ANY
Remote control point . . . . . > _____      Name, *ANY
SSCP identifier . . . . . > _____      050000000000-05FFFFFFFF
Local exchange identifier . . . . . > *LIND          05600000-056FFFFF, *LIND
Station address . . . . . > 0A          01-FE
Recontact on vary off . . . . . > *YES          *YES, *NO
Text 'description' . . . . . > *BLANK

-----
F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys
                                Bottom

```

Figure 16-4. Step 2: Configuring the Host Controller to Support NRF

Step 3: Configuring the Device

To configure a 3270-type display, use the Create Device Description (Display) (CRTDEV DSP) command. To configure a 3287-type printer, use the Create Device Description (Printer) (CRTDEV PRT) command. On the CRTDEV DSP or CRTDEV PRT display, enter the device description name, the device class (*RMT for the AS/400 system), the 327x device type, and the device model. You also need to fill in the application type parameter with a type of *NRF. Also, in some instances, fill in the host signon/logon command (LOGON) parameter. For DBCS-capable devices, fill in the DBCS feature (IGCFEAT) parameter. For information about configuring the IGCFEAT parameter, see Table 12-1 on page 12-3.

The LOGON parameter is the logon string, which is sent to the VTAM system services control point on the host system at file-open time.

The logon string must be sent if VTAM is configured such that the AS/400 system must initiate the NRF-to-AS/400 session, or if a printer device is being used. The logon string is optional if only *NRF display devices are being used.

When the logon string is configured using the CRTDEV DSP or CRTDEV PRT commands, the AS/400 NRF support automatically sends the logon string, and there is no need for operator action other than varying on the *NRF device.

Figure 16-5 on page 16-7 shows a configuration for a 3279 *NRF display device with a device description name of DSP02, a device class of *RMT, a device type of 3279, and a device model of 0. The attached controller parameter shows the controller description HOSTCTL created in "Step 2: Configuring the Host Controller to Support Network Routing Facility" on page 16-5

```

                                Create Device Desc (Display) (CRTDEV DSP)

Type choices, press Enter.

Device description . . . . . > DSP02      Name
Device class . . . . . > *RMT          *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 3279          3101, 3151, 3161, 3162...
Device model . . . . . > 0           0, 1, 2, 4, 11, 12, 23...
Local location address . . . . . > 0E   00-FE
Online at IPL . . . . . > *NO         *YES, *NO
Attached controller . . . . . > HOSTCTL Name
Keyboard language type . . . . . > *SYSVAL *SYSVAL, AGB, AGI, BLI...
Drop line at signoff . . . . . > *YES  *YES, *NO
Application type . . . . . > *NRF     *NONE, *NRF, *CTLSSN...
Inactivity timer . . . . . > *ATTACH  1-30, *ATTACH, *NOMAX...
Host signon/logon command . . . . . > *NONE

-----

                                           More...
F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

Figure 16-5. Step 3: Configuring the Device to Controller

Using Network Routing Facility

Users who want to access an AS/400 system using the session partner function of NRF must issue an unformatted system services (USS) request to the VTAM system services control point (SSCP) in the form of a logon string.

The logon string consists of three parts:

Application Identifier (APPLID)
Specifies the requested application.

SNA Logon Mode (LOGMODE)
Determines the session parameters to be used during the LU-to-LU session and is defined in an unformatted system services table in VTAM.

Data Operand (DATA)
Indicates that user data will be made available to the logon exit routine of the application program.

The logon request may appear in either basic assembler language (BAL) or PL/I format. However, the logon string must be entered in the same format as the logon string configured in the USS VTAM table on the System/370 host. It is also recommended that you enter the logon string entirely in uppercase characters.

An example of a full logon string written in PL/I could look like this:

```
LOGON APPLID(NRF1A03) LOGMODE(SD82) DATA(USERDATA)
```

In this example, the application identifier (APPLID) is named NRF1A03, the SNA logon mode is labeled SD82, and the data operand indicates that user data will be made available to the logon exit routine of the application program.

Customizing Your SNA 3270 Display Keyboard Map

For instructions on customizing your 3270 display keyboard to be mapped as a 5250 display keyboard, see "Display Station Considerations for DHCF" on page 15-11. The instructions for customizing your keyboard using DHCF are the same for NRF.

AS/400 Work Station Printing

Most installations require the remote 3270 work station printers to print from either the System/370 host or the AS/400 system, depending on the application requirements. It is important to make sure the 3270 printer LU is not kept permanently committed to either the System/370 host or the AS/400 system. If either system keeps the LU, the other will not be able to use it. System/370 VTAM applications should be reviewed to make sure that printer LUs are released after the printer spool queues are cleared.

To allow printer sharing, the AS/400 printer device description must be configured such that the session is unbound when there are no more spooled files. Use the inactivity timer (INACTTMR) parameter on the Create Device Description (Printer) (CRTDEVPRT) command. Specify a short length of time for the session to remain bound after a spooled file has completed printing.

Because NRF allows the 3287 printers in the network to be shared by users on the System/370 host and the AS/400 system, you may not always have immediate access to the printer. If you try to print, but find that the printer is already in use, wait a short while and try again.

Ending Network Routing Facility

You may use either of the following two methods to end NRF:

1. Use the ENDCNN parameter of the SIGNOFF command to sign off the AS/400 system and end the session between your 3270 display station and the AS/400 system. For example, type:
`SIGNOFF ENDCNN(*YES)`
and press the Enter key.
2. Do the following:
 - a. Sign off the AS/400 system using the SIGNOFF command.
 - b. Press the 3270 system request key.
 - c. Log off VTAM using the LOGOFF command for VTAM.

If you sign off the system while using NRF without ending NRF, the session remains bound even after you sign off. This prevents other users from using the system and network resources used by this session.

VTAM Logon Mode and Definition Table Examples

This section contains sample System/370 VTAM logon mode (logmode) tables, and AS/400 system and NCP definitions. These tables are configured on the System/370 to allow the LU-to-LU connections necessary for NRF operation.

Logmode Tables

The following figure contains sample VTAM logon mode tables. These tables are used to define the characteristics of the session established by NRF to the 3270 devices and to the AS/400 system. The characteristics defined must be compatible with each other. That is, the characteristics of the session for an application on the AS/400 system must be compatible with the characteristics of the session for the 3270 device. To test the compatibility of the characteristics of the session, complete your configuration and send a break message to

the NRF device. If the display is restored when the break message is cleared, the values for the VTAM logon mode tables are probably correct.

```

SD82 MODETAB
*****
* LOGMODE PAIR FOR 24 X 80 TERMINAL -- PACING = 0, 256 BYTE RU *
*****
SD82 MODEENT LOGMODE=SD82, 3270 LOGMODE
      FMPROF=X'03',          BYTE 02
      TSPROF=X'03',          BYTE 03
      PRIPROT=X'B1',          BYTE 04
      SECPROT=X'90',          BYTE 05
      COMPROT=X'3080',        BYTE 06 - 07
      SSNDPAC=X'00',          BYTE 08
      SRCVPAC=X'00',          BYTE 09
      PSNDPAC=X'00',          BYTE 12
      PSERVIC=X'020000000000185018507F00',      BYTE 14-25
      RUSIZES=X'8585'
SD82HD MODEENT LOGMODE=SD82HD, AS/400 LOGMODE
      FMPROF=X'03',          BYTE 02
      TSPROF=X'03',          BYTE 03
      PRIPROT=X'B1',          BYTE 04
      SECPROT=X'90',          BYTE 05
      COMPROT=X'3081',        BYTE 06 - 07
      SSNDPAC=X'00',          BYTE 08
      SRCVPAC=X'00',          BYTE 09
      PSNDPAC=X'00',          BYTE 12
      PSERVIC=X'020000000000185018507F00',      BYTE 14-25
      RUSIZES=X'8585'          BYTE 10 - 11
*****
* LOGMODE PAIR FOR 24 X 80 TERMINAL -- PACING = 0, 2560 BYTE RU *
* NOTE - PSERVIC CAN BE ANY ACCEPTABLE VALUE *
*****
TRN0 MODEENT LOGMODE=TRN0, 3270 LOGMODE
      FMPROF=X'03',          BYTE 02
      TSPROF=X'03',          BYTE 03
      PRIPROT=X'B1',          BYTE 04
      SECPROT=X'B0',          BYTE 05
      COMPROT=X'3080',        BYTE 06 - 07
      SSNDPAC=X'00',          BYTE 08
      SRCVPAC=X'00',          BYTE 09
      PSNDPAC=X'00',          BYTE 12
      PSERVIC=X'02000000000000000000200',      BYTE 14-25
      RUSIZES=X'A8A8'
TRNHD0 MODEENT LOGMODE=TRNHD0, AS/400 LOGMODE
      FMPROF=X'03',          BYTE 02
      TSPROF=X'03',          BYTE 03
      PRIPROT=X'B1',          BYTE 04
      SECPROT=X'B0',          BYTE 05
      COMPROT=X'3081',        BYTE 06 - 07
      SSNDPAC=X'00',          BYTE 08
      SRCVPAC=X'00',          BYTE 09
      PSNDPAC=X'00',          BYTE 12
      PSERVIC=X'02000000000000000000200',      BYTE 14-25
      RUSIZES=X'A8A8'
*****
* LOGMODE PAIR FOR 24 X 80 TERMINAL -- PACING = 7, 512 BYTE RU *
* NOTE - RUSIZE AND PACING VALUES MUST CORRESPOND WITH 3X74 *
* CONFIGURATION VALUES *
*****
TRN7 MODEENT LOGMODE=TRN7, 3270 LOGMODE
      FMPROF=X'03',          BYTE 02
      TSPROF=X'03',          BYTE 03
      PRIPROT=X'B1',          BYTE 04
      SECPROT=X'B0',          BYTE 05
      COMPROT=X'3080',        BYTE 06 - 07
      SSNDPAC=X'07',          BYTE 08
      SRCVPAC=X'07',          BYTE 09
      PSNDPAC=X'00',          BYTE 12
      PSERVIC=X'02000000000000000000200',      BYTE 14-25
      RUSIZES=X'8686'

```

Figure 16-6 (Part 1 of 2). Sample System/370 VTAM Logmode Tables

```

TRNHD7  MODEENT LOGMODE=TRNHD7, AS/400 LOGMODE
        FMPROF=X'03',           BYTE 02
        TSPROF=X'03',           BYTE 03
        PRIPROT=X'B1',          BYTE 04
        SECPROT=X'B0',          BYTE 05
        COMPROT=X'3081',        BYTE 06 - 07
        SSNDPAC=X'07',          BYTE 08
        SRCVPAC=X'07',          BYTE 09
        PSNDPAC=X'00',          BYTE 12
        PSERVIC=X'020000000000000000000200',        BYTE 14-25
        RUSIZES=X'8686'         BYTE 10 - 11

*****
*
* LOGMODE PAIR FOR 328X PRINTER -- PACING = 1 (MINIMUM VALUE)
*                               256 BYTE RU
*
*****

SCSPTR  MODEENT LOGMODE=SCSPTR, 3270 LOGMODE
        FMPROF=X'03',           BYTE 02
        TSPROF=X'03',           BYTE 03
        PRIPROT=X'B1',          BYTE 04
        SECPROT=X'90',          BYTE 05
        COMPROT=X'3080',        BYTE 06 - 07
        SSNDPAC=X'01',          BYTE 08
        SRCVPAC=X'01',          BYTE 09
        PSERVIC=X'01000000E100000000000000',        BYTE 14-25
        PSNDPAC=X'01',          BYTE 11
        RUSIZES=X'8585'

SCSPTRR MODEENT LOGMODE=SCSPTRR, AS/400 LOGMODE
        FMPROF=X'03',           BYTE 02
        TSPROF=X'03',           BYTE 03
        PRIPROT=X'B1',          BYTE 04
        SECPROT=X'90',          BYTE 05
        COMPROT=X'3081',        BYTE 06 - 07
        SSNDPAC=X'01',          BYTE 08
        SRCVPAC=X'01',          BYTE 09
        PSERVIC=X'01000000E100000000000000',        BYTE 14-25
        PSNDPAC=X'01',          BYTE 11
        RUSIZES=X'8585'

*****
*
* LOGMODE PAIR FOR 328X PRINTER -- PACING = 3, 512 BYTE RU
*
*****

SCSTRN  MODEENT LOGMODE=SCSTRN, 3270 LOGMODE
        FMPROF=X'03',           BYTE 02
        TSPROF=X'03',           BYTE 03
        PRIPROT=X'B1',          BYTE 04
        SECPROT=X'90',          BYTE 05
        COMPROT=X'3080',        BYTE 06 - 07
        SSNDPAC=X'03',          BYTE 08
        SRCVPAC=X'03',          BYTE 09
        PSERVIC=X'01000000E100000000000000',        BYTE 14-25
        PSNDPAC=X'03',          BYTE 11
        RUSIZES=X'8686'

SCSTRNR MODEENT LOGMODE=SCSTRNR, AS/400 LOGMODE
        FMPROF=X'03',           BYTE 02
        TSPROF=X'03',           BYTE 03
        PRIPROT=X'B1',          BYTE 04
        SECPROT=X'90',          BYTE 05
        COMPROT=X'3081',        BYTE 06 - 07
        SSNDPAC=X'03',          BYTE 08
        SRCVPAC=X'03',          BYTE 09
        PSERVIC=X'01000000E100000000000000',        BYTE 14-25
        PSNDPAC=X'03',          BYTE 11
        RUSIZES=X'8686'

```

Figure 16-6 (Part 2 of 2). Sample System/370 VTAM Logmode Tables

Network Control Program Definitions

The following tables define NRF virtual devices on the SNA communications controller to the host system.

```

R4GEN  OPTIONS NEWDEFN=YES,USERGEN=(CXRNRF,X25NPSI)
*
*****
*
*   NRF VIRTUAL DEFINITIONS   *
*
*****
GRPNRF1  GROUP LNCTL=SDLC,VIRTUAL=YES,ISTATUS=INACTIVE,VPACING=0,VIROWN*
          ER=CXRNRF,PACING=0,DIAL=NO
LNENRF1  LINE LINEFVT=CXRXFVT,PUFVT=CXRXFVT,LUFVT=(CXRXFVT,CXRXFVT),LIN*
          ECB=CXRXLNK
*
*****
* FIRST GROUP USES SESSION PARTNER ROUTING *
*****
*
NRF1PUA  PU PUTYPE=2,PUCB=CXRP000
*
NRF1A01  LU NRF.SESSPART=NRF1B01,LOCADDR=01,LUCB=(CXRL0000,CXRS0000)
NRF1A02  LU NRF.SESSPART=NRF1B02,LOCADDR=02,LUCB=(CXRL0001,CXRS0002)
NRF1A03  LU NRF.SESSPART=NRF1B03,LOCADDR=03,LUCB=(CXRL0002,CXRS0004)
NRF1A04  LU NRF.SESSPART=NRF1B04,LOCADDR=04,LUCB=(CXRL0003,CXRS0006)
NRF1A05  LU NRF.SESSPART=NRF1B05,LOCADDR=05,LUCB=(CXRL0004,CXRS0008)
NRF1A06  LU NRF.SESSPART=NRF1B06,LOCADDR=06,LUCB=(CXRL0005,CXRS000A)
NRF1A07  LU NRF.SESSPART=NRF1B07,LOCADDR=07,VPACING=1,LUCB=(CXRL0006,CX*
          RS000C)
NRF1A08  LU NRF.SESSPART=NRF1B08,LOCADDR=08,VPACING=3,LUCB=(CXRL0007,CX*
          RS000E)
*
NRF1PUB  PU PUTYPE=2,PUCB=CXRP0001
*
NRF1B01  LU NRF.SESSPART=NRF1A01,LOCADDR=01,LUCB=(CXRL0008,CXRS0001)
NRF1B02  LU NRF.SESSPART=NRF1A02,LOCADDR=02,LUCB=(CXRL0009,CXRS0003)
NRF1B03  LU NRF.SESSPART=NRF1A03,LOCADDR=03,LUCB=(CXRL000A,CXRS0005)
NRF1B04  LU NRF.SESSPART=NRF1A04,LOCADDR=04,LUCB=(CXRL000B,CXRS0007)
NRF1B05  LU NRF.SESSPART=NRF1A05,LOCADDR=05,LUCB=(CXRL000C,CXRS0009)
NRF1B06  LU NRF.SESSPART=NRF1A06,LOCADDR=06,LUCB=(CXRL000D,CXRS000B)
NRF1B07  LU NRF.SESSPART=NRF1A07,LOCADDR=07,VPACING=1,LUCB=(CXRL000E,CX*
          RS000D)
NRF1B08  LU NRF.SESSPART=NRF1A08,LOCADDR=08,VPACING=3,LUCB=(CXRL000F,CX*
          RS000F)
*****
* AS/400 USING SDLC LINE TO CONNECT TO NRF *
*****
R4082  LINE ADDRESS=(082,HALF),ETRATIO=250,ISTATUS=INACTIVE,RETRIES=( *
          07,05,03),SPEED=9600,MAXDATA=265,OWNER=MVS,PACING=0,VPAC*
          ING=0
          SERVICE ORDER=(R4082A,R4082B)

```

Figure 16-7 (Part 1 of 2). System/370 VTAM Tables Defining NCP on the SNA Communications Controller

```

R4082A  PU ADDR=C1, ISTATUS=INACTIVE
R4082A01 LU LOCADDR=01, ISTATUS=INACTIVE
R4082A02 LU LOCADDR=02, ISTATUS=INACTIVE, LOGAPPL=NRF1A02, DLOGMOD=SD82HD
R4082A03 LU LOCADDR=03, ISTATUS=INACTIVE, LOGAPPL=NRF1A03, DLOGMOD=SD82HD
R4082A04 LU LOCADDR=04, ISTATUS=INACTIVE
R4082A05 LU LOCADDR=05, ISTATUS=INACTIVE
R4082A06 LU LOCADDR=06, ISTATUS=INACTIVE
R4082A07 LU LOCADDR=07, ISTATUS=INACTIVE, LOGAPPL=NRF1A07, DLOGMOD=SCSPTR
R4082A08 LU LOCADDR=08, ISTATUS=INACTIVE
R4082A09 LU LOCADDR=09, ISTATUS=INACTIVE
R4082A10 LU LOCADDR=10, ISTATUS=INACTIVE
R4082A11 LU LOCADDR=11, ISTATUS=INACTIVE
R4082A12 LU LOCADDR=12, ISTATUS=INACTIVE
R4082A13 LU LOCADDR=13, ISTATUS=INACTIVE
R4082A14 LU LOCADDR=14, ISTATUS=INACTIVE
R4082A15 LU LOCADDR=15, ISTATUS=INACTIVE
R4082A16 LU LOCADDR=16, ISTATUS=INACTIVE
R4082A17 LU LOCADDR=17, ISTATUS=INACTIVE
R4082A18 LU LOCADDR=18, ISTATUS=INACTIVE
R4082A19 LU LOCADDR=19, ISTATUS=INACTIVE
R4082A20 LU LOCADDR=20, ISTATUS=INACTIVE
R4082A21 LU LOCADDR=21, ISTATUS=INACTIVE
R4082A22 LU LOCADDR=22, ISTATUS=INACTIVE
R4082A23 LU LOCADDR=23, ISTATUS=INACTIVE
R4082A24 LU LOCADDR=24, ISTATUS=INACTIVE
R4082A25 LU LOCADDR=25, ISTATUS=INACTIVE
R4082A26 LU LOCADDR=26, ISTATUS=INACTIVE
R4082A27 LU LOCADDR=27, ISTATUS=INACTIVE
R4082A28 LU LOCADDR=28, ISTATUS=INACTIVE
R4082A29 LU LOCADDR=29, ISTATUS=INACTIVE
R4082A30 LU LOCADDR=30, ISTATUS=INACTIVE
R4082A31 LU LOCADDR=31, ISTATUS=INACTIVE
R4082A32 LU LOCADDR=32, ISTATUS=INACTIVE
R4082B  PU ADDR=C2, ISTATUS=INACTIVE
R4082B01 LU LOCADDR=01, ISTATUS=INACTIVE
R4082B02 LU LOCADDR=02, ISTATUS=INACTIVE
R4082B03 LU LOCADDR=03, ISTATUS=INACTIVE
R4082B04 LU LOCADDR=04, ISTATUS=INACTIVE
R4082B05 LU LOCADDR=05, ISTATUS=INACTIVE
R4082B06 LU LOCADDR=06, ISTATUS=INACTIVE
R4082B07 LU LOCADDR=07, ISTATUS=INACTIVE
R4082B08 LU LOCADDR=08, ISTATUS=INACTIVE

```

Figure 16-7 (Part 2 of 2). System/370 VTAM Tables Defining NCP on the SNA Communications Controller

VTAM Definitions for the AS/400 System

The following figure contains VTAM-switched major mode definitions for the connection between NRF and the AS/400 system:

```

SW744  VBUILD TYPE=SWNET,      REQUIRED PARAMETER          X
      MAXNO=8,                MAX OF 8 DIAL NUMBERS MAY BE DEFINED *
      MAXGRP=5                MAX OF 5 LINE GROUPS MAY BE DEFINED
SW744A  PU  ADDR=C1,          8 BIT STATION UNIQUE ADDRESS    X
      DISCNT=NO,              ACCEPT DISCONTACT FROM PU (DEFAULT) X
      IDBLK=056,              12 BIT BLOCK NUMBER FOR AS/400    X
      IDNUM=03100,            20 BIT ID NUMBER FOR REMOTE SYSTEM X
      MAXDATA=1994,           AS/400 MAXDATA FOR TOKENRING      X
      MAXPATH=8,              MAX OF 8 PATHS FOR CALL OUT      X
      NETID=RPC,              AS/400 LOCAL NETID VALUE        X
      PACING=0,               0 PACING                        X
      PASSLIM=7,              7 CONTIGUOUS PIUS MAX AT ONE TIME X
      PUTYPE=2,               VALID FOR TYPE 2 OR 2.1 SUPPORT  X
      ISTATUS=ACTIVE,         ACTIVATE WITH MAJOR NODE        X
      MODETAB=LOGMOD38,       VTAM LOGON MODE TABLE ON S/370  *
      SSCPFM=USSSCS,         VTAM TO STRIP/ADD MEDIA CONTROL CHAR *
      VPACING=0,              0 VPACING
*
PATH1  PATH  GRPNM=R3G092L,DIALNO=0504400031000000
*
*****
* USING NRF SESSON PARTNER ROUTING -- NRF1A.. IS PARTNER TO NRF1B.. *
*****
SW744A01 LU  LOCADDR=01,      CORRESPONDS TO AS/400 LOCADDR 01  X
      ISTATUS=ACTIVE          ACTIVATE WITH MAJOR NODE
SW744A02 LU  LOCADDR=02,DLOGMOD=TRNH00,LOGAPPL=NRF1A02, ADDR 02  X
      ISTATUS=ACTIVE          ACTIVATE WITH MAJOR NODE
SW744A03 LU  LOCADDR=03,DLOGMOD=TRNH00,LOGAPPL=NRF1A03, ADDR 03  X
      ISTATUS=ACTIVE          ACTIVATE WITH MAJOR NODE
SW744A04 LU  LOCADDR=04,DLOGMOD=TRNH00,LOGAPPL=NRF1A04, ADDR 04  X
      ISTATUS=ACTIVE          ACTIVATE WITH MAJOR NODE
SW744A05 LU  LOCADDR=05,DLOGMOD=TRNH00,LOGAPPL=NRF1A05, ADDR 05  X
      ISTATUS=ACTIVE          ACTIVATE WITH MAJOR NODE
SW744A06 LU  LOCADDR=06,      CORRESPONDS TO AS/400 LOCADDR 06  X
      ISTATUS=ACTIVE          ACTIVATE WITH MAJOR NODE
*****
SW744A07 LU  LOCADDR=07,DLOGMOD=SCSPTRR,PACING=1,VPACING=1,      X
      ISTATUS=ACTIVE          ACTIVATE WITH MAJOR NODE
SW744A08 LU  LOCADDR=08,VPACING=3,PACING=3,DLOGMOD=SCSTRNR,      X
      ISTATUS=ACTIVE          ACTIVATE WITH MAJOR NODE

```

Figure 16-8. System/370 VTAM AS/400 System Definitions

VTAM Definitions for the 3174 Controller

The following figure contains VTAM-switched major mode definitions for the connection between NRF and the 3174 controller:

```

SQ324   VBUILD TYPE=SWNET,      REQUIRED PARAMETER                X
        MAXNO=8,                MAX OF 8 DIAL NUMBERS MAY BE DEFINED X
        MAXGRP=5,               MAX OF 5 LINE GROUPS MAY BE DEFINED
SQ324A  PU  ADDR=C1,            8 BIT STATION UNIQUE ADDRESS      X
        DISCNT=NO,             ACCEPT DISCONTACT FROM PU (DEFAULT) X
        IDBLK=017,            12 BIT BLOCK NUMBER FOR 3174      X
        IDNUM=00000,          20 BIT ID NUMBER FOR REMOTE SYSTEM X
        MAXDATA=1994,        AS/400 MAXDATA FOR TOKENRING      X
        MAXPATH=8,           MAX OF 8 PATHS FOR CALL OUT       X
        PACING=0,            0 PACING                          X
        PUTYPE=2,            VALID FOR TYPE 2 OR 2.1 SUPPORT    X
        ISTATUS=ACTIVE,      ACTIVATE WITH MAJOR NODE          X
        MODETAB=SD82,        VTAM LOGN MODE TABLE ON S/370    *
        SSCPFM=USSSCS,      VTAM TO STRIP/ADD MEDIA CONTROL CHAR *
        VPACING=0,          0 VPACING
*
PATH1   PATH  GRPNM=R4G088L,DIALNO=0104400031740004
*
*****
* USING NRF SESSION PARTNER ROUTING -- NRF1B.. IS PARTNER TO NRF1A.. *
*****
SQ324A02 LU  LOCADDR=02,        CORRESPONDS TO 3174 PORT 00      X
        ISTATUS=ACTIVE,LOGAPPL=NRF1B02
SQ324A03 LU  LOCADDR=03,        CORRESPONDS TO 3174 PORT 01      X
        ISTATUS=ACTIVE,LOGAPPL=NRF1B03
SQ324A04 LU  LOCADDR=04,        CORRESPONDS TO 3174 PORT 02      X
        ISTATUS=ACTIVE      ACTIVATE WITH MAJOR NODE
SQ324A05 LU  LOCADDR=05,        CORRESPONDS TO 3174 PORT 03      X
        ISTATUS=ACTIVE      ACTIVATE WITH MAJOR NODE
SQ324A06 LU  LOCADDR=06,        CORRESPONDS TO 3174 PORT 04      X
        ISTATUS=ACTIVE      ACTIVATE WITH MAJOR NODE
SQ324A07 LU  LOCADDR=07,        CORRESPONDS TO 3174 PORT 05      X
        ISTATUS=ACTIVE,LOGAPPL=NRF1B07,
        DLOGMOD=SCSPTR
SQ324A08 LU  LOCADDR=08,        CORRESPONDS TO 3174 PORT 06      X
        ISTATUS=ACTIVE,VPACING=3,LOGAPPL=NRF1B08,PACING=3,
        DLOGMOD=SCSTRN

```

Figure 16-9. System/370 VTAM Tables Defining the 3174 Controller

Chapter 17. SNA Primary LU2 Support

SNA Primary LU2 Support (SPLS) allows 3270 display stations and 3287 printers to communicate with AS/400 systems. These devices may be connected to the AS/400 systems through a Systems Network Architecture (SNA) communication controller such as the 3720 or 3745. They may also be connected through a 3174 gateway.

For example, a 3481 display connected to a 3174 controller, connected to a 3745 controller, connected to both an ES/9000* system¹ and an AS/400 system (see Figure 17-1).

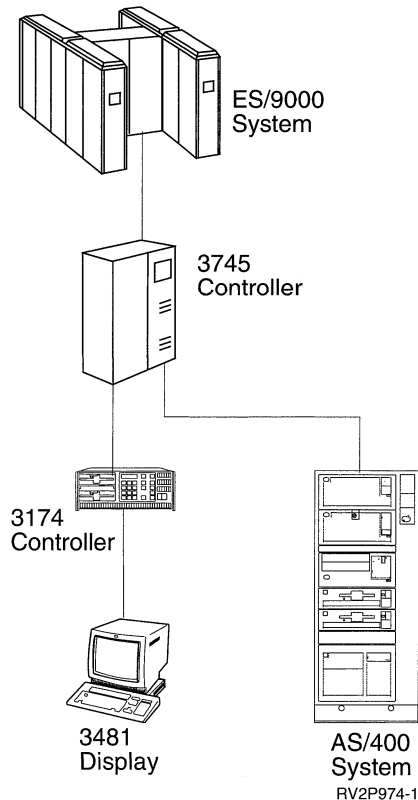


Figure 17-1. Configuration Example for Connecting a 3270 Display Station to an AS/400 System.

Another example is a personal computer connected to a 3174 gateway, connected to an ES/9000 system, connected to another 3174 gateway configured with APPN support, connected to an AS/400 system. Figure 17-2 on page 17-2 shows this example.

The connection can be much more complex, however. The 3270 display station and the AS/400 system do not need to be connected to the same SNA communications controller. For example, both of the 3270 display stations and the 3287 printer in Figure 17-3 on page 17-2 may have a session through SPLS with the AS/400 system shown.

SPLS allows a 3270 display station to have a logical unit (LU) type 2 session with an AS/400 system. The AS/400 system provides the primary LU (PLU), and the 3270 display station is the secondary LU (SLU). SPLS does not support file transfer using the IND\$FILE program.

SPLS allows a 3287 printer to have an LU type 1 SNA character string (SCS) session. In this case, the AS/400 system provides the PLU, and the 3287 printer is the SLU.

¹ ES/9000 system is used in this chapter to mean any system that can run the required level of the VTAM licensed program.

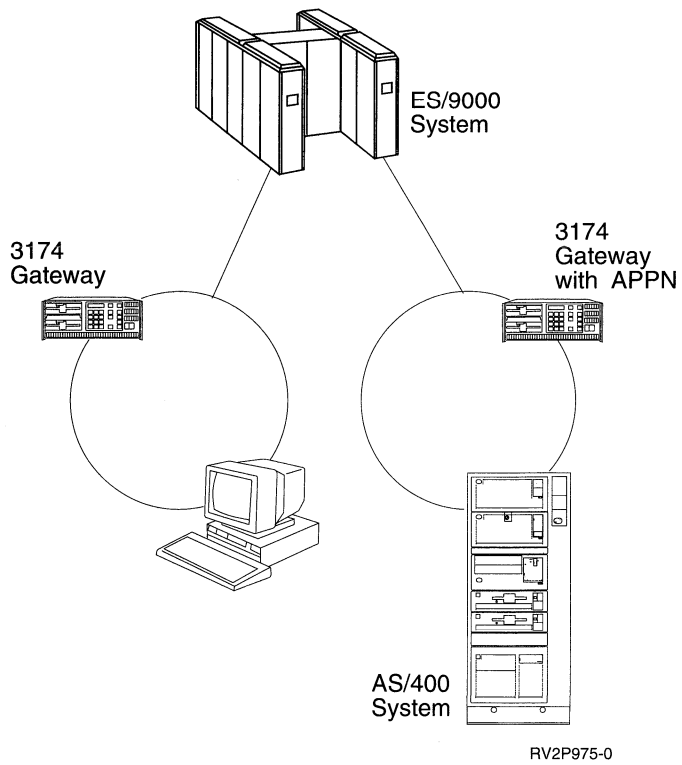


Figure 17-2. Example of a 3174 Gateway Configuration for SPLS

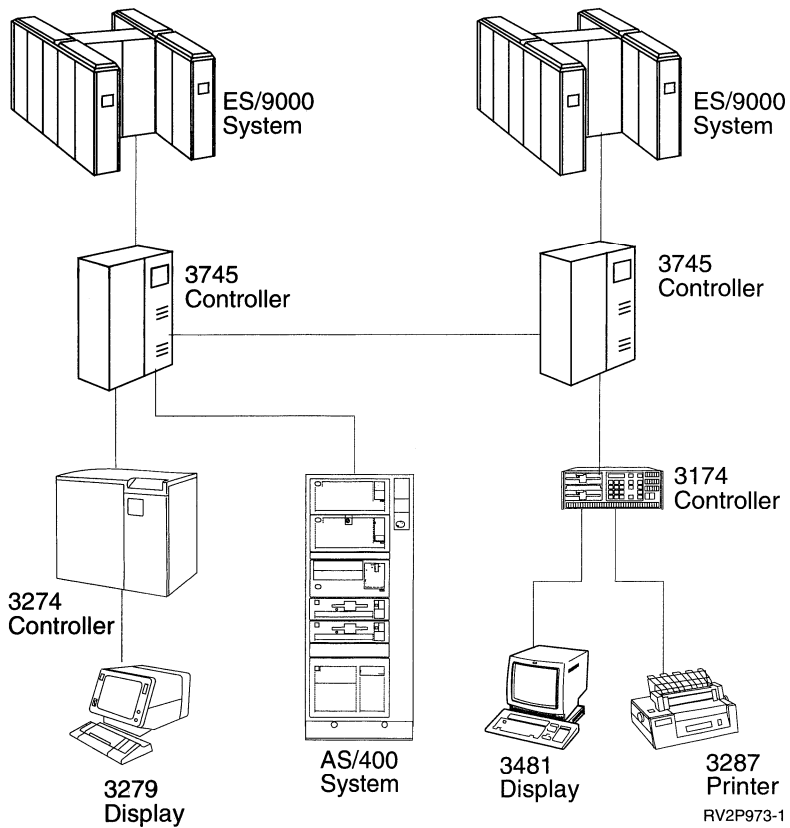


Figure 17-3. SPLS Configuration Example. The two 3270 display stations and the 3287 printer can connect to the AS/400 system using SPLS.

Differentiating SNA Primary LU2 Support from Similar Functions

SPLS function is similar to the Network Routing Facility (NRF). SPLS function is also similar to the combined function of the Host Command Facility (HCF) and the distributed host command facility (DHCF). All these functions allow users attached to an ES/9000 system to access an AS/400 system as if they were 5250 display station users.

The AS/400 NRF support, however, requires the NRF licensed program to be installed on the SNA communications controller. SPLS does not require the NRF licensed program. Furthermore, SPLS does not require the communications controller (3745, for example) processing time that is used by the NRF licensed program for AS/400 NRF support.

SPLS differs from HCF-DHCF because:

- SPLS supports printers.
- SPLS does not require that the HCF licensed program be installed on the ES/9000 host.
- SPLS does not require the ES/9000 host-system processing unit time that is used by the HCF licensed program.

Benefits of SNA Primary LU2 Support

SPLS enables 3270 users, who are connected to an SNA communications controller, to use any AS/400 system that is connected to the SNA network. This opens up the world of AS/400 applications to these users. SPLS does this with less overhead than previous implementations. The NRF licensed program is not required on the SNA communications controller, and the HCF licensed program is not required on the ES/9000 system. Only normal host and SNA communications controller resources are used. (The Virtual Telecommunications Access Method (VTAM) licensed program uses the host resources. The Network Control Program (NCP) licensed program uses the SNA communications controller resources.) VTAM configuration for SPLS is simpler than VTAM configuration for NRF. VTAM configuration for SPLS is also simpler than VTAM configuration for HCF-DHCF.

Devices Supported by SNA Primary LU2 Support

SPLS supports the following controllers, displays, and printers:

3174 Establishment Controller

3174 Establishment Controller with the Gateway feature:

- APPN support required
- Must be a LENNODE
- The XID parameter on the VTAM PU definition must be set for a gateway

3274 Control Unit

3270 display stations

All emulators conforming to 3274 Control Unit Model 31C protocol

3287-type printers in LU 1 SCS mode

3720 Communication Controller

3745 Communication Controller

The support provided for the following list is approximately the same as that provided by the 3270 remote attachment function. For more information about the type of support provided, see Chapter 11 on page 11-1.

3174 and 3274 controllers

3270 display stations

Emulators conforming to 3274-31C controller protocol

3287-type printers

SPLS supports 3270 display stations that are capable of displaying double-byte characters. SPLS supports 3287-type printers that are capable of printing double-byte characters.

Software Requirements for SNA Primary LU2 Support

SPLS requires:

The Advanced Communications Function for the Virtual Telecommunications Access Method (ACF/VTAM*) licensed program. Version 3, Release 4 or later is recommended.

SPLS supports:

The Network Control Program (NCP) licensed program. Version 5, Release 4 or later is recommended.

The ACF/VTAM licensed program maintains control of communications between terminals and application programs.

NCP runs SNA communications controllers such as the IBM 3745, providing controller support for single-domain, multiple-domain, and interconnected network capabilities.

SNA Primary LU2 Support Sessions

SPLS sessions can be either device-initiated sessions or application-initiated sessions.

The following information describes how a device-initiated session is established:

1. **Device-initiated sessions** begin with a request to log on to a VTAM application. For SPLS, the VTAM application is actually an LU for the AS/400 system. The logon request is typically from a 3270 display station user. The request can also be from a LOGAPPL operand configured on a VTAM LU definition statement for a printer.
2. The VTAM licensed program sends information about the 3270 display station or printer to the AS/400 system. This information is sent through a session between a system services control point (SSCP) and an LU. The LU is a dependent LU and is represented on the AS/400 system by a display device description attached to the host controller. This device description has an application type of *CTLSSN (control session) and is used only when remote devices request a session with the AS/400 system.
3. For each logon request, the AS/400 system selects (or in some cases creates) another device description attached to the host controller. This latter device description is used for the actual display or printer session, has an application type of *DEVINIT, and is an independent LU.
4. After selecting the device description with an application type of *DEVINIT, the system starts the session.

Application-initiated sessions begin when an AS/400 application opens a file against a 3270 display station or printer. For example, a spool writer may send a printout to a printer, which causes SPLS to start a session between the spool writer and the printer. Or an order-entry application may send information to a display station, which causes SPLS to start a session between the order-entry application and the display station. The VTAM licensed program is involved in starting the session, but that is the extent of VTAM's involvement. Application-initiated sessions require independent device descriptions with an application type of *APPINIT. The device descriptions must also have all the information needed to start a session to the remote device.

For both kinds of sessions, data flows between the AS/400 system and the 3270 display station or printer without additional intermediate processing; only normal SNA intermediate processing is needed. The VTAM licensed program cannot observe or process the session data. There is no SSCP-to-LU session; the LU is independent. Once a session is established, SPLS can continue to send and receive data using the session; it does not matter whether or not the ES/9000 host continues to be active and available.

Configuring the AS/400 System for SNA Primary LU2 Support

Before creating the line, controller, and device descriptions for SPLS, you should decide whether or not to use automatic configuration. The following information describes what you should consider when making your decision. After the automatic configuration information, there are instructions about how to create the line description, controller description, and device descriptions.

Considerations for Automatic Configuration

You can save time by having the system automatically create display and printer device descriptions with an application type of *DEVINIT. By using automatic configuration, you do not have to figure out how many device descriptions you need. You also do not have to figure out how many device descriptions of a particular device type you need. However, automatic configuration uses system resources and affects system performance. Nevertheless, you can set up your system to use automatic configuration initially. Then, manually maintain the configuration thereafter to minimize your efforts while limiting any effects on performance to the initial period of SPLS use. For details, see "Reducing Automatic Creation Time" on page 17-6.

To use automatic configuration, specify the following values for the SNA host controller description:

- *YES for the APPN-capable (APPN) parameter
- *ALL or *DEVINIT for the autcreate device (AUTOVRTDEV) parameter

When the AUTOVRTDEV parameter allows device descriptions with an application type of *DEVINIT to be automatically created, the system creates those device descriptions as needed. Specifically, a device description is created only when there is not an appropriate device description available. If an appropriate device description exists but is not varied on, the system varies it on automatically.

You may set the AUTOVRTDEV parameter to automatically create device descriptions. Then, let the system run until enough device descriptions have been created. After that, turn off automatic creation by changing AUTOVRTDEV to *NONE. Finally, ensure that the device descriptions (that were automatically created) are not deleted. To do so, do either of the following:

- Change the device descriptions (any manual change to a device description makes it ineligible for automatic deletion).
- Change the autodelete device (AUTODLTDEV) parameter (for the host controller) to *NO.

When the system automatically creates a device description with an application type of *DEVINIT, the system copies some of the values for the device description. The system copies the values from the associated display device description that has an application type of *CTLSSN. The system copies the following parameters:

- Keyboard language type (KBDTYPE)
- DBCS feature (IGCFEAT)
- Attached controller name (CTL)

When a device description with an application type of *DEVINIT is automatically created, it is created with ONLINE(*NO). If AUTOVRTDEV is *NONE, the system does not automatically vary on device descriptions with an application type of *DEVINIT as they are needed. Therefore, in this situation you must ensure that the right number of device descriptions are varied on. You can do this by changing the device descriptions to ONLINE(*YES) or by manually varying on the device descriptions.

Reducing Automatic Creation Time

The most obvious way to reduce the amount of resources used to create device descriptions automatically is to minimize the need for automatic creation. You can do this using one or more of the following methods:

- Manually, create enough display or printer device descriptions with an application type of *DEVINIT.
- Let the system automatically create device descriptions with application type *DEVINIT until the number of device descriptions equals the number of sessions to be used. Then, use the Change Device Description (Display) (CHGDEVDSP) command or the Change Device Description (Printer) (CHGDEVPRT) command to change the device descriptions. (For example, change the text description.) Changing the device descriptions makes them ineligible for automatic deletion.
- Set the AUTODLTDEV parameter on the host controller description to a high number or to *NO. This prevents the system from deleting APPTYPE(*DEVINIT) device descriptions that will need to be re-created. This also prevents the system from deleting APPC device descriptions that are both automatically created and are APPN capable (a side effect you may or may not want).

If you set the AUTODLTDEV parameter to a high number, make sure it is high enough to cover normal periods of inactivity. When the host controller is varied on, the timer starts for all device descriptions that are eligible for automatic deletion. The timer is canceled for a device description when that device description is used for a session and is restarted when the session ends. You may need to set the AUTODLTDEV parameter to around 6000 to keep device descriptions from being deleted over a 3-day weekend. You may need to set it even higher. The AUTODLTDEV parameter needs to be high enough to prevent the deletion of device descriptions that you do not want deleted. Therefore, it needs to cover periods when the host controller description is varied on and device descriptions that you do not want deleted are inactive.

Another way to reduce the amount of resources used for the automatic creation of device descriptions is to avoid name conflicts. For display device descriptions with an application type of *CTLSSN, use names that are unique for the first 7 characters.

Configuration Steps for SNA Primary LU2 Support

To configure the AS/400 system to communicate with SPLS, perform these steps:

- ___ **Step 1.** Configure a line description to the ES/9000 host network (described in “Step 1: Configuring the Line to the Host Network” on page 17-7).
- ___ **Step 2.** Configure a host controller description (described in “Step 2: Configuring the Host Controller” on page 17-7).
- ___ **Step 3.** Configure display device descriptions or printer device descriptions (described in “Step 3: Configuring the Device” on page 17-9).
- ___ **Step 4.** Configure the host system (described in “Step 4: Configuring the Host System” on page 17-15).

Note: SPLS can share the line and controller descriptions with other AS/400 communications functions that have the same line and controller requirements, provided those functions can also share the line. For example, SPLS can share line and controller descriptions with devices configured for NRF, SNA upline facility (SNUF), DHCF, and advanced program-to-program communications (APPC). Therefore, you may have already configured the line and controller descriptions.

For additional information about how to configure lines, controllers, and devices, refer to the *OS/400* Communications Configuration Reference*.

Step 1: Configuring the Line to the Host Network

Use one of the following Create Line Description (CRTLINxxx) commands to configure a line to the host system that supports an SNA host controller:

- Create Line Description (SDLC) (CRTLINS DLC)
- Create Line Description (Token-Ring) (CRTLINTRN)
- Create Line Description (Ethernet) (CRTLINETH)
- Create Line Description (X.25) (CRTLINX25)

This step may already have been performed if the AS/400 system has been communicating with the ES/9000 host for such functions as 3270 emulation, HCF-DHCF, or NRF.

Integrated services digital network (ISDN) data link control (IDLC) lines (CRTLINIDLC command) require a network interface description and a connection list. For more information about configuring for ISDN, see the *ISDN Guide*.

Figure 17-4 is an example of an SDLC line configured to communicate with the ES/9000 host to support SPLS. This example uses HOSTLINE as the name of the line description and LIN012 as the resource name.

```

                                Create Line Desc (SDLC) (CRTLINS DLC)

Type choices, press Enter.

Line description . . . . . > HOSTLINE      Name
Resource names . . . . . > LIN012         Name
      + for more values
Online at IPL . . . . . > *NO             *YES, *NO
Data link role . . . . . > *SEC           *NEG, *PRI, *SEC
Physical interface . . . . . > *RS232V24   *RS232V24, *V35, *X21, ...
Connection type . . . . . > *NONSWTPP     *NONSWTPP, *SWTPP, *MP, *SHM
Switched network backup . . . . . > *NO    *NO, *YES
Exchange identifier . . . . . > *SYSGEN    05600000-056FFFFF, *SYSGEN
NRZI data encoding . . . . . > *YES       *YES, *NO
Line speed . . . . . > 9600              600, 1200, 2400, 4800...
Modem type supported . . . . . > *NORMAL   *NORMAL, *V54, *IBMWRAP...
Maximum frame size . . . . . > 521       265, 521, 1033, 2057
Duplex . . . . . > *HALF                *HALF, *FULL
Inactivity timer . . . . . > 300         *NOMAX, 150-4200 (0.1 sec)
Poll response delay . . . . . > 0        0-2048 (0.0001 seconds)

F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

```

Figure 17-4. Configuring the Line to the ES/9000 Host Network

Step 2: Configuring the Host Controller

Use the Create Controller Description (SNA Host) (CRTCTLHOST) command to create the controller description. Again, this may already have been done if the AS/400 system has been communicating with the ES/9000 host for such functions as 3270 emulation, HCF-DHCF, or NRF.

Figure 17-5 on page 17-8 is an example of a host controller description that supports SPLS. Note that the attached nonswitched line parameter specifies the line description (HOSTLINE) that was created in "Step 1: Configuring the Line to the Host Network." This example uses HOSTCTL as the name of the controller description and *SDLC as the link type, which indicates the line is an SDLC line.

```

                                Create Ct1 Desc (SNA Host) (CRTCTLHOST)

Type choices, press Enter.

Controller description . . . . . > HOSTCTL      Name
Link type . . . . . > SDLCL      *IDLCL, *FR, *LAN, *SDLC, *X25
Online at IPL . . . . . > NO      *YES, *NO
Switched connection . . . . . > NO      *NO, *YES
Switched network backup . . . . . > NO      *NO, *YES
APPN-capable . . . . . > YES 1      *YES, *NO
Attached nonswitched line . . . . . > HOSTLINE    Name
Maximum frame size . . . . . > LINKTYPE      265-16393, 256, 265, 512...
Remote network identifier . . . . . > NETATR 2      Name, *NETATR, *NONE, *ANY
Remote control point . . . . . > NVFY1 2      Name, *ANY
SSCP identifier . . . . . > 05600000-05FFFFFFF 050000000000-05FFFFFFF
Local exchange identifier . . . . . > LIND      05600000-056FFFFFF, *LIND
Station address . . . . . > C1      01-FE
APPN CP session support . . . . . > YES      *YES, *NO
APPN node type . . . . . > LENNODE 3      *ENDNODE, *LENNODE...
APPN transmission group number . . . . . > 1 4      1-20, *CALC

More...
F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display F24=More keys

```

```

                                Create Ct1 Desc (SNA Host) (CRTCTLHOST)

Type choices, press Enter.

APPN minimum switched status . . . . . > ALL 5      *VRYONPND, *VRYON
Autocreate device . . . . . > ALL 5      *ALL, *DEVINIT, *NONE
Autodelete device . . . . . > 6000      1-10000, 1440, *NO
User-defined 1 . . . . . > LIND      0-255, *LIND
User-defined 2 . . . . . > LIND      0-255, *LIND
User-defined 3 . . . . . > LIND      0-255, *LIND
Recontact on vary off . . . . . > YES      *YES, *NO
Text 'description' . . . . . > 'SPLS host controller'

```

Figure 17-5. Configuring the Host Controller to Support SPLS

- 1** APPN-capable: May be either *YES or *NO.
When APPN-capable is *NO, device descriptions are not created automatically.
- 2** Remote network identifier and remote control point: Specify values such that these two parameters uniquely identify this controller.
SNA requires that the remote network identifier, remote control point, and APPN transmission group number form a unique identifier. VTAM Version 3 Release 4 requires that the APPN transmission group number is 1. Therefore, the remote network identifier and remote control point must be a unique combination.
The remote network identifier and remote control point do not have to match the host network identifier and control point name. This is because the remote network identifier and remote control point are not verified against the values the host sends on an XID exchange. The controller description must have an APPN node type of *LENNODE to ensure these values are not verified.
- 3** APPN node type: Specify *LENNODE.
- 4** APPN transmission group number: Must be 1.
- 5** Autocreate device: To have the system automatically create (as needed) display and printer device descriptions with an application type of *DEVINIT, specify *ALL or *DEVINIT. APPN-capable must be *YES for the system to automatically create these device descriptions. To require manual creation of device descriptions with an application type of *DEVINIT, specify *NONE.
For more information about automatic creation of device descriptions, see "Considerations for Automatic Configuration" on page 17-5.

Step 3: Configuring the Device

If you create device descriptions with an application type of *DEVINIT, you must also create a display device description with an application type of *CTLSSN. If you do not create devices with an application type of *DEVINIT, you do not need a device description with an application type of *CTLSSN.

To configure a 3270-type display, use the Create Device Description (Display) (CRTDEVDSP) command. To configure a 3287-type printer, use the Create Device Description (Printer) (CRTDEVPRT) command. On the CRTDEVDSP or CRTDEVPRT display, enter the device description name, the device class (*RMT value), the 327x device type, and the device model. You also need to specify the application type (APPTYPE) parameter.

Generally, the APPTYPE parameter is *DEVINIT for displays and *APPINIT for printers. You can, however, specify *APPINIT for a display if an application starts the session with the display. Similarly, you can specify *DEVINIT for a printer if the printer starts the session. The printer may start the session using the LOGAPPL operand on the VTAM printer definition.

For information about configuring the DBCS feature (IGCFEAT) parameter, see Table 12-1 on page 12-3.

Configuring a Display with an Application Type Parameter of *CTLSSN: A display device description with an application type of *CTLSSN is used only while a device-initiated session is being started. It is used for control and does not represent a physical display. It is configured as a display, however, because it is associated with device descriptions that have an application type of *DEVINIT, which typically are displays.

Figure 17-6 shows a configuration for a display with an application type of *CTLSSN.

```

                                Create Device Desc (Display) (CRTDEVDSP)
Type choices, press Enter.
Device description . . . . . > R4082A0 1 Name
Device class . . . . . > *RMT 2 *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 3279 3 3101, 3151, 3161, 3162...
Device model . . . . . > 0 4 0, 1, 2, 4, 11, 12, 23...
Local location address . . . . . > 09 5 00-FE
Online at IPL . . . . . > *NO *YES, *NO
Attached controller . . . . . > HOSTCTL 6 Name
Keyboard language type . . . . . > *SYSVAL *SYSVAL, AGB, AGI, BLI...
Drop line at signoff . . . . . > *NO *YES, *NO
Application type . . . . . > *CTLSSN 7 *NONE, *NRF, *CTLSSN...
Inactivity timer . . . . . > *ATTACH 1-30, *ATTACH, *NOMAX...
Local location . . . . . > *NETATR 8 Name, *NETATR
Text 'description' . . . . . > 'SPLS control session display'
```

Figure 17-6. Configuring a Display with an Application Type of *CTLSSN

- 1 Device description: Use the name of this dependent LU as it is defined to VTAM (suggestion).

The first 7 characters of this name are the first 7 characters of the names of any device descriptions that the AS/400 system automatically creates for sessions that come in to this LU. Because the automatically created device descriptions have an application type of *DEVINIT, it would be confusing if they were named CTLSSN000, CTLSSN001, and so forth. Therefore, you should not use CTLSSN or any variation of control session as the name of a device description with an application type of *CTLSSN.

Similarly, the automatically created device descriptions may be a mixture of 3277, 3278, 3279, and 3287 devices. Hence, it would be confusing if they were named DEV3279, DEV3279000, DEV3279001, and so forth. Therefore, you should not include a device type in the name.

- 2 Device class: Must be *RMT.
- 3 Device type: May be 3277, 3278, or 3279.
- 4 Device model: May be 0 or (only if the device type is 3278) 4.
- 5 Local location address: Must be nonzero. The local location address corresponds to a dependent VTAM LU. The user logs on to this LU but is connected to a different LU. See Figure 17-10 on page 17-18 for an example of how the dependent VTAM LU can be defined.
- 6 Attached controller: The name of the SNA host controller description. In this case, the controller description is HOSTCTL, which was created in "Step 2: Configuring the Host Controller" on page 17-7.
- 7 Application type: Must be *CTLSSN.
- 8 Local location: Normally, you can specify *NETATR. However, if you have multiple host lines, you should use explicit local location names, and you will probably want to make them unique. If your host lines connect into separate networks, you definitely should make the local location names unique.

The local location name is the name of the independent VTAM LU in the SNA communications controller. The user is bound to this LU. See Figure 17-10 on page 17-18 for an example of how the independent VTAM LU can be defined.

The system does not display a message if you type the wrong local location name.

Notes:

1. A host controller must have a display device description with application type *CTLSSN if it has device descriptions with application type *DEVINIT.
2. When a physical display or printer starts a session, SPLS looks for a device description with an application type of *DEVINIT to use for the session. SPLS selects the device description based on its device type and model. Table 17-1 shows how SPLS selects the device type and model. In summary, SPLS selects the device type and model based on the following values, which are listed in priority order:
 - a. The device type and model of the display device description with an application type of *CTLSSN to which the control initiate (CINIT) request came
 - b. The requested screen size
 - c. The value of the extended data stream supported bit (byte 2, bit 0) in the PSERVIC parameter of the bind image in the CINIT request.

Table 17-1. Device Type and Model Selection

| Device Type and Model of Display with APPTYPE *CTLSSN | Selected Device Type and Model | | | |
|---|--------------------------------|--------|------------------------------|--------|
| | Extended Data Stream Bit ON | | Extended Data Stream Bit OFF | |
| | Not 43x80 | 43x80 | Not 43x80 | 43x80 |
| 3277 | 3277 | 3277 | 3277 | 3277 |
| 3278-0 | 3278-0 | 3278-4 | 3277 | 3278-4 |
| 3278-4 | 3278-4 ¹ | 3278-4 | 3277 | 3278-4 |
| 3279 | 3279 | 3278-4 | 3277 | 3278-4 |

Note: ¹Even though a device type and model of 3278 Model 4 is selected, the primary screen size for the session is set to 24 by 80. If the PSERVIC parameter of the bind image in the CINIT request indicates that the device should be queried to find the alternate screen size, the alternate screen size for the session is set to 43 by 80. This is indicated when byte 10 of the PSERVIC parameter is X'03' (the byte numbers begin at zero). The PSERVIC parameter of the bind image in the CINIT request is set by the PSERVIC operand of the MODEENT macroinstruction. For more information about the PSERVIC operand, see the *VTAM Resource Definition Reference*.

After SPLS selects the device type and model, it looks for an available, existing device description with that device type and model. If that search fails, SPLS attempts to automatically create the device description. If the automatic creation is not allowed or fails, SPLS degrades the requested device type and model (until the device type is 3277) and repeats the search until it either succeeds or fails altogether. The following list shows

the device types and models starting with the most capable and ending with the least capable:

- 3279 or 3278 Model 4
- 3278 Model 0
- 3277

When SPLS must degrade the device type and model, it uses the preceding list. For example, if a device description with a device type of 3279 is not available and cannot be automatically created, SPLS tries to find an available device description with a device type of 3278 and a model of 0. If that fails, SPLS moves down to a 3277.

Configuring a Display with an Application Type Parameter of *DEVINIT: Figure 17-7 shows a configuration for a 3279 display with an application type of *DEVINIT.

```

Create Device Desc (Display) (CRTDEVSP)

Type choices, press Enter.

Device description . . . . . > DSP02          Name
Device class . . . . . > *RMT 1             *LCL, *RMT, *VRT, *SNPT
Device type . . . . . > 3279 2             3101, 3151, 3161, 3162...
Device model . . . . . > 0 3                0, 1, 2, 4, 11, 12, 23...
Local location address . . . . . > 00 4      00-FE
Online at IPL . . . . . > *NO                *YES, *NO
Attached controller . . . . . > HOSTCTL 5     Name
Keyboard language type . . . . . > *SYSVAL    *SYSVAL, AGB, AGI, BLI...
Drop line at signoff . . . . . > *NO 6       *YES, *NO
Application type . . . . . > *DEVINIT 7      *NONE, *NRF, *CTLSSN...
Inactivity timer . . . . . > *ATTACH 8       1-30, *ATTACH, *NOMAX...
Text 'description' . . . . . > '3279 display device for using SPLS'

```

Figure 17-7. Configuring a Display with an Application Type of *DEVINIT

- 1** Device class: Must be *RMT.
- 2** Device type: May be 3277, 3278, or 3279.
- 3** Device model: May be 0 or (only if the device type is 3278) 4.
- 4** Local location address: Must be 0 to indicate that this device is associated with an independent PLU.
- 5** Attached controller: The name of the SNA host controller description. In this case, the controller description is HOSTCTL, which was created in “Step 2: Configuring the Host Controller” on page 17-7.
- 6** Drop line at signoff: If you have a switched connection, specify *NO. For switched connections, the line should not be dropped because sessions are started by a request that must come across the line from the device.
- 7** Application type: Specify *DEVINIT.
- 8** Inactivity timer: The default value, *ATTACH, is suitable most of the time.

Notes:

1. The following values for display device descriptions with an application type of *DEVINIT are set by the system when the device description is in use. They cannot be changed. To see these values, use the Display Device Description (DSPDEVD) command or the Retrieve Device Description (QDCRDEVD) application program interface (API). Use the DSPDEVD command or the QDCRDEVD API when the device description is in use. For more information about the QDCRDEVD API, see the *System Programmer's Interface Reference*.

Remote location

The VTAM/NCP name of the 3277, 3278, or 3279 display.

|
| **Remote network identifier**

| The VTAM/NCP network identifier. If the 3270 display is on the same
| network as the AS/400 system, the remote network identifier may be
| *NONE.

| **Local location**

| The name of the independent LU in the SNA communications controller.

| **Control session device description**

| The name of the display device description with an application type of
| *CTLSSN that is associated with this device for the current session.

| **Associated printer**

| The SLU name of the primary printer associated with this 3270 display
| station. A remote network identifier is also displayed for this printer. The
| associated printer information is shown if it is received on the CINIT
| request. In some cases, VTAM does not resolve the remote network identi-
| fier to the name of the network that has the printer LU definition. If you
| know the printer and display are in the same network, use the display's
| remote network identifier to configure an appropriate printer device
| description.

| **Alternate printer**

| The SLU name of the alternate printer that is associated with this 3270
| display station. A remote network identifier is also displayed for this printer.
| The alternate printer information is shown if it is received on the CINIT
| request. In some cases, VTAM does not resolve the remote network identi-
| fier to the name of the network that has the printer LU definition. If you
| know the printer and display are in the same network, use the display's
| remote network identifier to configure an appropriate printer device
| description.

- | 2. When in use, all device descriptions with an application type of *DEVINIT are associated
| with a display device description with an application type of *CTLSSN.
- | 3. If the system automatically creates a device description with an application type of
| *DEVINIT, the value of the online at IPL (ONLINE) parameter is *NO.

| **Configuring a Display with an Application Type Parameter of *APPINIT:** Configuring
| display device descriptions with an application type of *APPINIT is not recommended.

| To successfully use a display device description with an application type of *APPINIT, you
| must understand how to control displays using an application program. For example, the
| device description should not be held by a subsystem, or there will be no way to end the
| SPLS session. An application must start the session with the display. VTAM does not
| inform the AS/400 system when the display becomes available.

| Use the CRTDEV DSP command to create the display device description with an application
| type of *APPINIT. The key considerations are:

| Device class: Must be *RMT.

| Device type: May be 3277, 3278, or 3279.

| Device model: May be 0 or (only if the device type is 3278) 4.

| Local location address: Must be 0 to indicate that this device is associated with an
| independent PLU.

| Application type: Specify *APPINIT.

| Inactivity timer: The default value, *ATTACH, is suitable most of the time.

| Remote location: Must be specified and should be unique. This is the name of the LU
| in the network with which the AS/400 application communicates.

| Local location: Normally, you can specify *NETATR. However, if you have multiple host
| lines, you should use explicit local location names, and you will probably want to make

them unique. If your host lines connect into separate networks, you definitely should make the local location names unique.

The local location name is the name of the independent VTAM LU in the SNA communications controller. The user is bound to this LU. See Figure 17-10 on page 17-18 for an example of how the independent VTAM LU can be defined.

Notes:

1. The system does not automatically create device descriptions that have an application type of *APPINIT.
2. Display device descriptions with an application type of *APPINIT do not use or require a display device description with an application type of *CTLSSN.

Configuring a Printer with an Application Type Parameter of *APPINIT: Figure 17-8 shows a configuration for a printer device description with an application type of *APPINIT.

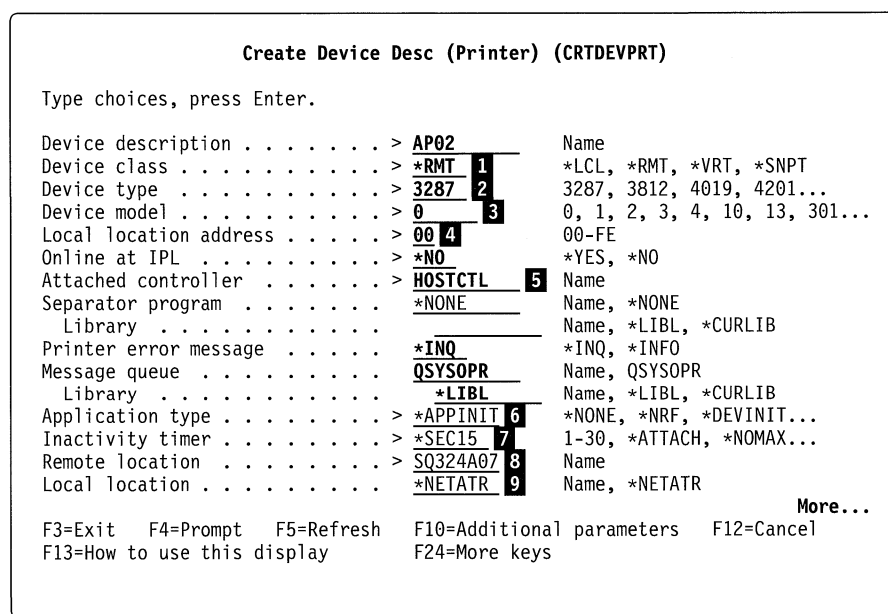


Figure 17-8. Configuring a Printer with an Application Type of *APPINIT

- 1 Device class: Must be *RMT.
- 2 Device type: Must be 3287.
- 3 Device model: Must be 0.
- 4 Local location address: Must be 0 to indicate that this device is associated with an independent PLU.
- 5 Attached controller: The name of the SNA host controller description. In this case, the controller description HOSTCTL created in “Step 2: Configuring the Host Controller” on page 17-7.
- 6 Application type: Must be *APPINIT.
- 7 Inactivity timer: Specify *SEC15. This allows the system to end the session with the printer 15 seconds after the application's job has been printed. (If the application sends another job to this printer within 15 seconds, the system does not end the session.) This allows various applications on different systems around the network to share this printer.
- 8 Remote location: Must be specified and should be unique. This is the name of the LU in the network with which the AS/400 application communicates. See Figure 17-12 on page 17-20 for an example of how the corresponding LU can be defined.

Local location

The name of the independent LU in the SNA communications controller.

Control session device description

The name of the display device description with an application type of *CTLSSN that is associated with this device for the current session.

2. When in use, all device descriptions with an application type of *DEVINIT are associated with display device descriptions with an application type of *CTLSSN.
3. If the system automatically creates a device description with an application type of *DEVINIT, the value of the online at IPL (ONLINE) parameter is *NO.

Step 4: Configuring the Host System

Only one independent LU definition is necessary in VTAM or NCP on the physical unit (PU) for the AS/400 system. This independent LU can support many independent device descriptions for LU 1 and LU 2 sessions. A dependent LU definition is also needed in VTAM or NCP for device-initiated sessions. This dependent LU definition must match the AS/400 device description with an application type of *CTLSSN. Up to 253 display and printer sessions may be established across a subarea network using the following LU definitions.

- One VTAM or NCP predefined dependent LU (for the device-initiated sessions)
- One independent LU

A cross-domain resource (CDRSC) definition statement for the independent LU must exist in both the source and target VTAM definitions. The CDRSC definition statement can be created dynamically by VTAM or explicitly by the VTAM system programmer.

For information about how to configure the ES/9000 host to support dependent and independent LUs, refer to the ES/9000 documentation. For example, for information about VTAM definitions, see the *VTAM Resource Definition Reference*. For information about NCP definitions, see the *NCP, SSP, EP Resource Definition Reference* and the *NCP, SSP, EP Resource Definition Guide*. For some examples that may help you, see “Examples of VTAM Logon Mode Tables and Definitions” on page 17-17, “Matching Parameters for an SDLC Line” on page 17-22, and “Matching Parameters for a Token-Ring Line” on page 17-23.

Starting SNA Primary LU2 Support Sessions

Users who want to access an AS/400 system can do so using VTAM and SPLS by sending an unformatted system services (USS) request to the VTAM SSCP in the form of a logon string.

The logon string consists of the following parts:

Application Identifier (APPLID)

Specifies the requested application. In this case, the APPLID is the name of the dependent LU for the AS/400 system. The dependent LU has a matching display device description with an application type of *CTLSSN.

SNA Logon Mode (LOGMODE)

Determines the session parameters to be used during the LU-to-LU session and is defined in a USS table for the VTAM licensed program. You can use the default value for this operand.

Data Operand (DATA)

SPLS currently ignores this operand.

Associated Printer (PRINTER1)

Indicates the name of the printer associated with the 3270 display station.

Alternate Printer (PRINTER2)

Indicates the name of the alternate printer for the 3270 display station.

The logon request may appear in either basic assembler language (BAL) or PL/I format.

However, the logon string must be entered in the same format as the logon string configured in the USS VTAM table. The USS VTAM table is on the ES/9000 host.

An example of a full logon string written in PL/I could look like this:

```
LOGON APPLID(R4082A09) LOGMODE(SD82HD) PRINTER1(PRT1) PRINTER2(PRT2)
```

The application identifier (APPLID) is named R4082A09. The SNA logon mode is labeled SD82HD. The name of the associated printer is PRT1. The name of the alternate printer is PRT2.

You can set up USS tables to supply defaults for all of the parameters except APPLID. For more information about the LOGON command and USS tables, see the *VTAM Resource Definition Reference*.

Customizing Your SNA 3270 Display Keyboard Map

SPLS has the same considerations as DHCF for customizing a 3270 display station keyboard to be mapped as a 5250 display station keyboard. See “Display Station Considerations for DHCF” on page 15-11.

AS/400 Work Station Printing

SPLS has the same considerations for remote 3270 work station printers as NRF. See “AS/400 Work Station Printing” on page 16-8.

Creating a Printer Device Description for the Associated Printer

You can use the Create Printer for SPLS (TNXCRTPT) tool in the QUSRTOOL library to create printer device descriptions for the associated and alternate printers.

Ending SNA Primary LU2 Support Sessions

You may use either of the following two methods to end SPLS:

1. Use the ENDCNN parameter of the Sign Off (SIGNOFF) command to sign off the AS/400 system and end the session between your 3270 display station and the AS/400 system. For example, type:

```
SIGNOFF ENDCNN(*YES)
```

and press the Enter key.
2. Do the following:
 - a. Sign off the AS/400 system using the Sign Off (SIGNOFF) command.
 - b. Press the 3270 system request key.
 - c. Log off from the application using the LOGOFF command, which is a VTAM command.

If you sign off the system while using SPLS without ending your SPLS session, the session remains bound even after you sign off. This prevents other users from using the system and network resources used by this session.

SNA Primary LU2 Support Performance Considerations

For general performance considerations regarding AS/400 communications, see the *Communications Management Guide*.

Examples of VTAM Logon Mode Tables and Definitions

This topic contains samples of ES/9000 VTAM logon mode (logmode) tables, and AS/400 system and NCP definitions. These tables are configured on the ES/9000 host to allow the LU-to-LU connections necessary for SPLS operation.

Logon Mode Tables

The following figure contains sample VTAM logon mode tables. These tables are used to define the characteristics of the session established between the 3270 displays and the AS/400 system.

```
SD82 MODETAB
*****
* LOGMODE PAIR FOR 24 X 80 TERMINAL -- PACING = 0, 256 BYTE RU      *
*****
SD82HD  MODEENT LOGMODE=SD82HD,
        FMPROF=X'03',          BYTE 02
        TSPROF=X'03',          BYTE 03
        PRIPROT=X'B1',         BYTE 04
        SECPROT=X'90',         BYTE 05
        COMPROT=X'3081',       BYTE 06 - 07
        SSNDPAC=X'00',         BYTE 08
        SRCVPAC=X'00',         BYTE 09
        PSNDPAC=X'00',         BYTE 12
        PSERVIC=X'020000000000185018507F00',          BYTE 14-25
        RUSIZES=X'8585'        BYTE 10 - 11
*****
* LOGMODE PAIR FOR 24 X 80 TERMINAL -- PACING = 0, 2560 BYTE RU   *
*****
TRNH00  MODEENT LOGMODE=TRNH00,
        FMPROF=X'03',          BYTE 02
        TSPROF=X'03',          BYTE 03
        PRIPROT=X'B1',         BYTE 04
        SECPROT=X'B0',         BYTE 05
        COMPROT=X'3081',       BYTE 06 - 07
        SSNDPAC=X'00',         BYTE 08
        SRCVPAC=X'00',         BYTE 09
        PSNDPAC=X'00',         BYTE 12
        PSERVIC=X'028000000000000000000000200',      BYTE 14-25
        RUSIZES=X'A8A8'
*****
* LOGMODE PAIR FOR 24 X 80 TERMINAL -- PACING = 7, 512 BYTE RU   *
*****
TRNH07  MODEENT LOGMODE=TRNH07,
        FMPROF=X'03',          BYTE 02
        TSPROF=X'03',          BYTE 03
        PRIPROT=X'B1',         BYTE 04
        SECPROT=X'B0',         BYTE 05
        COMPROT=X'3081',       BYTE 06 - 07
        SSNDPAC=X'07',         BYTE 08
        SRCVPAC=X'07',         BYTE 09
        PSNDPAC=X'00',         BYTE 12
        PSERVIC=X'028000000000000000000000200',      BYTE 14-25
        RUSIZES=X'8686'        BYTE 10 - 11
```

Figure 17-9 (Part 1 of 2). Sample ES/9000 VTAM Logon Mode Tables

```

*****
*
* LOGMODE PAIR FOR 328X PRINTER -- PACING = 1 (MINIMUM VALUE)
*
*                               256 BYTE RU
*
*****
SCSPTRR  MODEENT LOGMODE=SCSPTRR,
          FMPROF=X'03',           BYTE 02
          TSPROF=X'03',           BYTE 03
          PRIPROT=X'B1',          BYTE 04
          SECPROT=X'90',          BYTE 05
          COMPROT=X'3081',        BYTE 06 - 07
          SSNDPAC=X'01',          BYTE 08
          SRCVPAC=X'01',          BYTE 09
          PSERVIC=X'01000000E100000000000000',  BYTE 14-25
          PSNDPAC=X'01',          BYTE 11
          RUSIZES=X'8585'
*****
*
* LOGMODE PAIR FOR 328X PRINTER -- PACING = 3,  512 BYTE RU
*
*
*****
SCSTRNR  MODEENT LOGMODE=SCSTRNR,
          FMPROF=X'03',           BYTE 02
          TSPROF=X'03',           BYTE 03
          PRIPROT=X'B1',          BYTE 04
          SECPROT=X'90',          BYTE 05
          COMPROT=X'3081',        BYTE 06 - 07
          SSNDPAC=X'03',          BYTE 08
          SRCVPAC=X'03',          BYTE 09
          PSERVIC=X'01000000E100000000000000',  BYTE 14-25
          PSNDPAC=X'03',          BYTE 11
          RUSIZES=X'8686'

```

Figure 17-9 (Part 2 of 2). Sample ES/9000 VTAM Logon Mode Tables

Network Control Program Definitions

The following figure defines an SDLC connection on the SNA communications controller to the host system:

```

*****
* AS/400 USING SDLC LINE TO CONNECT TO AS/400 SPLS
*
*****
R4082  LINE ADDRESS=(082,HALF),ETRATIO=250,ISTATUS=INACTIVE,RETRIES=(
      07,05,03),SPEED=9600,MAXDATA=521,OWNER=MVS,PACING=0,VPAC*
      ING=0
      SERVICE ORDER=(R4082A,R4082B)
R4082A PU ADDR=C1,ISTATUS=INACTIVE,XID=YES,NETID=RPC
R4082A01 LU LOCADDR=01,ISTATUS=INACTIVE
R4082A02 LU LOCADDR=02,ISTATUS=INACTIVE
R4082A03 LU LOCADDR=03,ISTATUS=INACTIVE
R4082A04 LU LOCADDR=04,ISTATUS=INACTIVE
R4082A05 LU LOCADDR=05,ISTATUS=INACTIVE
R4082A06 LU LOCADDR=06,ISTATUS=INACTIVE
R4082A07 LU LOCADDR=07,ISTATUS=INACTIVE
R4082A08 LU LOCADDR=08,ISTATUS=INACTIVE
R4082A09 LU LOCADDR=09,ISTATUS=INACTIVE
R4082A10 LU LOCADDR=10,ISTATUS=INACTIVE
R4082A11 LU LOCADDR=11,ISTATUS=INACTIVE
R4082A12 LU LOCADDR=12,ISTATUS=INACTIVE
R4082A13 LU LOCADDR=13,ISTATUS=INACTIVE
R4082A14 LU LOCADDR=00,RESSCB=16,ISTATUS=INACTIVE
R4082A15 LU LOCADDR=00,RESSCB=16,ISTATUS=INACTIVE
R4082A16 LU LOCADDR=00,RESSCB=16,ISTATUS=INACTIVE

```

Figure 17-10 (Part 1 of 2). ES/9000 VTAM Tables Defining NCP on the SNA Communication Controller

```

R4082B  PU  ADDR=C2, ISTATUS=INACTIVE, XID=YES, NETID=RPC
R4082B01 LU  LOCADDR=01, ISTATUS=INACTIVE
R4082B02 LU  LOCADDR=02, ISTATUS=INACTIVE
R4082B03 LU  LOCADDR=03, ISTATUS=INACTIVE
R4082B04 LU  LOCADDR=04, ISTATUS=INACTIVE
R4082B05 LU  LOCADDR=05, ISTATUS=INACTIVE
R4082B06 LU  LOCADDR=06, ISTATUS=INACTIVE
R4082B07 LU  LOCADDR=07, ISTATUS=INACTIVE
R4082B08 LU  LOCADDR=08, ISTATUS=INACTIVE

```

Figure 17-10 (Part 2 of 2). ES/9000 VTAM Tables Defining NCP on the SNA Communication Controller

VTAM Definitions for the AS/400 System

The following figure contains VTAM-switched major node definitions for the connection between the NCP communications controller and the AS/400 system using token ring:

```

SW722  VBUILD TYPE=SWNET,      REQUIRED PARAMETER          X
          MAXNO=8,             MAX OF 8 DIAL NUMBERS MAY BE DEFINED *
          MAXGRP=5             MAX OF 5 LINE GROUPS MAY BE DEFINED
*
SW722A  PU  ADDR=C1,          8 BIT STATION UNIQUE ADDRESS      X
          DISCNT=NO,          ACCEPT DISCONTACT FROM PU (DEFAULT) X
          IDBLK=056,          12 BIT BLOCK NUMBER FOR AS/400    X
          IDNUM=0722A,        20 BIT ID NUMBER FOR REMOTE SYSTEM X
          MAXDATA=1994,       AS/400 MAXDATA FOR TOKENRING      X
          MAXPATH=8,          MAX OF 8 PATHS FOR CALL OUT        X
          NETID=RPC,          AS/400 LOCAL NETID VALUE          X
          MAXOUT=7,           7 PIUS TO DEVICE BEFORE RESPONSE X
          PACING=0,           0 PACING                          X
          PASSLIM=7,          7 CONTIGUOUS PIUS MAX AT ONE TIME X
          PUTYPE=2,           VALID FOR TYPE 2 OR 2.1 SUPPORT    X
          ISTATUS=ACTIVE,     ACTIVATE WITH MAJOR NODE          X
          MODETAB=LOGMOD38,   VTAM LOGN MODE TABLE ON S/370    *
          SSCPFM=USSSCS,     VTAM TO STRIP/ADD MEDIA CONTROL CHAR *
          VPACING=0           0 VPACING
*
PATH2   PATH  GRPNM=R4G088L, DIALNO=01044000705F4512
*
RCHAS722 LU  LOCADDR=00,      INDEPENDENT LU                  X
          ISTATUS=ACTIVE     ACTIVATE WITH MAJOR NODE
SW722A01 LU  LOCADDR=00,      INDEPENDENT LU                  X
          ISTATUS=ACTIVE     ACTIVATE WITH MAJOR NODE
SW722A02 LU  LOCADDR=02,      CORRESPONDS TO AS/400 LOCADR 02 X
          ISTATUS=ACTIVE     ACTIVATE WITH MAJOR NODE
SW722A03 LU  LOCADDR=03,      CORRESPONDS TO AS/400 LOCADR 03 X
          ISTATUS=ACTIVE     ACTIVATE WITH MAJOR NODE
SW722A04 LU  LOCADDR=04,      CORRESPONDS TO AS/400 LOCADR 04 X
          ISTATUS=ACTIVE     ACTIVATE WITH MAJOR NODE
*

```

Figure 17-11 (Part 1 of 2). ES/9000 VTAM AS/400 System Definitions

```

SW722B  PU  ADDR=C1,          8 BIT STATION UNIQUE ADDRESS      X
          DISCNT=NO,      ACCEPT DISCONTACT FROM PU (DEFAULT) X
          IDBLK=056,      12 BIT BLOCK NUMBER FOR AS/400   X
          IDNUM=0722B,    20 BIT ID NUMBER FOR REMOTE SYSTEM X
          MAXDATA=1994,   AS/400 MAXDATA FOR TOKENRING      X
          MAXPATH=8,      MAX OF 8 PATHS FOR CALL OUT       X
          NETID=RPC,      AS/400 LOCAL NETID VALUE         X
          MAXOUT=7,       7 PIUS TO DEVICE BEFORE RESPONSE  X
          PACING=0,       0 PACING                               X
          PASSLIM=7,      7 CONTIGUOUS PIUS MAX AT ONE TIME    X
          PUTYPE=2,       VALID FOR TYPE 2 OR 2.1 SUPPORT      X
          ISTATUS=ACTIVE, ACTIVATE WITH MAJOR NODE          X
          MODETAB=LOGMOD38, VTAM LOGN MODE TABLE ON S/370      *
          SSCPFM=USSSCS,  VTAM TO STRIP/ADD MEDIA CONTROL CHAR *
          VPACING=0       0 VPACING

*
PATH2    PATH  GRPNM=R4G088L,DIALNO=01084000705F4512
*
SW722B00 LU  LOCADDR=00,      INDEPENDENT LU                      X
          ISTATUS=ACTIVE  ACTIVATE WITH MAJOR NODE
SW722B01 LU  LOCADDR=00,      INDEPENDENT LU                      X
          ISTATUS=ACTIVE  ACTIVATE WITH MAJOR NODE
SW722B02 LU  LOCADDR=02,      CORRESPONDS TO AS/400 LOCADR 02    X
          ISTATUS=ACTIVE  ACTIVATE WITH MAJOR NODE
SW722B03 LU  LOCADDR=03,      CORRESPONDS TO AS/400 LOCADR 03    X
          ISTATUS=ACTIVE  ACTIVATE WITH MAJOR NODE
SW722B04 LU  LOCADDR=04,      CORRESPONDS TO AS/400 LOCADR 04    X
          ISTATUS=ACTIVE  ACTIVATE WITH MAJOR NODE

```

Figure 17-11 (Part 2 of 2). ES/9000 VTAM AS/400 System Definitions

VTAM Definitions for the 3174 Establishment Controller

The following figure contains VTAM-switched major node definitions for the connection between NCP and the 3174 controller:

```

SQ324    VBUILD TYPE=SWNET,    REQUIRED PARAMETER                    X
          MAXNO=8,            MAX OF 8 DIAL NUMBERS MAY BE DFINED *
          MAXGRP=5            MAX OF 5 LINE GROUPS MAY BE DEFINED
SQ324A   PU  ADDR=C1,          8 BIT STATION UNIQUE ADDRESS      X
          DISCNT=NO,      ACCEPT DISCONTACT FROM PU (DEFAULT) X
          IDBLK=017,      12 BIT BLOCK NUMBER FOR 3174       X
          IDNUM=00000,    20 BIT ID NUMBER FOR REMOTE SYSTEM X
          MAXDATA=1994,   AS/400 MAXDATA FOR TOKENRING      X
          MAXPATH=8,      MAX OF 8 PATHS FOR CALL OUT       X
          PACING=0,       0 PACING                               X
          PUTYPE=2,       VALID FOR TYPE 2 OR 2.1 SUPPORT      X
          ISTATUS=ACTIVE, ACTIVATE WITH MAJOR NODE          X
          MODETAB=SD82,   VTAM LOGN MODE TABLE ON S/370      *
          SSCPFM=USSSCS,  VTAM TO STRIP/ADD MEDIA CONTROL CHAR *
          VPACING=0       0 VPACING

*
PATH1    PATH  GRPNM=R4G088L,DIALNO=0104400031740004
*

```

Figure 17-12 (Part 1 of 2). ES/9000 VTAM Tables Defining the 3174 Establishment Controller


```

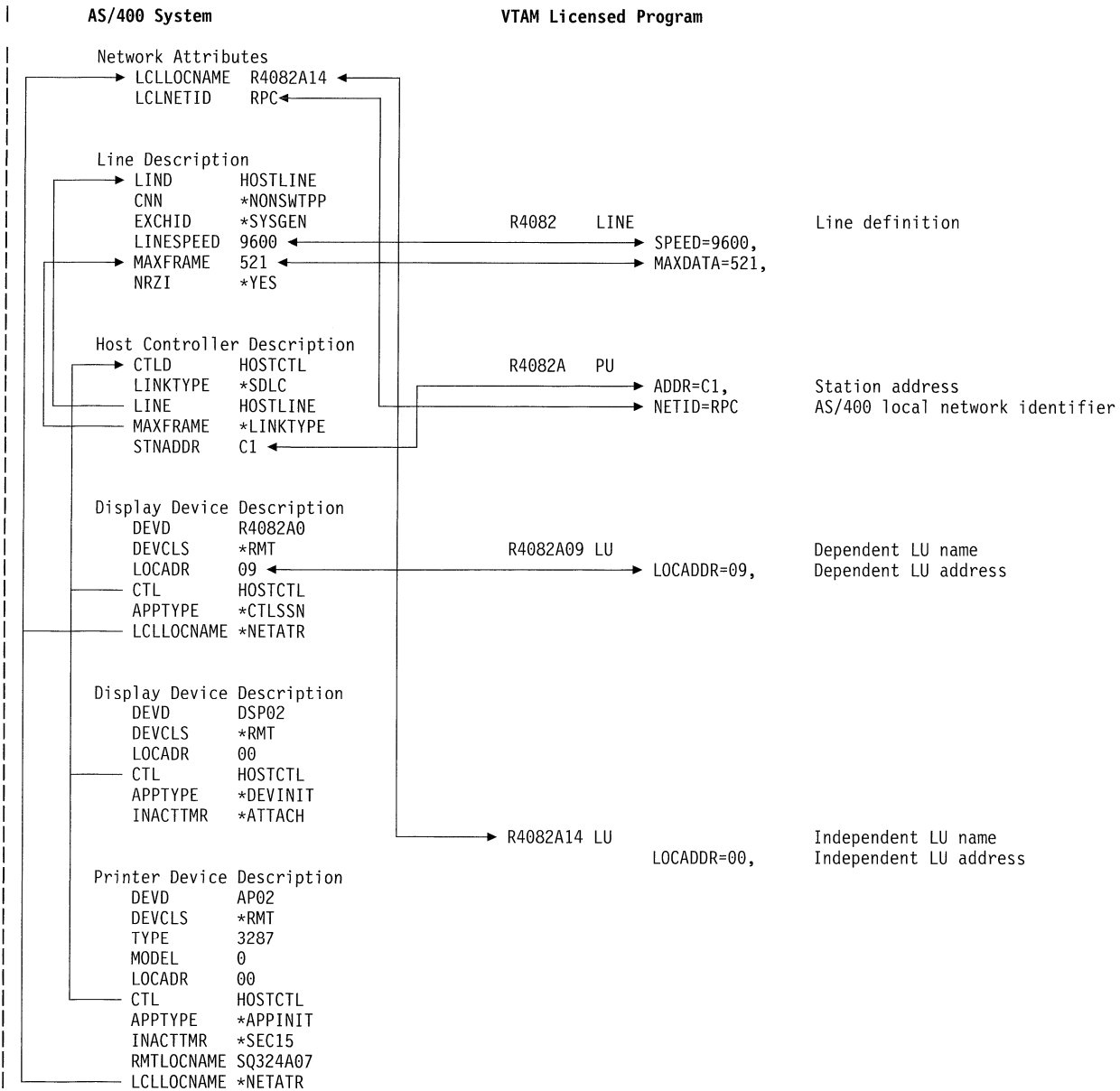
*****
* LUs SQ324A02 through SQ324A06 use the first entry in LOGMODE table *
* SD82. *
* LUs SQ324A07 and SQ324A08 use the logmode specified in the LU *
* definition. *
*****
SQ324A02 LU LOCADDR=02, CORRESPONDS TO 3174 PORT 00 X
           ISTATUS=ACTIVE
SQ324A03 LU LOCADDR=03, CORRESPONDS TO 3174 PORT 01 X
           ISTATUS=ACTIVE
SQ324A04 LU LOCADDR=04, CORRESPONDS TO 3174 PORT 02 X
           ISTATUS=ACTIVE ACTIVATE WITH MAJOR NODE
SQ324A05 LU LOCADDR=05, CORRESPONDS TO 3174 PORT 03 X
           ISTATUS=ACTIVE ACTIVATE WITH MAJOR NODE
SQ324A06 LU LOCADDR=06, CORRESPONDS TO 3174 PORT 04 X
           ISTATUS=ACTIVE ACTIVATE WITH MAJOR NODE
SQ324A07 LU LOCADDR=07, CORRESPONDS TO 3174 PORT 05 X
           ISTATUS=ACTIVE,
           DLOGMOD=SCSPTRR X
SQ324A08 LU LOCADDR=08, CORRESPONDS TO 3174 PORT 06 X
           ISTATUS=ACTIVE,VPACING=3,PACING=3,
           DLOGMOD=SCSTRNR X

```

Figure 17-12 (Part 2 of 2). ES/9000 VTAM Tables Defining the 3174 Establishment Controller

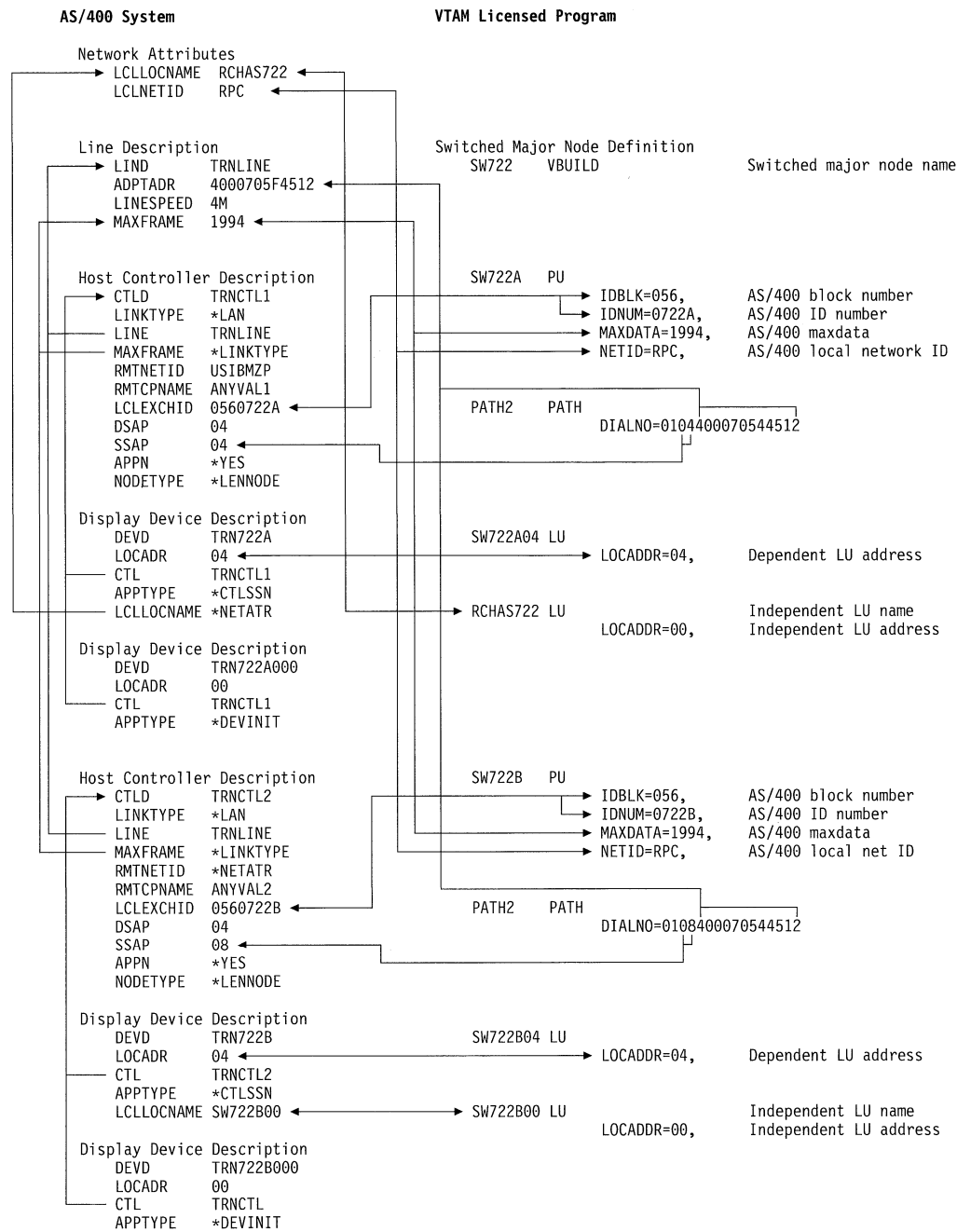
Matching Parameters for an SDLC Line

The following diagram shows which AS/400 values need to match which VTAM values when using a switched SDLC line:



Matching Parameters for a Token-Ring Line

The following diagram shows AS/400 values and the corresponding VTAM values when using a token-ring line:



Bibliography

The following manuals referred to in this guide can be used for more information on the subject matter. These manuals are listed with their full title and order number. When these manuals are referred to in this guide, a shortened version of the title is used. The shortened title version follows each manual description in this bibliography.

- *Communications: Advanced Peer-to-Peer Networking Guide*, SC41-8188, provides the application programmer with information about the Advanced Peer-to-Peer Networking (APPN) support provided by the AS/400 system. This guide provides information for configuring an APPN network and presents considerations to apply when using APPN support.

Short Title: *APPN Guide*

- *Communications: Advanced Program-to-Program Communications Programmer's Guide*, SC41-8189, provides the application programmer with information about the advanced program-to-program communications (APPC) support provided by the AS/400 system. This is a guide for programming and defining the communications environment for APPC communications.

Short Title: *APPC Programmer's Guide*.

- *Communications: Distribution Services Network Guide*, SC41-9588, provides the system operator or administrator with information about configuring a network for Systems Network Architecture distribution services (SNADS) and the Virtual Machine/Multiple Virtual Storage (VM/MVS) bridge.

Short Title: *Distribution Services Network Guide*

- *Communications: Integrated Services Digital Network Guide*, SC41-0003, provides the system administrator, the system programmer, and service personnel with information about configuring and using ISDN.

Short Title: *ISDN Guide*

- *Communications: Management Guide*, SC41-0024, provides the system operator with communications work management information, error handling information, communications status information, and communications performance information.

Short Title: *Communications Management Guide*

- *Communications: Operating System/400* Communications Configuration Reference*, SC41-0001, provides the application programmer with information on configuring line, controller, and device descriptions to communicate within a network. Additional configuration considerations are discussed.

Short Title: *OS/400* Communications Configuration Reference*

- *Communications: 3270 Device Emulation Guide*, SC41-9602, provides display station operators and programmers with information about using 3270 device

emulation, configuring the device for 3270 device emulation, and creating system device configurations on the host system.

Short Title: *3270 Device Emulation Guide*

- *Data Description Specifications Reference*, SC41-9620, provides the application programmer with detailed descriptions of entries and keywords needed to describe database files and device files external to the user's programs.

Short Title: *DDS Reference*

- *Programming: Concepts and Programmer's Guide for the System/36 Environment*, SC41-9663, provides programmers with information on configuring a System/36 and identifying the differences in the application process in the System/36 environment on the AS/400 system.

Short Title: *Concepts and Programmer's Guide for the System/36 Environment*

- *Programming: Control Language Reference*, SC41-0030, provides the application programmer with a description of the AS/400 control language (CL) and its commands.

Short Title: *CL Reference*

- *Programming: System/38 Environment Programmer's Guide and Reference*, SC41-9755, provides the programmer with the information needed to configure a System/38, migrate from a System/38, convert to an AS/400 system, and coexist in a network.

Short Title: *System/38 Environment Programmer's Guide/Reference*

- *Programming: Work Management Guide*, SC41-8078, provides the programmer with information about how to create and change a work management environment. This guide describes tuning the system, collecting performance data, working with system values, and how to evaluate system use.

Short Title: *Work Management Guide*

- *System Programmer's Interface Reference*, SC41-8223 provides information for the experienced programmer on how to use the application programming interfaces (APIs) to such OS/400 functions as:

- Database files
- Message handling
- Security
- Spooled files
- Network management
- User interface
- User object
- User-defined communications
- Work management

Some of the APIs provide an alternative to the CL commands.

| **Short Title:** *System Programmer's Interface Reference*

- *Transmission Control Protocol/Internet Protocol Guide*, SC41-9875, provides the application programmer and end user with information about how the AS/400 system carries out Transmission Control Protocol/Internet Protocol (TCP/IP). This guide describes how to use and configure TCP/IP and its relationship to other AS/400 communications protocols.

Short Title: *TCP/IP Guide*

Non-AS/400 Publications

- *ACF/VTAM General Information*, GC38-0254
- *ACF/VTAM System Programmer's Guide*, SC38-0258
- *Host Command Facility: Diagnostic Reference*, LY38-3061
- *Host Command Facility: Guide and Reference*, SC27-0455
- *NCP, SSP, EP Resource Definition Guide*, SC30-3447
- *NCP, SSP, EP Resource Definition Reference*, SC30-3448
- *Network Program Products General Information*, GC30-3350

- *Network Program Products Planning*, SC30-3351
- *Network Routing Facility Migration, Resource Definition, and Customization*, SC31-6203
- *Using S/36 Communications Guide*, SC21-9082
- *VTAM Resource Definition Reference*, SC31-6412
- *3174 Establishment Controller Planning Guide Configuration Support A and S, Release 5*, GA27-3844
- *3174 Establishment Controller Planning Guide Configuration Support B, Release 3*, GA27-3862
- *3174 Establishment Controller Utilities Guide Configuration Support A and S, Release 5*, GA27-3853
- *3270 Information Display System—3274 Control Unit Description and Programmer's Guide*, GA23-0061
- *3274 Configuration Level D Support*, GA23-0065
- *5394 Remote Control Unit User's Guide*, GA27-3852
- *5394 Remote Control Unit Type 2.1 Node Support RPQ 8Q0775*, SC30-3531
- *5494 Remote Control Unit Attachment to Subarea Network RPQ 8Q0932*, SC30-3566
- *5494 Remote Control Unit Planning Guide*, GA27-3936
- *5494 Remote Control Unit User's Guide*, GA27-3960

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*DEVINIT value

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Communications:

Remote Work Station Guide

Version 2

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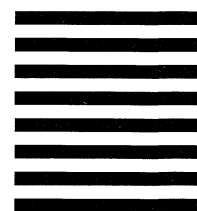
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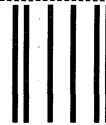
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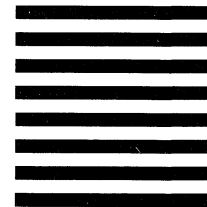
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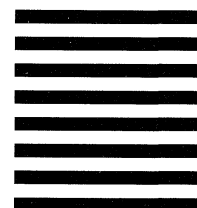
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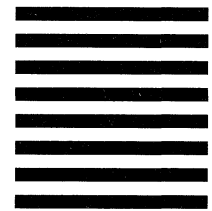
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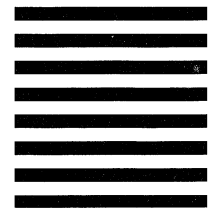
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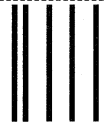
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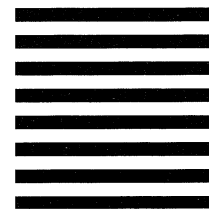
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