Distributing AFP Printing from a Host System

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

First Edition (November 1994)

This edition applies to Print Services Facility/2 Version 2 in OS/2 and Print Services Facility/6000 Version 1
Release 2 in AIX/6000.

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Abstract

This document is unique in its detailed coverage of different ways of distributing printing from a host system. It focuses on the distribution of AFP printing using Print Services Facility/2 running under OS/2 and Print Services Facility/6000 running under AIX/6000 operating system. The main interest is on new enhancements (PSF Direct) included in PSF/2 Version 2 and enhancements applied as fixes in PSF/6000 Version 1 Release 2. It provides information about how to install and use different ways of distributing printing.

This document was written for IBM customer printing specialists and IBM system engineers responsible for printing applications. Some knowledge of AFP printing and the operating systems is assumed.

(76 pages)

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Special Notices

This publication is intended to help IBM customer printer specialists and IBM system engineers supporting printing application to understand the differences between different ways of distributing printing from a host system. The document concentrates on new features implemented in PSF/2 and PSF/6000 recent releases. The information in this publication is not intended as the specification of any programming interfaces that are provided by the products mentioned in the document. See the PUBLICATIONS section of the IBM Programming Announcement for the products mentioned in this document for more information about what publications are considered to be product documentation.

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Preface

This document is intended for IBM customer printing specialists and IBM systems engineers dealing with printing.

It contains an introduction to different ways of distributing printing, especially AFP printing, from a host system.

How This Document is Organized

The document is organized as follows:

- Chapter 1, "Introduction" introduces different ways of distributing printing.
- Chapter 2, "Requirements" lists the requirements in hosts and workstations.
- Chapter 3, "Installation" describes the installation procedures.
- Chapter 4, "Operation" describes how to operate the printing procedure.
- Chapter 5, "Performance Considerations" deals with the performance considerations.
- Chapter 6, "SNA Upload Facility" describes the SNA upload and print function.
- Chapter 7, "When to Use Which Way" summarizes the information about different ways to distribute printing.

Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this document.

Advanced Function Printing

- *Intelligent Printer Data Stream Reference*, S544-3417
- *Advanced Function Printing: Printer Information*, G544-3290
- *Advanced Function Printing: Data Stream Reference*, S544-3202
- *Advanced Function Printing: Host Font Data Stream Reference*, S544-3289
- *A Guide to IBM′s Advanced Function Printing*, G544-3095
- *Advanced Function Printing: Printer Summary*, G544-3135
- *Advanced Function Printing: Software General Information*, G544-3415

Printing in AS/400

- *Advanced Function Printing Utilities/400 User′s Guide*, SH18-2416
- *AS/400 Guide to Programming for Printing*, SC41-8194

Printing in MVS

- *Print Services Facility/MVS: System Programming Guide*, S544-3672
- *Print Services Facility/MVS: Application Programming Guide*, S544-3673
- *IBM TCP/IP for MVS Network Print Facility*, SC31-8074

Printing in VM

- *Print Services Facility/VM: System Programming Guide*, S544-3680
- *Print Services Facility/VM: Application Programming Guide*, S544-3677
- *Print Services Facility/VM: Operator's Guide*, S544-3682

Printing in VSE

- *Print Services Facility/VSE: System Programming Guide*, S544-3665
- *Print Services Facility/VSE: Application Programming Guide*, S544-3666

Print Services Facility/2

- *Print Services Facility/2: Getting Started*, G544-3767
- *Print Services Facility/2: Distributed Print Function Network Configuration Guide for System/370*, S544-3809
- *Print Services Facility/2: Distributed Print Function Network Configuration Guide for OS/400*, S544-3823
- *Print Services Facility/2: Type Transformer User's Guide*, G544-3796
- *Print Services Facility/2: Printer Attachment Guide*, G544-5215
- *IBM Print Services Facility for OS/2: A Network Configuration Guide for System/370 and Communications Manager/2 Version 2.00*, S544-3911
- *IBM Print Services Facility for OS/2: An Installation Cookbook for System/370 and Token Ring Networks Version 2.00*, G544-3965
- *IBM Print Services Facility for OS/2: An Installation Cookbook for AS/400 and Token Ring Networks Version 2.00*, G544-3966
- *PSF/2 Technical Reference*, online publication

Print Services Facility/6000

- *IBM/AIX Print Services Facility/6000: Print Services Facility for AIX Users*, G544-3814
- *IBM/AIX Print Services Facility/6000: AIX for Users of Print Services Facility*, G544-3877
- *IBM/AIX Print Services Facility/6000: Print Administration*, S544-3817
- *IBM/AIX Print Services Facility/6000: Print Submission*, S544-3878
- *IBM/AIX Print Services Facility/6000: AFP Conversion and Indexing Facility*, S544-3930

International Technical Support Organization Publications

- *AS/400 Printing II*, GG24-3704

- *AS/400 Printing III*, GG24-4028

- *Print and View Data Streams*, GG24-3938

- *Transforming Type 1 Outline Fonts*, GG24-3964

- *AFP Resources in a Multi-system Environment*, GG24-4029

- *AFP Printing in an IBM Cross-System Environment*, GG24-3765

A complete list of International Technical Support Organization publications, with a brief description of each, may be found in:

> *International Technical Support Organization Bibliography of Redbooks,* GG24-3070.

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Acknowledgments

Chapter 1. Introduction

This chapter describes the development of distributed printing and different ways to distribute AFP printing from a host system.

1.1 Development of Distributed Printing

The development of distributed data processing power lead also to requirements of distributing printing from the host system. In the early times of data processing, the only way to have printed documents delivered to the remote users was to transport the printed documents.

With the invention of time sharing systems and remote job processing, the documents could be printed on printers that were remotely attached to the host systems.

The coming of intelligent workstations increased the ways of distributing significantly.

The following chapters describe the different ways to distribute printing of AFP documents.

1.2 Using Remote Printers

The simplest way to distribute AFP printing is to attach AFP printers to the host system with telecommunications connections.

In this case the control of the printing is completely under the services of the host system.

The speed of the communications restricts the speed of printing, as all the resources needed for printing have to be downloaded to the printer.

With slow telecommunications lines, the printer performance is affected significantly.

1.3 Remote PrintManager Version 1

To avoid the performance problems caused by the slow telecommunications lines when resources were needed to be downloaded, a program called Remote PrintManager was designed.

The basic idea was to have an intelligent workstation, PC/AT at that time, store the resources, and when the printer needed the resources, the downloading was done from the workstation to the printer. The speed of downloading resources was much faster this way than through the telecommunications lines.

The first version of Remote PrintManager Version 1 supported only 9600 bps SDLC lines and the IBM 3820 Printer.

1.4 Remote PrintManager Version 2

Remote PrintManager Version 2 provided support for 19200 bps lines, token-ring attachment. It also supported new printers.

Functionally Version 2 was similar to Version 1. Both versions could store resources, when sent from systems supporting resource marking. Marking the resources *public* allowed Remote PrintManager to store the resources when the resources were first used for a printer. When the resources where referred to the next time, the resources stored in the workstation were used, provided that the resources had not been changed in the host library.

Control of whether the resources were stored or not was also possible in the Remote PrintManager by specifying LIBRARY On or OFF. PSF/MVS and PSF/VSE could take the advantage of resources stored in the workstation; with PSF/VM or PSF in AS/400, it was not possible.

Remote PrintManager Version 2 is no longer orderable.

1.5 Remote PrintManager Version 3

Although the name of Remote PrintManager Version 3 was similar to Remote PrintManager Version 2, these two versions are functionally almost completely different.

Remote PrintManager Version 3 has separate functions for receiving host print files to the workstation spool and printing the files from the spool to a printer attached to the workstation.

Either at least two workstations were needed for receiving and printing, or the user had to switch the same workstation between receiving and printing.

One of the advantages in Remote PrintManager Version 3 was that the user could share a workstation-attached printer for host printing and local printing.

The most significant difference between Version 3 and Version 2 was that with Version 3 the control of the printing procedure was moved to the workstation. In Version 2 the printing is controlled by the host PSF, which means that, for example, error recovery is handled by the host, all the operating commands are entered in the host, and so on. In Version 3, the host system considers the print job completed as soon as it is successfully transferred to the RPM spool in the workstation. After that, the job is controlled by the workstation software and operated from the workstation.

1.6 PSF/2 Distributed Print Facility

The announcement of PSF/2 Version 1.0 running in a PS/2 under the OS/2 operating system brought the AFP support to the workstation. AFP files in the workstation could be printed on various printers attached to the workstation, including printers such as 4019, 4029 and HP Laserjet, attached to the parallel port of the workstation.

In this version there was no direct support for downloading the print files from the host, neither was there any direct way to print from the host to a printer attached to the workstation. If the user wanted to print a host file on a PSF/2

attached printer, the file had to be downloaded from the host to the workstation manually.

PSF/2 Version 1.10 added a new function, Distributed Print Function. This could be said to be Remote PrintManager Version 3 included in PSF/2. Functionally, PSF/2 Distributed Print Function works almost exactly as Remote PrintManager Version 3 did.

To the host, DPF is acting like a printer. The host system considers the print job completed when the print file has been successfully received into the spool of PSF/2. After that, everything is controlled in the workstation. DPF allows printing of host files and local printing share a printer.

1.7 PSF Direct/2

PSF/2 version 2 provides PSF Direct/2, which is another way to distribute printing. If DPF is seen as Remote PrintManager Version 3 included in PSF/2, PSF Direct may be considered to be Remote PrintManager Version 2 in PSF/2.

PSF Direct works the same way as Remote PrintManager 1 or 2 with the library function switched off. This means that the PSF Direct/2 component of PSF/2 is only a printer driver. The print data is not spooled to the workstation spool, but sent directly to the printer. So, the print job is controlled by the host system until the printing has completed.

1.8 PSF Direct/6000

PSF Direct/6000 was implemented as fixes to Print Services Facility/6000 Version 1 Release 2. This is functionally the same as the corresponding component in the PSF/2 product.

1.9 Network Print Facility

With TCP/IP MVS V3R1, a component called Network Print Facility (NPF) was included. This component was originally designed for printing normal line printer data files using the LPR command on the MVS side and LPD server on the receiving side. NPF allows the user to control the printing process by writing user exits to intercept the processing. One exit of this kind was included in PSF/6000 as a enhancement fix. This exit provides support for AFP related functions and transmitting AFP parameters to the PSF/6000.

NPF is different from other ways of distributing printing, as it does not need PSF in the host system. NPF is not available in the TCP/IP implementations in operating systems other than MVS.

1.10 SNA Upload-n-Print Facility

This facility, included in PSF/2 Version 2, does not exactly distribute printing from a host system, but rather vice versa.

It allows the user of a PSF/2 workstation to upload the print job from a workstation and print the job on a printer controlled by the host system.

1.11 Summary

Figure 1 shows the different ways of distributing printing from a host system.

PSF/6000 in this picture refers to the PSF Direct/6000 component of PSF/6000.
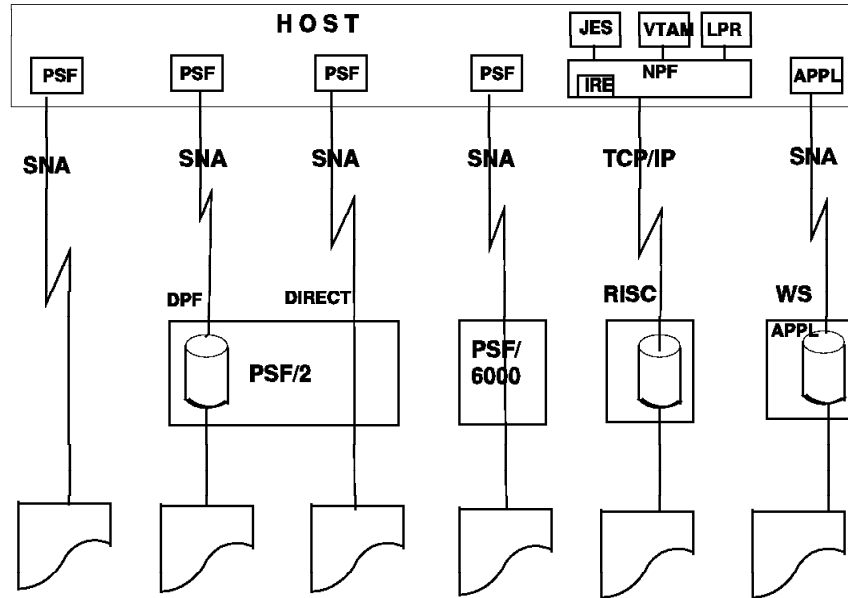
Figure 1. Summary of Distributed Printing Possibilities

Chapter 2. Requirements

This chapter describes the differences in host system and workstation requirements with different ways of distributed printing.

2.1 Requirements in the Host System for PSF/2

This section lists the host system requirements for distributing printing. These requirements apply to PSF/2 Version 2.0 product.

2.1.1 Hardware Requirements

The hardware requirements for the host system just call for any S/370, S/390 or AS/400 system, provided they have adequate software installed.

2.1.2 Software Requirements

Software required varies according to the platform and operating system.

For S/370 and S/390:

- PSF/MVS 2.1 (5695-040) with APAR #OY51438 for DPF support only.
- PSF/MVS 2.1 (5695-040) with APAR #OW08338 for full PSF Direct support.

or

- PSF/VSE 2.2.0 (5686-040) for DPF support only.
- PSF/VSE 2.2.0 (5686-040) with APAR #DY43428 for full PSF Direct support.

or

- PSF/VM 2.1.0 (5684-141) with APARs #PN23680 and #PN26700 for DPF support only.
- PSF/VM 2.1.0 (5684-141) with APAR #PN62804 for full PSF Direct support.

For AS/400:

- OS/400 V2R2 (5738-SS1) or higher, with appropriate PTFs for both DPF and PSF Direct printing. OS/400 V3R1 requires the PSF feature.

2.2 Requirements in the OS/2 Workstation

This section lists the OS/2 system requirements for distributing printing.

2.2.1 Hardware Requirements

PSF/2 requires a PS/2 or compatible personal computer. It should be equipped with Micro Channel for all printers with the exception of IBM LaserPrinter 4019, 4019E, 4029, Lexmark IBM 4037, 4039 (using PCL5 emulation) and all Hewlett-Packard Laserjet II, Laserjet III and Laserjet IV compatible as well as IBM PPDS compatible laser printers. All these printers only require a PS/2 that can run the operating system, as described below in 2.2.2, "Software Requirements" on page 7. Micro Channel is not needed, if the printer is attached using AFCCU or i-data 7913, and TCP/IP communication.

When using PSF/2 to print PostScript data, a PS/2 math coprocessor is recommended for performance reasons. The math coprocessor is usually a standard feature in many of the newest PS/2 systems.

More than one supported printer may be attached to a PS/2, thus making multiple printers available to the users (LAN and host). Under OS/2 Version 2.x, a single PSF/2 can support up to ten printers, although hardware, memory and performance constraints may impose a lower limit.

Multiple printers are supported using the various ports available. These may be the parallel and the serial ports as well as the various LAN adapter cards that allow attachment of ASCII printers. The IPDS printers may be attached either through the Printer Service Adapter (PSA) card through coax cable, or through the S/370 Channel Emulator/A card through S/370 channel or through a Multi-Protocol Adapter/A card through modems and SDLC lines.

For more detailed information on printer attachment, refer to ″IBM Print Services Facility/2 Printer Attachments Guide″ (G544-5215).

From the memory standpoint, here are some guidelines to follow:

Required for local printing

- 16MB minimum for a standalone, single printer configuration. This includes only PSF/2.

Required for host printing:

- 22.1MB minimum for a DPF single printer configuration. This includes DPF, CM/2 and NTS/2-LAPS.

- 21MB minimum for a PSF Direct single printer configuration. This includes DPF, CM/2 and NTS/2-LAPS.

Required for LAN support:

- 4MB additional for OS/2 LAN Server

- .5MB additional for Novell support Netware Requester for OS/2, V2.0

- 4MB additional for TCP/IP

Required for additional printers:

- 1.9MB additional for each additional local printer

- 1.3MB additional for each new DPF printer

- 1.7MB additional for each new PSF Direct printer

Required for optional PSF/2 functions:

- 4MB additional for Type Transformer (available with PSF/2 1.0 and 1.1 only)

- 4MB additional for PostScript Level 1 support

Hard disk space is also important, so here are some guidelines:

Required for local printing:

- 72MB

Required for host printing:

- 22.2MB additional for DPF
- 20MB additional for PSF Direct

Required for LAN support:

- 8.7MB additional for OS/2 3.0 LAN Server
- 2MB additional for Novell support Netware Requester for OS/2, V2.01
- 11MB additional for TCP/IP

Required for additional printers:

- 0.33MB for each additional local printer
- 0.33MB for each additional DPF printer
- 0MB for each additional PSF Direct

Required for optional PSF/2 functions:

- 5.9MB additional for PostScript (includes Type 1 outline fonts)
- 2.2MB additional for the Type Transformer (PSF/2 1.0 and 1.1 only)

Required for fonts:

- 1.9MB additional for Type 1 outline fonts
- 2.1MB additional for 240-pel Proprinter Emulation fonts
- 2.9MB additional for 300-pel Proprinter Emulation fonts
- 11.3MB additional for coded fonts (all countries)
- 2.8MB additional for PSF/2 240-pel IBM-supplied compatibility fonts
- 3.8MB additional for PSF/2 300-pel IBM-supplied compatibility fonts

And, of course, disk space will be needed for resources and print data. Also, the OS/2 swap file and the OS/2 spool will have to be enlarged. The PSF/2 IBM Core Interchange fonts are shipped on CD-ROM and may be accessed using a dedicated CD-ROM player at the workstation. They may be copied partially or totally to the hard disk, in which case they will take 192MB of additional space.

Besides, the PS/2 must have a card to connect it to the LAN. This may be a token-ring card or an Ethernet card, depending on the LAN configuration.

2.2.2 Software Requirements

PSF/2 Version 2.0 has the following software requirements:

- OS/2 Version Version 2.10 or 2.11 is recommended.
- Communications Manager/2 1.10, if DPF, store of fonts on host system with Type Transformer or a communications-attached 3820 printer is used. The latest CSD level is recommended.
- DataBase 2 for OS/2 (without Remote Data Services). The latest CSD level is recommended as well.
- Query Manager 1.0.

If used as a LAN print server, OS/2 LAN Server Version 3.0 is required. If used with a Novell Netware LAN, the Novell NetWware Requester for OS/2 is required.

2.3 Requirements in the Host System for PSF/6000

This section lists the host system requirements for distributing printing. These requirements apply to PSF/6000 Version 1.2 product.

2.3.1 Hardware Requirements

The hardware requirements for the host system just call for any S/370, S/390 or AS/400 system, provided they have adequate software installed.

2.3.2 Software Requirements

Job routing and resource mounting requirements:

If you plan to use TCP/IP or NFS to route print jobs from other IBM systems or mount resources from other IBM systems, the following list shows the products that must be installed on the applicable systems, and it indicates the minimum release levels of those products:

- For MVS systems:

    - 5735-HAL IBM TCP/IP Version 2 Release 2

    - Either 5665-XA3 MVS/Data Facility Product Version 3 Release 1 (Network File System server support), or 5695-DF1 IBM DFSMS/MVS(TM) Version 1 Release 1 (Network File System support)

- For VM systems:

    - 5735-FAL IBM TCP/IP for VM Version 2 Release 2 with Network File System Feature (Feature 0802 or 0803) installed

    - Optionally, the 5798-DRG VM Interface Program for TCP/IP

- For AIX/ESA(TM) systems:

    - 5756-112 IBM AIX/ESA Version 2 Release 1

    - 5696-149 Network File System for IBM AIX/ESA Version 2 Release 1

- For OS/400 systems

    - 5738-TC1 IBM TCP/IP Connectivity Utilities/400 Version 2 Release 3

    - 5798-RYW IBM TCP/IP File Server Support/400 Version 2 Release 2

Routing print jobs to or from the VSE/ESA system using File Transfer Protocol (FTP) requires that one or more of the following products be installed on the VSE/ESA system:

- 5758-PC0 File Transfer Protocol Client (for VSE)

- 5758-PC1 File Transfer Protocol Server (for VSE)

- 5758-PC3 OCS II (for IBM RISC System/6000 for VSE) 16 Logical Unit

- 5758-PC4 OCS II (for IBM RISC System/6000 for VSE) 32 Logical Unit

- 5758-PC5 OCS II (for IBM RISC System/6000 for VSE) 64 Logical Unit

- 5758-PC6 OCS II (for IBM RISC System/6000 for VSE) 128 Logical Unit

- 5758-PC7 OCS II (for IBM RISC System/6000 for VSE) 256 Logical Unit

If you plan to use the Network Print Facility to send line-data and MO:DCA-P data streams from the MVS JES spool to the AIX queue through TCP/IP for printing by

IBM Print Services Facility for AIX Release 2, the following product must be installed:

- IBM TCP/IP Version 3 Release 1 for MVS (5655-HAL) or later versions or releases. Many fixes are needed on the code shipped at general availability time. Please check the latest service recommendations with an IBM representative.

If you plan to send print data streams from PSF on MVS, VM, or OS/400 systems across SNA links to IBM Print Services Facility for AIX Release 2, the following list shows the products that must be installed on the applicable system and it indicates the minimum release levels of these products.

For S/370 and S/390:

- PSF/MVS 2.1 (5695-040) with APAR #OW08338 for full PSF Direct support.

or

- PSF/VSE 2.2.0 (5686-040) with APAR #DY43428 for full PSF Direct support.

or

    support only.

- PSF/VM 2.1.0 (5684-141) with APAR #PN62804 for full PSF Direct support.

For AS/400:

- OS/400 V2R2 (5738-SS1) or higher, with appropriate PTFs for PSF Direct printing. OS/400 V3R1 requires the PSF feature.

Appropriate SNA LU 6.2 communications software for the specific host attachment.

2.4 Requirements in the RISC System/6000 Workstation

This section lists the RISC System/6000 system requirements for distributing printing.

2.4.1 Hardware Requirements

Hardware requirements are a function of the printers to be driven by the RISC/System/6000 server. For basic data stream transformation and printer management, IBM Print Services Facility for AIX Release 2 requires, at a minimum, a RISC System/6000 POWERstation(TM) or POWERserver(TM) Model 220 with 32MB of memory. If you will be connecting channel-attached printers, IBM Print Services Facility for AIX Release 2 requires a RISC System/6000 POWERstation or POWERserver Model C10 or higher with 32MB of memory.

The minimum system memory requirement for the workstation on which IBM Print Services Facility for AIX Release 2 is installed is 32MB. IBM Print Services Facility for AIX Release 2 also requires 5MB of system memory for a RISC System/6000 with a single printer, and an additional 5MB of system memory for each additional printer.

Fixed-disk space is dependent on the functions you choose to install, as well as the fonts needed. The minimum required for a base system is 20MB. These numbers reflect the minimum amount of fixed-disk space IBM Print Services Facility for AIX Release 2 requires and are in addition to the space required by

the AIX operating system and other programs that may be installed. More fixed-disk space is required if:

- Additional fonts, overlays, page segments, form definitions, or page definitions are needed.

- The IBM Print Services Facility for AIX Release 2 PostScript transform is configured to create IM images, which typically require more than 500KB per page.

- You are printing large jobs or PostScript jobs. The amount of processing (spool) space depends on the number, type, and size of the print files.

Also, depending on the printers to be attached, several pieces of additional hardware may be needed, like the S/370 Channel Emulator/A Adapter for channel attached printers, or the i-data 7913 IPDS Printer LAN Attachment for coax or twinax attached printers.

2.4.2 Software Requirements

IBM Print Services Facility for AIX Release 2 requires IBM AIX Version 3 (program number 5756-030) Release 2.4 or later releases for the RISC System/6000. The new functions described in this book are supported with APARs PN59095 and IX46492 installed.

The following product is a prerequisite for PSF Direct:

- IBM AIX SNA Server/6000, Version 2.1 (5765-247) or later.

   There are very recent fixes that were not available for the most recent level of SNA Server/6000 at the time of our residency. That was why we used a release that was a little older, as the fix for that release was available. The reader is asked to check the status of the service recommended for SNA Server/6000. The most recent information is available from your IBM representative.

   We used SNA Server/6000 2.1 with PTF U428435 installed. In addition, fixes for APARs IX44683, IX44984, and IX45510 were received from Pennant.

Chapter 3. Installation

This chapter describes the differences in host system and workstation installation with different ways of distributing printing.

3.1 Installation in the Host System

This section lists the host system installation for distributing printing.

3.1.1 Hardware Installation

The host systems used were MVS/ESA, VM/ESA, and VSE/ESA running in an IBM 9121 CPU. VSE was running under VM. An AS/400 system was also included.

The physical connection from the host to the workstations was through IBM 3745 Token Ring Controller from S/370 hosts and through a token-ring adapter from the AS/400 system. The token ring was running at 4Mbs speed.

TCP/IP connection from the MVS system was through an IBM 3172 Controller.

3.1.2 Software Installation

The software levels of the host systems and the host system Print Services Facility products were as follows:

- In MVS/ESA:

    - MVS/ESA 4.3

    - PSF/MVS 2.1.1

- In VM/ESA:

    - VM/ESA 2.2

    - PSF/VM 2.1.0

- In VSE/ESA:

    - VSE/ESA 1.2.3

    - PSF/VSE 2.2.0

3.2 Installation in the OS/2 Workstation

This section describes the OS/2 system installation for distributing printing.

3.2.1 Workstation Hardware Installation

PSF/2 was running in an PS/2 Model 90 486 processor with 24MB of memory.

3.2.2 Workstation Software Installation

OS/2 Version 2.1 was used; a more recent release is recommended, as the only problems faced were OS/2 related.

3.2.3 PSF/2 Customization

The following tasks must be performed for customization of PSF/2:

define printer device
See Figure 2.

define printer queue
See Figure 3 on page 13.

define host receiver
For host connection, you have two possibilities:

1. DPF - Distributed Print Function

2. PSF Direct

DPF is a spooled solution; print files from the host are first copied into a PSF/2 spool and afterwards printed onto paper. See 3.2.3.1, "Distributed Print Function" on page 13.

PSF Direct links the host, the PSF/2 and printer together so that printable pages go directly to paper without any intermediate steps. See 3.2.3.2, "PSF Direct" on page 15.

First you must define the printer to PSF. This includes name of the printer and its physical connection. Select **Profile** from the PSF/2 Control Panel and then **New**.

Figure 2. Define a New Printer Device

Next you must define a printer queue so that local printing within the OS/2 can take place. Select **Options** from PSF/2 Control Panel and **Setup queues**.
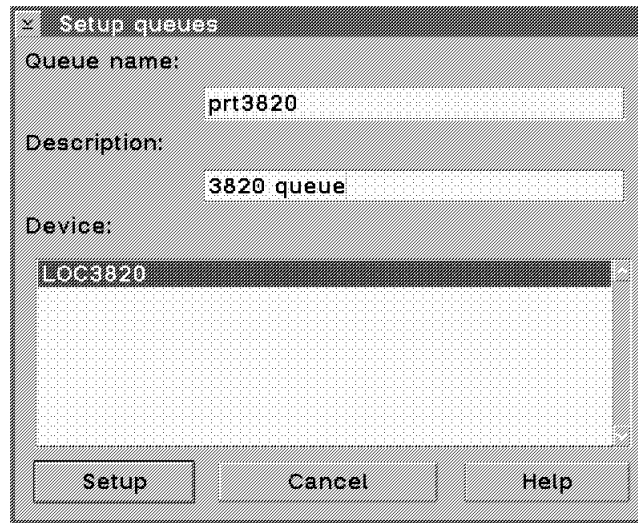
Figure 3. Define a New Printer Queue

Now you can test local printing by using the APRINT command. The dest= operand must refer to the queue defined above.

```
aprint config.sys dest=prt3820
```

3.2.3.1 Distributed Print Function
When you have decided to use DPF, you can add the host connection for it. Select PSF Distributed Print Function and add a new spool to PSF/2.

If you want to use DPF with several hosts, you must do this for each of them.
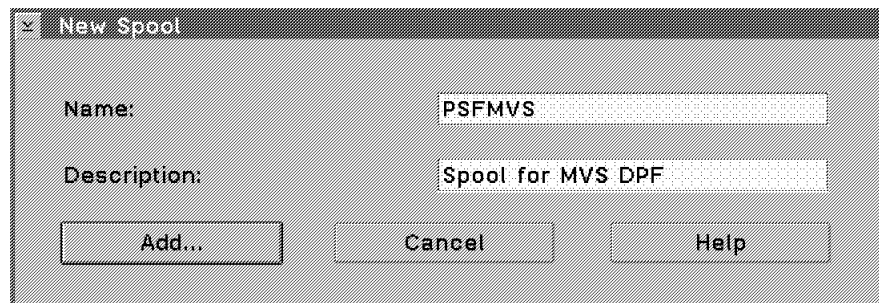
Figure 4. Create New Spool for DPF

Next you must add the host receiver to the host PSF. From DPF Spool Manager select **Receiver** and **Setup** to add a new receiver to PSF/2.
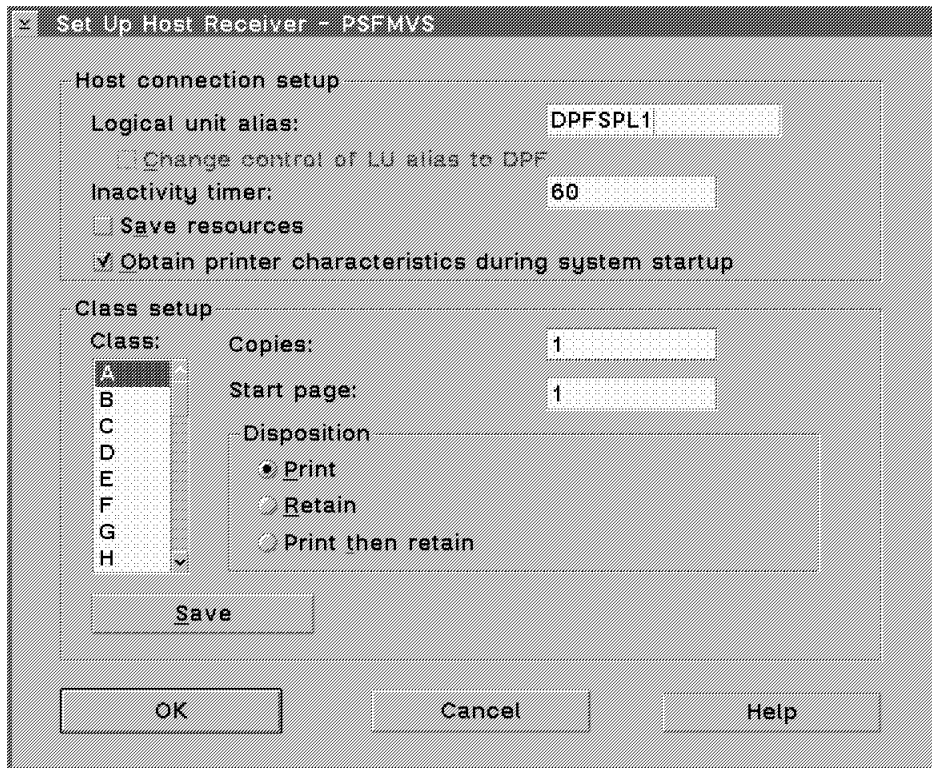
Figure 5. Set Up Host Receiver for DPF

3.2.3.2 PSF Direct

When you have decided to use PSF Direct, you can add the host connection for it.

Select **PSF Direct** and further select **Receiver** and **Setup** to add a new host for PSF Direct.

If you want to use Direct with several hosts, you must do this for each of them.
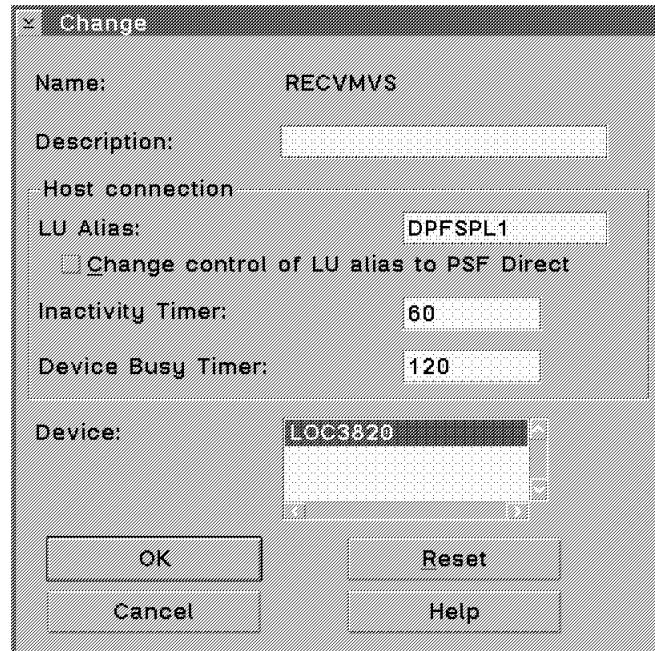
Figure 6. Set Up Host Receiver for PSF Direct

3.2.4 Sharing Printers between Different Host Printer Drivers

If you have two (or more) host systems, you can share a single printer in different ways

- Both hosts use DPF

- Both hosts use Direct

- One host uses DPF and the other uses Direct

The panels shown in Figure 5 on page 14 and Figure 6 and also the Tuning option of PSF/2 Control Panel have a field named **Inactivity timer**. A value less than 9999 means that the related connection is freed when it has been unused for that many seconds.

If sharing printers with DPF, the **Job Interval Shutdown Timer** in the Tuning Options of the PSF Control Panel must be set to something less than 9999.

Table 1 on page 16 describes the parameters related to printer sharing.

Table 1. Recommended Values for PSF/2 Parameters for a Single Printer

Case	Job Interval Shutdown Timer	DPF inactivity timer	Direct inactivity timer	Direct device busy timer	Notes
Single host using DPF	9999	9999	-	-	**1** **5** **6**
Single host using Direct	9999	-	9999	9999	**1** **5** **7**
Single host switching between DPF and Direct (occasional)	9999	9999	9999	9999	**2** **5** **7**
Single host switching between DPF and Direct (frequent)	30	30	30	9999	**3** **6**
Multiple hosts using DPF	9999	9999(host1) 9999(host2)	-	-	**1** **5** **6**
Multiple hosts, one with DPF and other with Direct	30	9999(host1)	30 (host2)	9999(host2)	**4** **5** **6**
Multiple hosts using Direct	30	-	30(host1) 30(host2)	9999(host1) 9999(host2)	**4** **6**

Notes

1 No need to terminate sessions.

2 Values 9999 mean that sessions are not closed when all files have been processed. It saves the overhead of setting up the connections, but causes more work at switching. The device and host receivers must be manually operated.

3 Value 30 terminates the sessions 30 seconds after all files have been printed. Value 30 is used as a sample of a low value. You must consider your own case and set this value according to your needs.

4 Value 30 frees the printer for the other host 30 seconds after all files have been printed. No manual switching required. Device busy timer makes the Direct host just wait until printer is free. Value 30 is used as a sample of a low value. You must consider your own case and set this value according to your needs.

5 When either the DPF inactivity timer or the Direct inactivity timer is set to 9999, it is recommended to put the DISCINTV parameter at the host PSF into 0.

6 Local printing using the APRINT command or the Print Submitter panel is fully supported.

7 Local printing using the APRINT command or the Print Submitter panel can't be done without manually stopping the PSF Direct connection.

3.3 Communications Manager/2 Customization

The following tasks must be performed for customization of PSF/2:

1. Define physical connection to the host

2. Define the logical connection between the PSF/2 and host PSF

To connect the PSF/2 to host you, will have to go to CM/2 Setup, and open the configuration of the appropriate type, in our case Token-ring. Select **APPC APIs** and you will get the screen shown in Figure 7.
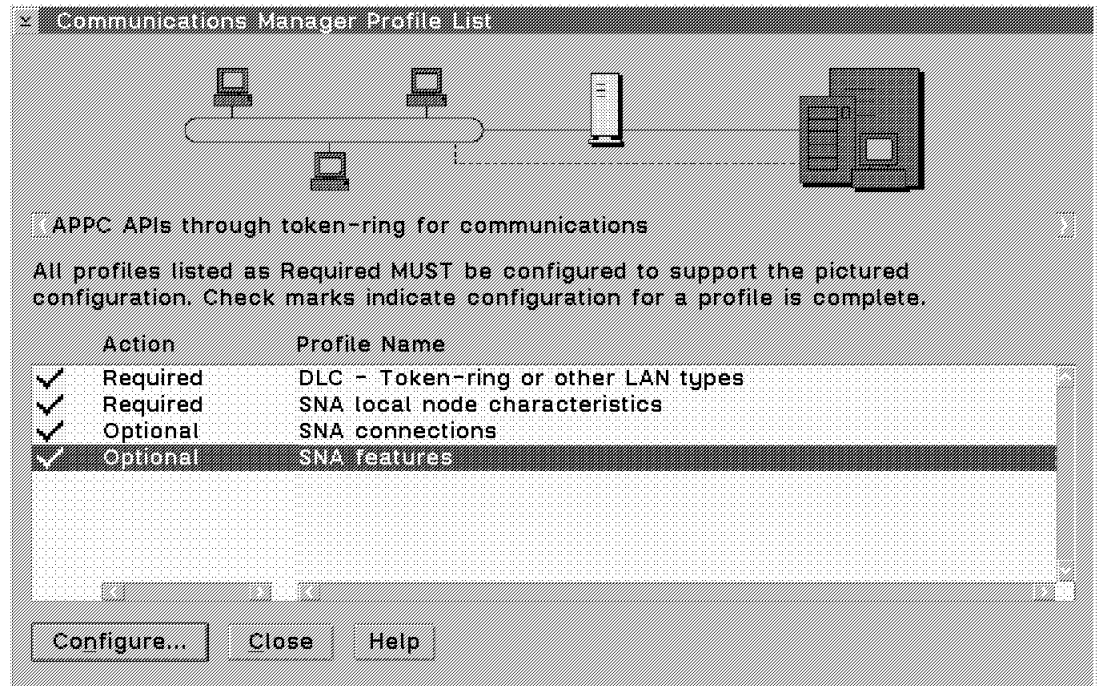
Figure 7. Definition of APPC APIs

This panel has four profiles listed, two required and two optional. You will have to go through all of them.

The first selection lets you define parameters relating to the adapter. The second one allows you to define the local node. The third one defines the host where you are connecting to.

The last one allows you to define the features, like Local LUs or Partner LUs.

Figure 8. Definition of Data Link Control

Figure 9. Local Node Characteristics
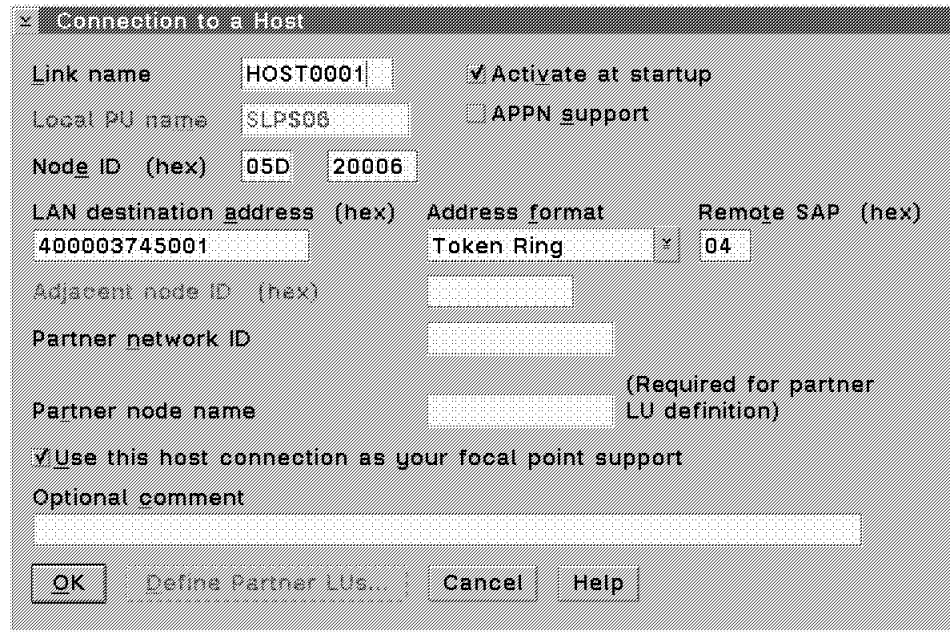
Figure 10. Definition of Host Connection
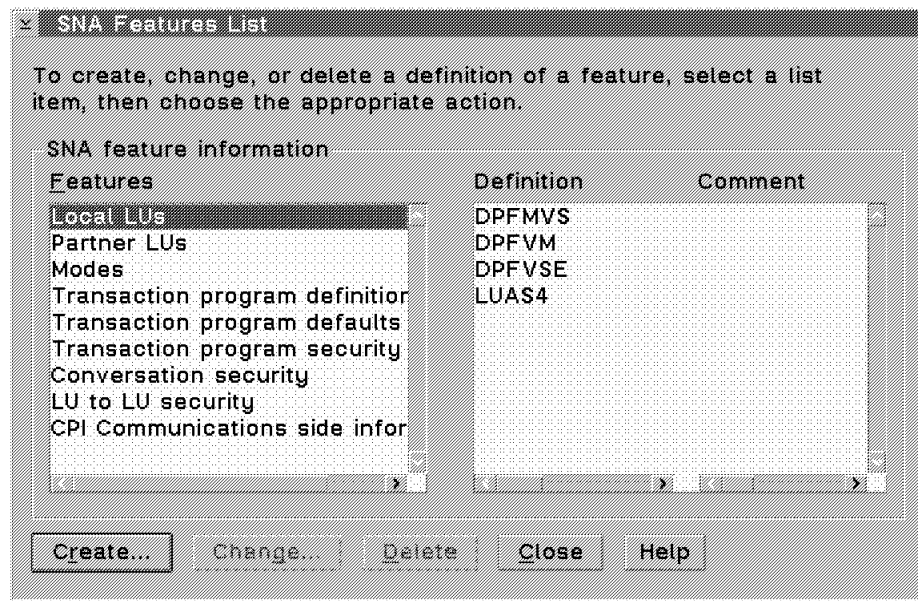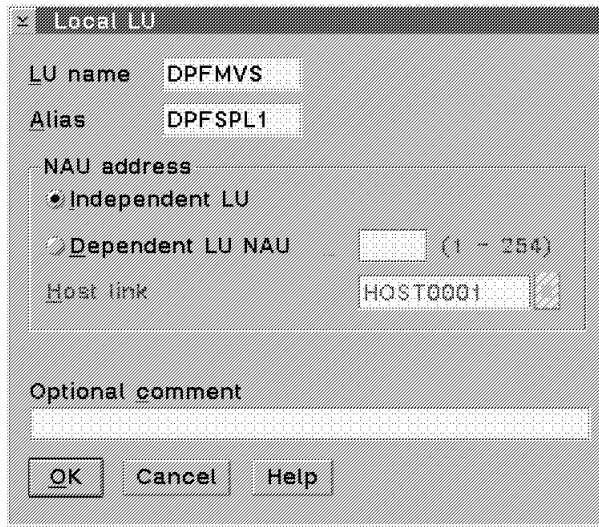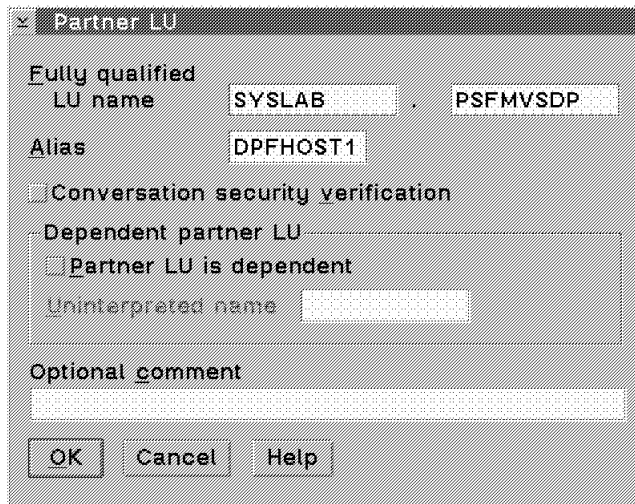
Figure 11. Definition of SNA Features

Figure 12. Local LU

Figure 13. Partner LU

Figure 14. Transaction Program Name

3.4 Parameter Relationships for PSF/2

Note that the use of reversed numbers (like **1**) refers to values, which must match. Every occurrence of the same number must have equal value.

3.4.1 Host PSF Definitions

```
PRT5  1      CLASS=X,FSS=WRT5  2
```

Figure 15. MVS JESPARM Definitions

```
S DEV,PR3820,SYSPSFF8,8  10
```

Figure 16. VSE Printer Start

```
//WRT5  2      PROC
 . . .
//PRT5  1      PRINTDEV APPLID=PSFMVSDP,  3
//                 LUNAME=DPFMVS,          4
//                 LOGMODE=MODDPFC2
```

Figure 17. PSF/MVS JCL

```
APPLID    PSFVMDP                  5
LUNAME    DPFVM                    9
LOGMODE   MODDPFC2
```

Figure 18. PSF/VM OPTIONS PDM Definitions

```
PR3820  10      PRINTDEV APPLID=PSFVSEDP,  11
                LUNAME=DPFVSE,             12
                LOGMODE=MODDPFC2
```

Figure 19. PSF/VSE Start-Up JCL

3.4.2 VTAM definitions

```
            NETID=SYSLAB,  6
```

Figure 20. VTAM Startup Parameters

```
            VBUILD TYPE=ALL
PSFMVSDP  3  APPL  AUTH=ACQ,EAS=1,SONSCIP=YES
```

Figure 21. VTAM Application Definition

```
            VBUILD TYPE=ALL
PSFVMDP   5  APPL  AUTH=ACQ,EAS=1,SONSCIP=YES
```

Figure 22. VTAM Application Definition

```
            VBUILD TYPE=ALL
PSFVSEDP  11  APPL AUTH=ACQ,EAS=1,SONSCIP=YES
```

Figure 23. VTAM Application Definition

```
            VBUILD TYPE=SWNET
SLPS06   7  PU
DPFMVS   4  LU    LOCADDR=0,
                  MODETAB=MODDPFN,
                  DLOGMODE=MODDPFC2
DPFVM    9  LU    LOCADDR=0,
                  MODETAB=MODDPFN,
                  DLOGMODE=MODDPFC2
DPFVSE   12  LU   LOCADDR=0,
                  MODETAB=MODDPFN,
                  DLOGMODE=MODDPFC2
```

Figure 24. NCP Definitions

```
MODDPFN MODETAB
MODDPFC2 MODEENT LOGMODE=MODDPFC2,FMPROF=X'13',TSPROF=X'07',            X
            PRIPROT=X'B0',SECPROT=X'B0',COMPROT=X'D0B1',               X
            RUSIZES=X'8585',PSERVIC=X'06020000000000000000002000',     X
            PSNDPAC=X'10',SRCVPAC=X'10',SSNDPAC=X'00'
        MODEEND
        END
```

Figure 25. Logmode

3.4.3 OS/2

Table 2. Communication Manager/2 Definitions			
Reference	**See figure**	**Field name**	**Value**
6	Figure 9 on page 18	Network ID	SYSLAB
7	Figure 9 on page 18	Local node name	SLPS06
4	Figure 12 on page 20	LU name	DPFMVS
8	Figure 12 on page 20	Alias	DPFSPL1
6 **3**	Figure 13 on page 20	Fully qualified LU name	SYSLAB.PSFMVSDP

Table 3. PSF/2 Definitions			
Reference	**See figure**	**Field name**	**Value**
8	Figure 5 on page 14	Logical unit alias	DPFSPL1
8	Figure 6 on page 15	Logical unit alias	DPFSPL1

3.5 Installation in the RISC System/6000 Workstation

This section describes the RISC System/6000 system installation for distributing printing.

3.5.1 Hardware Installation

PSF/6000 was running in a RISC System/6000 Model 530H.

3.5.2 Software installation

AIX/6000 Version 3.2.5 was used.

3.6 PSF/6000 Customization

```
                              System Management

 Move cursor to desired item and press Enter.

   Software Installation & Maintenance
   Devices
   Physical & Logical Storage
   Security & Users
   Diskless Workstation Management & Installation
   Communications Applications and Services
   Spooler (Print Jobs)
   Problem Determination
   Performance & Resource Scheduling
   System Environments
   Processes & Subsystems
   Remote Customer Support and Services
   Applications
   Using SMIT (information only)




 F1=Help             F2=Refresh          F3=Cancel           F8=Image
 F9=Shell            F10=Exit            Enter=Do
```

Figure 26. SMIT System Management Panel

Select **Communications Applications and Services** for PSF/6000 definitions.

```
┌─────────────────────────────────────────────────────────────────────────┐
│                    Communications Applications and Services               │
│                                                                           │
│  Move cursor to desired item and press Enter.                             │
│                                                                           │
│    TCP/IP                                                                 │
│    NFS                                                                    │
│    SNA Server/6000                                                        │
│    PSF Direct                                                             │
│    3270 Host Connection Program (HCON)                                    │
│    DCE (Distributed Computing Environment)                                │
│                                                                           │
│                                                                           │
│                                                                           │
│                                                                           │
│                                                                           │
│                                                                           │
│                                                                           │
│  F1=Help            F2=Refresh         F3=Cancel         F8=Image         │
│  F9=Shell           F10=Exit           Enter=Do                           │
└─────────────────────────────────────────────────────────────────────────┘
```
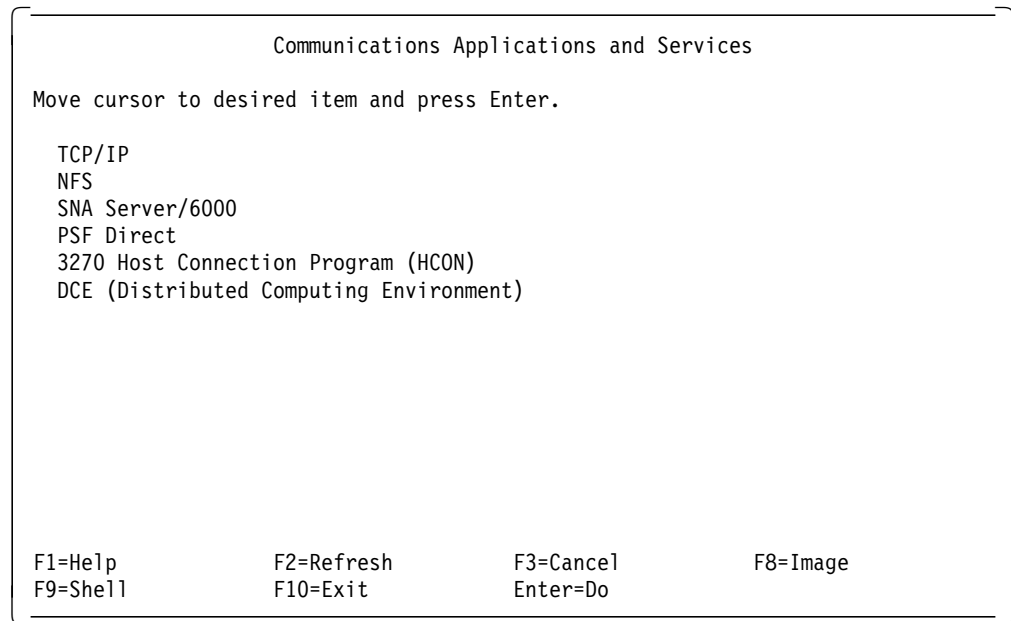
Figure 27. Communication Application and Services

Select **SNA Server/6000**, then **Configure SNA Profiles**, and then **Advanced Configuration**.

```
┌─────────────────────────────────────────────────────────────────────────┐
│                         Advanced Configuration                            │
│                                                                           │
│  Move cursor to desired item and press Enter.                             │
│                                                                           │
│    Links                                                                  │
│    Sessions                                                               │
│    SNA System Defaults                                                    │
│    Control Point                                                          │
│    Gateway Definitions                                                    │
│    Security                                                               │
│    Verify Configuration Profiles                                          │
│    Export Configuration Profiles                                          │
│    Import Configuration Profiles                                          │
│    Migrate Configuration Profiles                                         │
│                                                                           │
│                                                                           │
│                                                                           │
│                                                                           │
│  F1=Help            F2=Refresh         F3=Cancel         F8=Image         │
│  F9=Shell           F10=Exit           Enter=Do                           │
└─────────────────────────────────────────────────────────────────────────┘
```
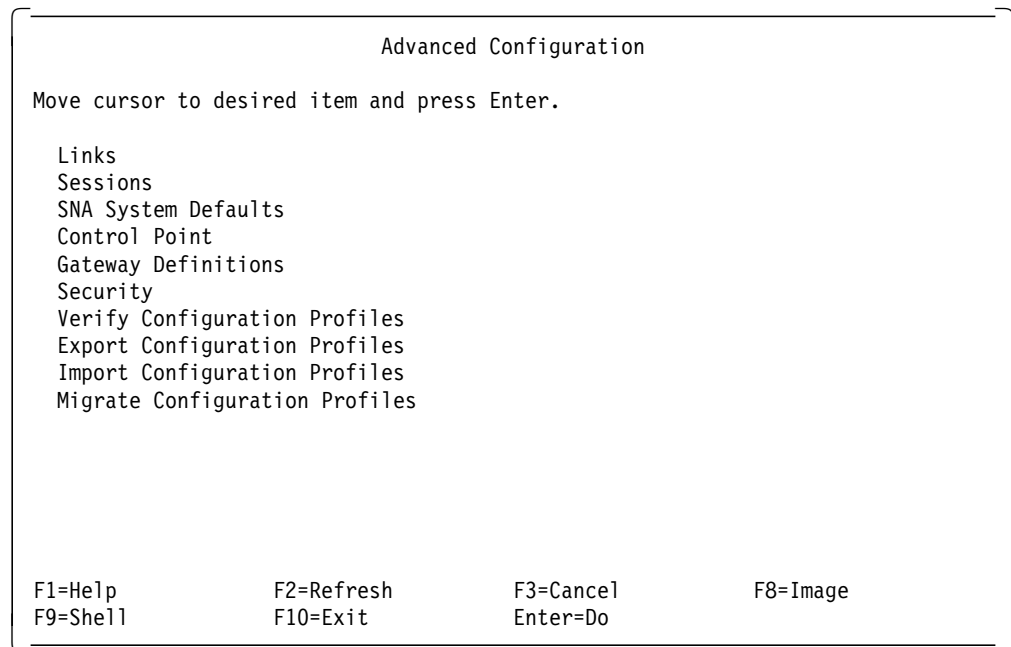
Figure 28. Advanced Configuration Menu

Select **Links**, then **Token Ring** for defining the host connection.

```
┌─                                                                         ─┐
                    Change/Show Token Ring SNA DLC Profile

 Type or select values in entry fields.
 Press Enter AFTER making all desired changes.

 [TOP]                                              [Entry Fields]
   Current profile name                             tr3745
   New profile name                                 []
   Data link device name                            [tok0]                +
   Force disconnect time-out (1-600 seconds)        [120]                    #
   User-defined maximum I-Field size?                no                   +
      If yes, Max. I-Field size (265-30729)         [30729]                  #
   Max. num of active link stations (1-255)         [100]                    #
      Number reserved for inbound activation        [0]                      #
      Number reserved for outbound activation       [0]                      #
   Transmit window count (1-127)                    [16]                     #
   Dynamic window increment (1-127)                 [1]                      #
   Retransmit count (1-30)                          [8]                      #
   Receive window count (1-127)                     [7]                      #
   Ring access priority                              0                    +
 [MORE...29]

 F1=Help            F2=Refresh         F3=Cancel            F4=List
 F5=Reset           F6=Command         F7=Edit              F8=Image
 F9=Shell           F10=Exit           Enter=Do
└─                                                                         ─┘
```

Figure 29. Token-Ring Definition

From Advanced Configuration select **Sessions**, then **LU 6.2** for defining the
PSF/6000 connection to host PSF.

```
┌─                                                                         ─┐
                                  LU 6.2

 Move cursor to desired item and press Enter.

   LU 6.2 Local LU
   LU 6.2 Side Information
   LU 6.2 Partner LU
   LU 6.2 Mode
   LU 6.2 Transaction Program Name (TPN)
   LU 6.2 Session Security
   LU 6.2 Conversation Security
   Class of Service (COS)
   Partner LU 6.2 Location






 F1=Help            F2=Refresh         F3=Cancel            F8=Image
 F9=Shell           F10=Exit           Enter=Do
└─                                                                         ─┘
```

Figure 30. Menu for LU 6.2 Definition

You must define all Local LU, Side Information, Partner LU, and Mode.

In the example below, the values entered in Local LU and Link Station Profile name have no effect, as we have specified *no* in "Local LU is dependent?" field.

```
                    Change/Show LU 6.2 Local LU Profile

 Type or select values in entry fields.
 Press Enter AFTER making all desired changes.

                                                  [Entry Fields]
   Current profile name                         SLRISC3
   New profile name                             []
   Local LU name                                [SLRISC3]
   Local LU alias                               [SLRISC3]
   Local LU is dependent?                        no                   +
      If yes,
         Local LU address (1-255)               [33]                  #
         System services control point
            (SSCP) ID (*, 0-65535)              [*]
         Link Station Profile name              [tr3725]              +
   Conversation Security Access List Profile name  []

   Comments                                     [LU for VM attach0]


 F1=Help            F2=Refresh        F3=Cancel          F4=List
 F5=Reset           F6=Command        F7=Edit            F8=Image
 F9=Shell           F10=Exit          Enter=Do
```

Figure 31. Local LU Definition

```
                    Change/Show LU 6.2 Partner LU Profile

 Type or select values in entry fields.
 Press Enter AFTER making all desired changes.

                                                  [Entry Fields]
   Current profile name                         PSFMVSDP
   New profile name                             []
   Fully qualified partner LU name              [SYSLAB.PSFMVSDP]
   Partner LU alias                             [PSFMVSDP]
   Parallel session supported?                  no                    +
   Session security supported?                  no                    +
   Conversation Security Level                  none                  +

   Comments                                     []




 F1=Help            F2=Refresh        F3=Cancel          F4=List
 F5=Reset           F6=Command        F7=Edit            F8=Image
 F9=Shell           F10=Exit          Enter=Do
```

Figure 32. Partner LU Definition

```
┌─────────────────────────────────────────────────────────────────────────┐
│                     Change/Show LU 6.2 Mode Profile                       │
│                                                                           │
│  Type or select values in entry fields.                                   │
│  Press Enter AFTER making all desired changes.                            │
│                                                                           │
│                                                        [Entry Fields]     │
│    Current profile name                                tr3745             │
│    New profile name                                    []                 │
│    Mode name                                           [MODDPFC2]         │
│    Number of sessions (1-5000)                         [1]              # │
│    Minimum contention winners (0-5000)                 [0]              # │
│    Minimum contention losers (0-5000)                  [1]              # │
│    Auto activate limit (0-500)                         [0]              # │
│    Upper bound for adaptive receive pacing window      [3]              # │
│    Receive pacing window (0-63)                        [3]              # │
│    Maximum RU size (128,...32768, multiples of 32)     [1024]           # │
│    Minimum RU size (128,...32768, multiples of 32)     [256]            # │
│    Class of Service (COS) name                         [#CONNECT]         │
│                                                                           │
│    Comments                                            []                 │
│                                                                           │
│  F1=Help           F2=Refresh         F3=Cancel          F4=List          │
│  F5=Reset          F6=Command         F7=Edit            F8=Image         │
│  F9=Shell          F10=Exit           Enter=Do                            │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure 33. LU Mode Definition

```
┌─────────────────────────────────────────────────────────────────────────┐
│                  Change/Show LU 6.2 Side Information Profile               │
│                                                                           │
│  Type or select values in entry fields.                                   │
│  Press Enter AFTER making all desired changes.                            │
│                                                                           │
│                                                        [Entry Fields]     │
│    Current profile name                                SLRISC3            │
│    New profile name                                    []                 │
│    Local LU or Control Point alias                     [SLRISC3]        + │
│    Provide only one of the following:                                     │
│       Partner LU alias                                 [PSFVMDP]        + │
│       Fully qualified partner LU name                  []                 │
│    Mode name                                           [MODDPFC2]       + │
│    Remote transaction program name (RTPN)              []                 │
│    RTPN in hexadecimal?                                 no              + │
│                                                                           │
│    Comments                                            [Side info for VM attac> │
│                                                                           │
│                                                                           │
│                                                                           │
│  F1=Help           F2=Refresh         F3=Cancel          F4=List          │
│  F5=Reset          F6=Command         F7=Edit            F8=Image         │
│  F9=Shell          F10=Exit           Enter=Do                            │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure 34. Side Information Definition

3.6.1 Exporting the Configurations

When you have done all definitions, go to the screen shown in Figure 28 on page 25 and select **Export Configuration Profiles**. It will create a list of all definitions. Compare that list with following sample and also the relations shown in 3.9, "Parameter relationships for PSF/6000" on page 44.

```
sna:
  prof_name                                   = "sna"
  max_sessions                                = 200
  max_conversations                           = 200
  restart_action                              = once
  rrm_enabled                                 = no
  dynamic_inbound_partner_lu_definitions_allowed = yes
  standard_output_device                      = "/dev/console"
  standard_error_device                       = "/var/sna/sna.stderr"
  nmvt_action_when_no_nmvt_process            = reject
  comments                                    = "PSF/6000 PROFILE"

control_pt:
  prof_name                                   = "node_cp"
  xid_node_id                                 = 0x07106000
  network_name                                = "SYSLAB"
  control_pt_name_alias                       = "SLRISC"
  control_pt_name                             = "SLRISC"
  control_pt_node_type                        = appn_end_node
  max_cached_trees                            = 500
  max_nodes_in_topology_database              = 500
  route_addition_resistance                   = 128
  comments                                    = "PSF/6000 CONTROL-PT"

local_lu_lu6.2:
  prof_name                                   = "SLRISC1"
  local_lu_name                               = "SLRISC1"
  local_lu_alias                              = "SLRISC1"
  local_lu_dependent                          = no
  local_lu_address                            = 33
  sscp_id                                     = *
  link_station_prof_name                      = "tr3725"
  conversation_security_list_profile_name     = ""
  comments                                    = ""

local_lu_lu6.2:
  prof_name                                   = "SLRISC2"
  local_lu_name                               = "SLRISC2"
  local_lu_alias                              = "SLRISC2"
  local_lu_dependent                          = no
  local_lu_address                            = 1
  sscp_id                                     = *
  link_station_prof_name                      = "tr3725"
  conversation_security_list_profile_name     = ""
  comments                                    = ""

local_lu_lu6.2:
  prof_name                                   = "SLRISC3"
  local_lu_name                               = "SLRISC3"
  local_lu_alias                              = "SLRISC3"
  local_lu_dependent                          = no
  local_lu_address                            = 33
```

```
      sscp_id                                      = *
      link_station_prof_name                       = "tr3725"
      conversation_security_list_profile_name      = ""
      comments                                     = "LU for VM attach"

   partner_lu6.2:
      prof_name                                    = "PSFMVSDP"
      fq_partner_lu_name                           = "SYSLAB.PSFMVSDP"
      partner_lu_alias                             = "PSFMVSDP"
      session_security_supp                        = no
      parallel_session_supp                        = no
      conversation_security_level                  = none
      comments                                     = ""

   partner_lu6.2:
      prof_name                                    = "PSFVSEDP"
      fq_partner_lu_name                           = "SYSLAB.PSFVSEDP"
      partner_lu_alias                             = "PSFVSEDP"
      session_security_supp                        = no
      parallel_session_supp                        = no
      conversation_security_level                  = none
      comments                                     = ""

   partner_lu6.2:
      prof_name                                    = "PSFVMDP"
      fq_partner_lu_name                           = "SYSLAB.PSFVMDP"
      partner_lu_alias                             = "PSFVMDP"
      session_security_supp                        = no
      parallel_session_supp                        = no
      conversation_security_level                  = none
      comments                                     = ""

   side_info:
      prof_name                                    = "SLRISC1"
      local_lu_or_control_pt_alias                 = "SLRISC1"
      partner_lu_alias                             = "PSFVSEDP"
      fq_partner_lu_name                           = ""
      mode_name                                    = "MODDPFC2"
      remote_tp_name_in_hex                        = no
      remote_tp_name                               = ""
      comments                                     = ""

   side_info:
      prof_name                                    = "SLRISC2"
      local_lu_or_control_pt_alias                 = "SLRISC2"
      partner_lu_alias                             = "PSFMVSDP"
      fq_partner_lu_name                           = ""
      mode_name                                    = "MODDPFC2"
      remote_tp_name_in_hex                        = no
      remote_tp_name                               = ""
      comments                                     = ""

   side_info:
      prof_name                                    = "SLRISC3"
      local_lu_or_control_pt_alias                 = "SLRISC3"
      partner_lu_alias                             = "PSFVMDP"
      fq_partner_lu_name                           = ""
      mode_name                                    = "MODDPFC2"
      remote_tp_name_in_hex                        = no
```

```
                    remote_tp_name                         = ""
                    comments                               = "Side info for VM attach"

                 local_tp:
                   prof_name                               = "tr3745"
                   tp_name                                 = "30F0F0F0"
                   tp_name_in_hex                          = yes
                   pip_data_present                        = no
                   pip_data_subfields_number               = 0
                   conversation_type                       = basic
                   sync_level                              = none
                   resource_security_level                 = none
                   resource_access_list_profile_name       = ""
                   full_path_tp_exe                        = "/usr/lpp/psf/bin/ainpsfhr"
                   multiple_instances                      = yes
                   user_id                                 = 0
                   server_synonym_name                     = ""
                   restart_action                          = once
                   communication_type                      = signals
                   ipc_queue_key                           = 0
                   standard_input_device                   = "/dev/console"
                   standard_output_device                  = "/dev/console"
                   standard_error_device                   = "/dev/console"
                   comments                                = ""

                 link_station_token_ring:
                   prof_name                               = "tr3725"
                   use_control_pt_xid                      = yes
                   xid_node_id                             = "*"
                   sna_dlc_profile_name                    = "tr3745"
                   stop_on_inactivity                      = no
                   time_out_value                          = 0
                   LU_registration_supported               = no
                   LU_registration_profile_name            = ""
                   link_tracing                            = no
                   trace_format                            = long
                   access_routing_type                     = link_address
                   remote_link_name                        = ""
                   remote_link_address                     = 0x400003745002
                   remote_sap                              = 0x04
                   verify_adjacent_node                    = no
                   net_id_of_adjacent_node                 = ""
                   cp_name_of_adjacent_node                = ""
                   xid_node_id_of_adjacent_node            = "*"
                   node_type_of_adjacent_node              = learn
                   solicit_sscp_sessions                   = yes
                   call_out_on_activation                  = yes
                   activate_link_during_system_init        = yes
                   activate_link_on_demand                 = no
                   cp_cp_sessions_supported                = no
                   cp_cp_session_support_required          = no
                   adjacent_node_is_preferred_server       = no
                   initial_tg_number                       = 0
                   restart_on_normal_deactivation          = no
                   restart_on_abnormal_deactivation        = no
                   restart_on_activation                   = no
                   TG_effective_capacity                   = 4300800
                   TG_connect_cost_per_time                = 0
                   TG_cost_per_byte                        = 0
```

```
        TG_security                               = nonsecure
        TG_propagation_delay                      = lan
        TG_user_defined_1                         = 128
        TG_user_defined_2                         = 128
        TG_user_defined_3                         = 128
        comments                                  = ""


    sna_dlc_token_ring:
      prof_name                                   = "tr3745"
      datalink_device_name                        = "tok0"
      force_timeout                               = 120
      user_defined_max_i_field                    = no
      max_i_field_length                          = 30729
      max_active_link_stations                    = 100
      num_reserved_inbound_activation             = 0
      num_reserved_outbound_activation            = 0
      transmit_window_count                       = 16
      dynamic_window_increment                    = 1
      retransmit_count                            = 8
      receive_window_count                        = 7
      priority                                    = 0
      inact_timeout                               = 48
      response_timeout                            = 4
      acknowledgement_timeout                     = 1
      link_name                                   = ""
      local_sap                                   = 0x04
      retry_interval                              = 60
      retry_limit                                 = 20
      dynamic_link_station_supported              = yes
      trace_base_listen_link_station              = yes
      trace_base_listen_link_station_format       = long
      dynamic_lnk_solicit_sscp_sessions           = yes
      dynamic_lnk_cp_cp_sessions_supported        = yes
      dynamic_lnk_cp_cp_session_support_required  = no
      dynamic_lnk_TG_effective_capacity           = 4300800
      dynamic_lnk_TG_connect_cost_per_time        = 0
      dynamic_lnk_TG_cost_per_byte                = 0
      dynamic_lnk_TG_security                     = nonsecure
      dynamic_lnk_TG_propagation_delay            = lan
      dynamic_lnk_TG_user_defined_1               = 128
      dynamic_lnk_TG_user_defined_2               = 128
      dynamic_lnk_TG_user_defined_3               = 128
      comments                                    = ""


    mode:
      prof_name                                   = "tr3745"
      mode_name                                   = "MODDPFC2"
      max_sessions                                = 1
      min_conwinner_sessions                      = 0
      min_conloser_sessions                       = 1
      auto_activate_limit                         = 0
      max_adaptive_receive_pacing_window          = 3
      receive_pacing_window                       = 3
      max_ru_size                                 = 1024
      min_ru_size                                 = 256
      class_of_service_name                       = "#CONNECT"
      comments                                    = ""
```

3.6.2 PSF Direct Customization

You will have to define the printer device (p4029 in our case) to AIX (if not already done). Refer to manual S544-3817 PSF/6000 Print Administration for further details. After the printer has been defined, you can proceed with the following steps.

To define host receivers for PSF Direct you must select **PSF Direct** under Communications Applications and Services. The following screen is shown:

```
┌─────────────────────────────────────────────────────────────────────┐
│                            PSF Direct                               │
│                                                                     │
│  Move cursor to desired item and press Enter.                       │
│                                                                     │
│    List all Host Receivers                                          │
│    Add a Host Receiver                                              │
│    Show or change Host Receiver characteristics                     │
│    Remove a Host Receiver                                           │
│                                                                     │
│                                                                     │
│                                                                     │
│                                                                     │
│                                                                     │
│                                                                     │
│                                                                     │
│                                                                     │
│   F1=Help           F2=Refresh          F3=Cancel          F8=Image │
│   F9=Shell          F10=Exit            Enter=Do                    │
└─────────────────────────────────────────────────────────────────────┘
```
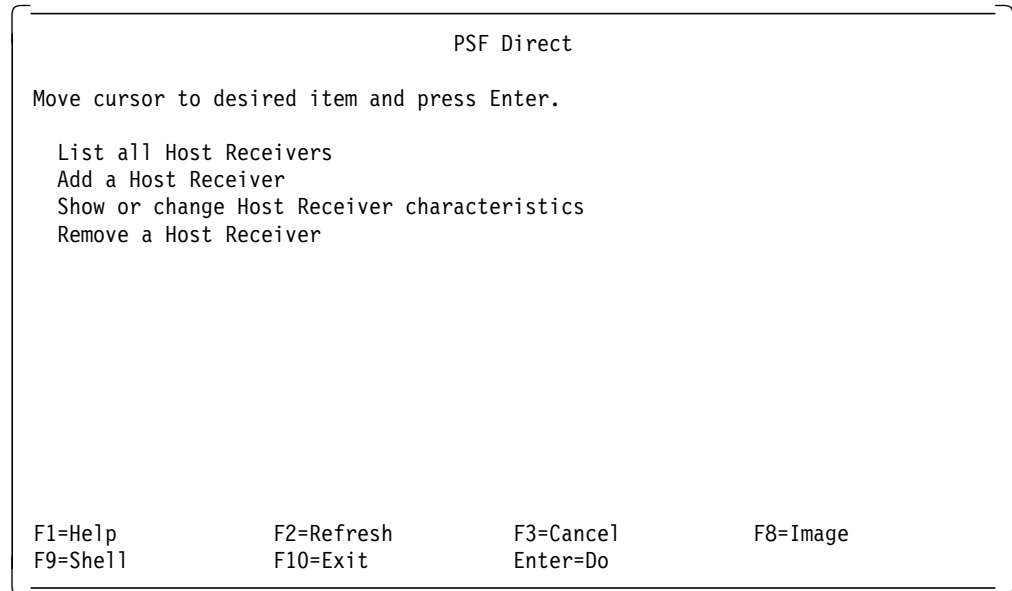
Figure 35. PSF Direct Menu

Here you select **Add a Host Receiver**.

```
┌─────────────────────────────────────────────────────────────────────┐
│              Show or change a Host Receiver characteristics         │
│                                                                     │
│  Type or select values in entry fields.                            │
│  Press Enter AFTER making all desired changes.                     │
│                                                                     │
│                                              [Entry Fields]          │
│  * SNA Logical Unit name                     SLRISC3                 │
│        (used as a Host Receiver name)                               │
│    Description                               [Host receiver for VM]  │
│  * PSF/6000 Printer name                      p4029              +   │
│    Inactivity limit (seconds)                [60]                #   │
│    Printer busy limit (seconds)              [9999]              #   │
│    SNA System Services Control Point ID      [050000000000]      X   │
│    NMVT Subsystem name                       [NMVT]                  │
│                                                                     │
│                                                                     │
│                                                                     │
│                                                                     │
│   F1=Help           F2=Refresh          F3=Cancel          F4=List  │
│   F5=Reset          F6=Command          F7=Edit            F8=Image  │
│   F9=Shell          F10=Exit            Enter=Do                    │
└─────────────────────────────────────────────────────────────────────┘
```
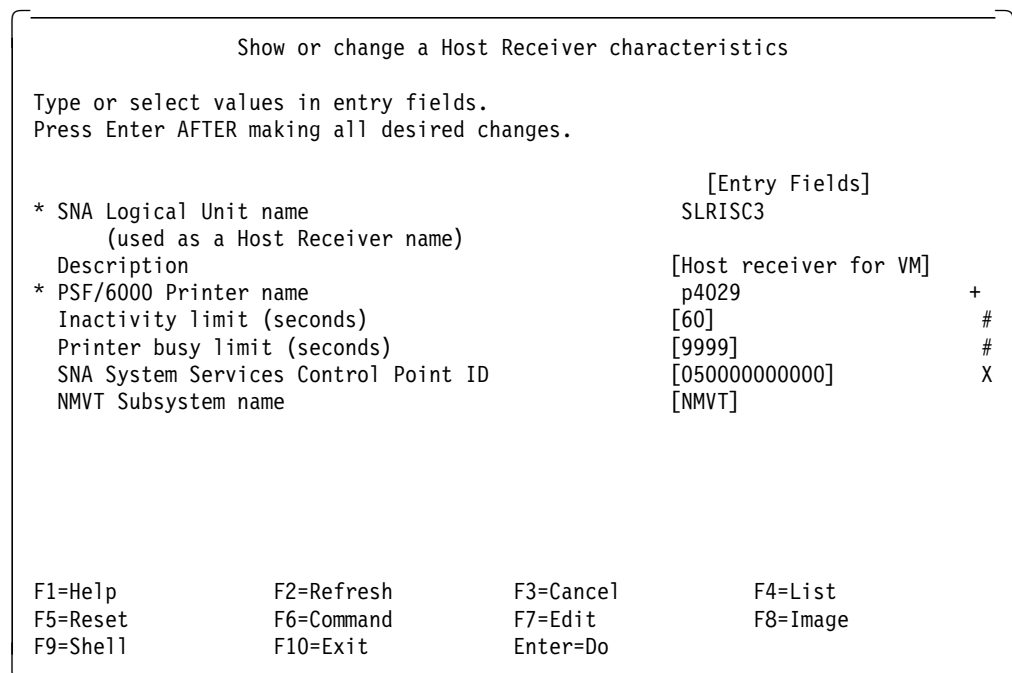
Figure 36. PSF Direct Host Receiver Definition

3.7 AS/400 to PSF/2 Definitions

Defining the necessary parameters for using PSF/2 DPF or Direct from an AS/400 system is easily done by following the instructions in PSF/2 manuals.

The definitions used on the AS/400 were the following:

```
                    Display Device Description                    Page    1
 5738SS1 V2R2M0  920925                         WTSCSL4   11/14/94  16:06:33
  Device description . . . . . . . . :   DEVD       DPF3820
  Option . . . . . . . . . . . . . . :   OPTION     *ALL
  Category of device . . . . . . . . :              *APPC
  Remote location  . . . . . . . . . :   RMTLOCNAME LUAS4
  Online at IPL  . . . . . . . . . . :   ONLINE     *YES
  Local location . . . . . . . . . . :   LCLLOCNAME AS4DPF
  Remote network identifier  . . . . :   RMTNETID   SYSLAB
  Attached controller  . . . . . . . :   CTL        DPF3820
  Message queue  . . . . . . . . . . :   MSGQ       QSYSOPR
    Library  . . . . . . . . . . . . :              *LIBL
  Local location address . . . . . . :   LOCADR     00
  APPN-capable . . . . . . . . . . . :   APPN       *NO
  Single session . . . . . . . . . . :   SNGSSN
    Single session capable . . . . . :              *NO
  Secure location  . . . . . . . . . :   SECURELOC  *NO
  Text . . . . . . . . . . . . . . . :   TEXT       APPC device for DPF
  Mode . . . . . . . . . . . . . . . :   MODE
  ------------------------Mode-------------------------
  AS4MODE
```

Figure 37. Device Description for APPC Device DPF4028

```
┌─────────────────────────────────────────────────────────────────────────┐
│             Display Device Description                        Page    1   │
│ 5738SS1 V2R2M0  920925                        WTSCSL4   11/14/94  16:06:14 │
│  Device description . . . . . . . . :  DEVD       PRT3820                  │
│  Option . . . . . . . . . . . . . . :  OPTION     *ALL                     │
│  Category of device . . . . . . . . :             *PRT                     │
│  Device class . . . . . . . . . . . :  DEVCLS     *RMT                     │
│  Device type  . . . . . . . . . . . :  TYPE       *IPDS                    │
│  Device model . . . . . . . . . . . :  MODEL      0                        │
│  Advanced function printing . . . . :  AFP        *YES                     │
│  AFP attachment . . . . . . . . . . :  AFPATTACH  *APPC                    │
│  Online at IPL . . . . . . . . . . :  ONLINE     *YES                      │
│  Font . . . . . . . . . . . . . . . :  FONT                               │
│    Identifier . . . . . . . . . . . :             011                      │
│    Point size . . . . . . . . . . . :             *NONE                    │
│  Form feed  . . . . . . . . . . . . :  FORMFEED   *CUT                     │
│  Separator drawer . . . . . . . . . :  SEPDRAWER  2                        │
│  Printer error message  . . . . . . :  PRTERRMSG  *INQ                     │
│  Message queue  . . . . . . . . . . :  MSGQ       QSYSOPR                  │
│    Library  . . . . . . . . . . . . :              *LIBL                   │
│  Maximum pending requests . . . . . :  MAXPNDRQS  6                        │
│  Print while converting . . . . . . :  PRTCVT     *YES                     │
│  Form definition  . . . . . . . . . :  FORMDF     F1C10110                 │
│    Library  . . . . . . . . . . . . :              *LIBL                   │
│  Character identifier . . . . . . . :  CHRID      *SYSVAL                  │
│  Remote location  . . . . . . . . . :  RMTLOCNAME LUAS4                    │
│  Local location . . . . . . . . . . :  LCLLOCNAME AS4DPF                   │
│  Remote network identifier  . . . . :  RMTNETID   SYSLAB                   │
│  Mode . . . . . . . . . . . . . . . :  MODE       AS4MODE                  │
│  Text . . . . . . . . . . . . . . . :  TEXT       Printer for DPF          │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure 38. Device Description for APPC Controller DPF3820

```
                   Display Device Description                     Page    1
5738SS1 V2R2M0  920925                          WTSCSL4  11/14/94  16:06:14
 Device description . . . . . . . . :  DEVD        PRT3820
 Option . . . . . . . . . . . . . :  OPTION      *ALL
 Category of device . . . . . . . :              *PRT
 Device class . . . . . . . . . . :  DEVCLS      *RMT
 Device type  . . . . . . . . . . :  TYPE        *IPDS
 Device model . . . . . . . . . . :  MODEL       0
 Advanced function printing . . . . :  AFP         *YES
 AFP attachment . . . . . . . . . :  AFPATTACH   *APPC
 Online at IPL  . . . . . . . . . :  ONLINE      *YES
 Font . . . . . . . . . . . . . . :  FONT
   Identifier . . . . . . . . . . :              011
   Point size . . . . . . . . . . :              *NONE
 Form feed  . . . . . . . . . . . :  FORMFEED    *CUT
 Separator drawer . . . . . . . . :  SEPDRAWER   2
 Printer error message  . . . . . :  PRTERRMSG   *INQ
 Message queue  . . . . . . . . . :  MSGQ        QSYSOPR
   Library  . . . . . . . . . . . :               *LIBL
 Maximum pending requests . . . . :  MAXPNDRQS   6
 Print while converting . . . . . :  PRTCVT      *YES
 Form definition  . . . . . . . . :  FORMDF      F1C10110
   Library  . . . . . . . . . . . :               *LIBL
 Character identifier . . . . . . :  CHRID       *SYSVAL
 Remote location  . . . . . . . . :  RMTLOCNAME  LUAS4
 Local location . . . . . . . . . :  LCLLOCNAME  AS4DPF
 Remote network identifier  . . . :  RMTNETID    SYSLAB
 Mode . . . . . . . . . . . . . . :  MODE        AS4MODE
 Text . . . . . . . . . . . . . . :  TEXT        Printer for DPF
```

Figure 39. Device Description for Printer PRT3820

3.8 AS/400 to PSF/6000 Direct Definitions

Defining the necessary parameters for using PSF/6000 Direct from an AS/400 system requires a lot of experience in how to use AS/400 system panels for network definitions. We decided to use a little different method in establishing the connection compared to what we had in the S/370 connection to PSF/6000 Direct.

After spending a lot of time to find the reason why we could not get the connection working, we realized that the initial connection between AS/400 and Risc System/6000 works a little differently. The important parameter is the *solicit_sscp_sessions* in *link_station_token_ring* definition. In the S/370 (3745 Token Ring Controller) connection, we used *yes*, in AS/400 it had to be set to *no* to get the connection working.

The definitions used on the AS/400 were the following. These definitions work together with the definitions in SNA Server/6000.

```
┌────────────────────────────────────────────────────────────────────────────┐
│                    Display Device Description                      Page    1 │
│ 5738SS1 V2R2M0  920925                          WTSCSL4   11/14/94  16:06:39 │
│  Device description . . . . . . . . :    DEVD      AIX4028                   │
│  Option . . . . . . . . . . . . . . :    OPTION    *ALL                     │
│  Category of device . . . . . . . . :              *APPC                     │
│  Remote location  . . . . . . . . . :    RMTLOCNAME AS4LU                    │
│  Online at IPL  . . . . . . . . . . :    ONLINE    *YES                      │
│  Local location . . . . . . . . . . :    LCLLOCNAME AS4AIX                   │
│  Remote network identifier  . . . . :    RMTNETID  SYSLAB                    │
│  Attached controller  . . . . . . . :    CTL       AIX4028                   │
│  Message queue  . . . . . . . . . . :    MSGQ      QSYSOPR                    │
│    Library  . . . . . . . . . . . . :              *LIBL                     │
│  Local location address . . . . . . :    LOCADR    00                        │
│  APPN-capable . . . . . . . . . . . :    APPN      *NO                       │
│  Single session . . . . . . . . . . :    SNGSSN                              │
│    Single session capable . . . . . :              *NO                       │
│  Secure location  . . . . . . . . . :    SECURELOC *NO                       │
│  Text . . . . . . . . . . . . . . . :    TEXT      *BLANK                     │
│  Mode . . . . . . . . . . . . . . . :    MODE                                │
│  ------------------------Mode-------------------------                        │
│  QSPWTR                                                                      │
└────────────────────────────────────────────────────────────────────────────┘
```

Figure 40. Device Description for APPC Device AIX4028

```
                   Display Controller Description                    Page    1
5738SS1 V2R2M0  920925                            WTSCSL4  11/14/94  16:06:55
 Controller description . . . . . . :   CTLD       AIX4028
 Option . . . . . . . . . . . . . . :   OPTION     *ALL
 Category of controller . . . . . . :              *APPC
 Link type  . . . . . . . . . . . . :   LINKTYPE   *LAN
 Online at IPL  . . . . . . . . . . :   ONLINE     *YES
 Character code . . . . . . . . . . :   CODE       *EBCDIC
 Maximum frame size . . . . . . . . :   MAXFRAME   1994
 Remote network identifier  . . . . :   RMTNETID   SYSLAB
 Remote control point . . . . . . . :   RMTCPNAME  SLRISC
 Exchange identifier  . . . . . . . :   EXCHID     07106000
 SSCP identifier  . . . . . . . . . :   SSCPID     0500000000FE
 Initial connection . . . . . . . . :   INLCNN     *DIAL
 Dial initiation  . . . . . . . . . :   DIALINIT   *LINKTYPE
 Switched disconnect  . . . . . . . :   SWTDSC     *NO
 Data link role . . . . . . . . . . :   ROLE       *NEG
 LAN remote adapter address . . . . :   ADPTADR    400006000001
 LAN DSAP . . . . . . . . . . . . . :   DSAP       04
 LAN SSAP . . . . . . . . . . . . . :   SSAP       04
 Text . . . . . . . . . . . . . . . :   TEXT       *BLANK
 Switched line list . . . . . . . . :   SWTLINLST
--------------------Switched Lines--------------------
SLTR041SNA
Attached devices . . . . . . . . . :   DEV
-------------------Attached Devices--------------------
AIX4028
APPN-capable . . . . . . . . . . . :   APPN       *NO
LAN frame retry  . . . . . . . . . :   LANFRMRTY  *CALC
LAN connection retry . . . . . . . :   LANCNNRTY  *CALC
LAN response timer . . . . . . . . :   LANRSPTMR  *CALC
LAN connection timer . . . . . . . :   LANCNNTMR  *CALC
LAN acknowledgement timer  . . . . :   LANACKTMR  *CALC
LAN inactivity timer . . . . . . . :   LANINACTMR *CALC
LAN acknowledgement frequency  . . :   LANACKFRQ  7
LAN max outstanding frames . . . . :   LANMAXOUT  7
LAN access priority  . . . . . . . :   LANACCPTY  *CALC
LAN window step  . . . . . . . . . :   LANWDWSTP  *NONE
Recovery limits  . . . . . . . . . :   CMNRCYLMT
  Count limit  . . . . . . . . . . :              2
  Time interval  . . . . . . . . . :              5
```

Figure 41. Device Description for APPC Controller AIX4028

```
                    Display Device Description                      Page    1
 5738SS1 V2R2M0  920925                          WTSCSL4   11/14/94  16:06:23
  Device description . . . . . . . . :    DEVD      PRT4028
  Option . . . . . . . . . . . . . . :    OPTION    *ALL
  Category of device . . . . . . . . :              *PRT
  Device class . . . . . . . . . . . :    DEVCLS    *RMT
  Device type  . . . . . . . . . . . :    TYPE      *IPDS
  Device model . . . . . . . . . . . :    MODEL     0
  Advanced function printing . . . . :    AFP       *YES
  AFP attachment . . . . . . . . . . :    AFPATTACH *APPC
  Online at IPL  . . . . . . . . . . :    ONLINE    *YES
  Font . . . . . . . . . . . . . . . :    FONT
    Identifier . . . . . . . . . . . :              011
    Point size . . . . . . . . . . . :              *NONE
  Form feed  . . . . . . . . . . . . :    FORMFEED  *CUT
  Separator drawer . . . . . . . . . :    SEPDRAWER *FILE
  Printer error message  . . . . . . :    PRTERRMSG *INQ
  Message queue  . . . . . . . . . . :    MSGQ      QSYSOPR
    Library  . . . . . . . . . . . . :               *LIBL
  Maximum pending requests . . . . . :    MAXPNDRQS 6
  Print while converting . . . . . . :    PRTCVT    *YES
  Form definition  . . . . . . . . . :    FORMDF    F1C10110
    Library  . . . . . . . . . . . . :               *LIBL
  Character identifier . . . . . . . :    CHRID     *SYSVAL
  Remote location  . . . . . . . . . :    RMTLOCNAME AS4LU
  Local location . . . . . . . . . . :    LCLLOCNAME AS4AIX
  Remote network identifier  . . . . :    RMTNETID  SYSLAB
  Mode . . . . . . . . . . . . . . . :    MODE      QSPWTR
  Text . . . . . . . . . . . . . . . :    TEXT      *BLANK
```

Figure 42. Device Description for Printer PRT4028

```
                    Display Mode Description                        Page    1
 5738SS1 V2R2M0  920925                          WTSCSL4   11/14/94  16:07:11
  Mode description . . . . . . . . . :    MODD      QSPWTR
  Class-of-service . . . . . . . . . :    COS       #CONNECT
  Maximum sessions . . . . . . . . . :    MAXSSN    8
  Maximum conversations  . . . . . . :    MAXCNV    8
  Locally controlled sessions  . . . :    LCLCTLSSN 4
  Pre-established sessions . . . . . :    PREESTSSN 0
  Inbound pacing value . . . . . . . :    INPACING  63
  Outbound pacing value  . . . . . . :    OUTPACING 63
  Maximum length of request unit . . :    MAXLENRU  512
  Text . . . . . . . . . . . . . . . :    TEXT      This mode is IBM supplied
```

Figure 43. LOGMODE Entry QSPWTR

The definitions used on the PSF/6000 side were the following:

```
local_lu_lu6.2:
 prof_name                                   = "AS4LU"
 local_lu_name                               = "AS4LU"
 local_lu_alias                              = "AS4LU"
 local_lu_dependent                          = no
 local_lu_address                            = 1
 sscp_id                                     = *
 link_station_prof_name                      = "AS4MODJ"
 conversation_security_list_profile_name     = ""
 comments                                    = ""


partner_lu6.2:
 prof_name                                   = "AS4AIX"
 fq_partner_lu_name                          = "SYSLAB.AS4AIX"
 partner_lu_alias                            = "AS4AIX"
 session_security_supp                       = no
 parallel_session_supp                       = no
 conversation_security_level                 = none
 comments                                    = ""


side_info:
 prof_name                                   = "AS4LU"
 local_lu_or_control_pt_alias                = "AS4LU"
 partner_lu_alias                            = "AS4AIX"
 fq_partner_lu_name                          = ""
 mode_name                                   = "QSPWTR"
 remote_tp_name_in_hex                       = no
 remote_tp_name                              = ""
 comments                                    = ""


link_station_token_ring:
 prof_name                                   = "AS4MODJ"
 use_control_pt_xid                          = yes
 xid_node_id                                 = "*"
 sna_dlc_profile_name                        = "tr3745"
 stop_on_inactivity                          = no
 time_out_value                              = 1
 LU_registration_supported                   = no
 LU_registration_profile_name                = ""
 link_tracing                                = no
 trace_format                                = long
 access_routing_type                         = link_address
 remote_link_name                            = ""
 remote_link_address                         = 0x400009406001
 remote_sap                                  = 0x04
 verify_adjacent_node                        = no
 net_id_of_adjacent_node                     = ""
 cp_name_of_adjacent_node                    = ""
 xid_node_id_of_adjacent_node                = "*"
 node_type_of_adjacent_node                  = learn
 solicit_sscp_sessions                       = no
 call_out_on_activation                      = no
 activate_link_during_system_init            = yes
```

```
                            activate_link_on_demand                   = no
                            cp_cp_sessions_supported                  = no
                            cp_cp_session_support_required            = no
                            adjacent_node_is_preferred_server         = no
                            initial_tg_number                         = 0
                            restart_on_normal_deactivation            = no
                            restart_on_abnormal_deactivation          = no
                            restart_on_activation                     = no
                            TG_effective_capacity                     = 4300800
                            TG_connect_cost_per_time                  = 0
                            TG_cost_per_byte                          = 0
                            TG_security                               = nonsecure
                            TG_propagation_delay                      = lan
                            TG_user_defined_1                         = 128
                            TG_user_defined_2                         = 128
                            TG_user_defined_3                         = 128
                            comments                                  = ""

                        sna_dlc_token_ring:
                            prof_name                                 = "tr3745"
                            datalink_device_name                      = "tok0"
                            force_timeout                             = 120
                            user_defined_max_i_field                  = no
                            max_i_field_length                        = 30729
                            max_active_link_stations                  = 100
                            num_reserved_inbound_activation           = 0
                            num_reserved_outbound_activation          = 0
                            transmit_window_count                     = 16
                            dynamic_window_increment                  = 1
                            retransmit_count                          = 8
                            receive_window_count                      = 7
                            priority                                  = 0
                            inact_timeout                             = 48
                            response_timeout                          = 4
                            acknowledgement_timeout                   = 1
                            link_name                                 = ""
                            local_sap                                 = 0x04
                            retry_interval                            = 60
                            retry_limit                               = 20
                            dynamic_link_station_supported            = yes
                            trace_base_listen_link_station            = yes
                            trace_base_listen_link_station_format     = long
                            dynamic_lnk_solicit_sscp_sessions         = yes
                            dynamic_lnk_cp_cp_sessions_supported      = yes
                            dynamic_lnk_cp_cp_session_support_required = no
                            dynamic_lnk_TG_effective_capacity         = 4300800
                            dynamic_lnk_TG_connect_cost_per_time      = 0
                            dynamic_lnk_TG_cost_per_byte              = 0
                            dynamic_lnk_TG_security                   = nonsecure
                            dynamic_lnk_TG_propagation_delay          = lan
                            dynamic_lnk_TG_user_defined_1             = 128
                            dynamic_lnk_TG_user_defined_2             = 128
                            dynamic_lnk_TG_user_defined_3             = 128
                            comments                                  = ""

                        mode:
                            prof_name                                 = "QSPWTR"
                            mode_name                                 = "QSPWTR"
                            max_sessions                              = 8
```

```
min_conwinner_sessions                  = 4
min_conloser_sessions                   = 0
auto_activate_limit                     = 2
max_adaptive_receive_pacing_window      = 16
receive_pacing_window                   = 7
max_ru_size                             = 512
min_ru_size                             = 256
class_of_service_name                   = "#CONNECT"
comments                                = ""
```

The figures on the next two pages show the relationships between host and RISC System/6000 parameters.

3.9 Parameter relationships for PSF/6000

Note that use of reversed numbers (such as **1**) refer to values, which must match. Every occurrence of the same number must have equal value.

3.9.1 Host PSF definitions

```
PRT5  1       CLASS=X,FSS=WRT5   2
```

Figure 44. MVS JESPARM Definitions

```
//WRT5  2       PROC
  . . .
//PRT5  1       PRINTDEV APPLID=PSFMVSDP,   3
//              LUNAME=SLRISC2,             4
//              LOGMODE=MODDPFC2
```

Figure 45. PSF/MVS JCL

```
S DEV,pr4028,SYSPSFF8,8  10
```

Figure 46. PSF/VSE Printer Start

```
APPLID    PSFVMDP                 5
LUNAME    SLRISC3                 9
LOGMODE   MODDPFC2
```

Figure 47. PSF/VM OPTIONS PDM Definitions

```
PR4028  10       PRINTDEV APPLID=PSFVSEDP,   11
                 LUNAME=SLRISC1,             12
                 LOGMODE=MODDPFC2
```

Figure 48. PSF/VSE Start-Up

3.9.2 VTAM definitions

```
                NETID=SYSLAB,   6
```

Figure 49. VTAM Startup Parameters

```
                VBUILD TYPE=ALL
PSFMVSDP  3  APPL  AUTH=ACQ,EAS=1,SONSCIP=YES
```

Figure 50. VTAM Application Definition

```
                VBUILD TYPE=ALL
PSFVMDP   5  APPL  AUTH=ACQ,EAS=1,SONSCIP=YES
```

Figure 51. VTAM Application Definition

```
                VBUILD TYPE=ALL
PSFVSEDP  11  APPL  AUTH=ACQ,EAS=1,SONSCIP=YES
```

Figure 52. VTAM Application Definition

```
                VBUILD TYPE=SWNET
SLRISC   7  PU
SLRISC1  12  LU    LOCADDR=0,
                   MODETAB=MODDPFN,
                   DLOGMODE=MODDPFC2
SLRISC2  4  LU     LOCADDR=0,
                   MODETAB=MODDPFN,
                   DLOGMODE=MODDPFC2
SLRISC3  9  LU     LOCADDR=0,
                   MODETAB=MODDPFN,
                   DLOGMODE=MODDPFC2
```

Figure 53. NCP Definitions

```
MODDPFN MODETAB
MODDPFC2 MODEENT LOGMODE=MODDPFC2,FMPROF=X'13',TSPROF=X'07',         X
              PRIPROT=X'B0',SECPROT=X'B0',COMPROT=X'D0B1',          X
              RUSIZES=X'8585',PSERVIC=X'060200000000000000002000',  X
              PSNDPAC=X'10',SRCVPAC=X'10',SSNDPAC=X'00'
        MODEEND
        END
```

Figure 54. Logmode

3.9.3 PSF/6000 Definitions

```
control_pt:
  prof_name                               = "node_cp"
  xid_node_id                             = 0x07106000
  network_name                            = "SYSLAB"          6
  control_pt_name_alias                   = "SLRISC"          7
  control_pt_name                         = "SLRISC"          7
  control_pt_node_type                    = appn_end_node
  max_cached_trees                        = 500
  max_nodes_in_topology_database          = 500
  route_addition_resistance               = 128
  comments                                = "PSF/6000 CONTROL-PT"

local_lu_lu6.2:
  prof_name                               = "SLRISC3"         9
  local_lu_name                           = "SLRISC3"         9
  local_lu_alias                          = "SLRISC3"         9
  local_lu_dependent                      = no
  local_lu_address                        = 33
  sscp_id                                 = *
  link_station_prof_name                  = "tr3725"
  conversation_security_list_profile_name = ""
  comments                                = "LU for VM attach"

partner_lu6.2:
  prof_name                               = "PSFVMDP"         5
  fq_partner_lu_name                      = "SYSLAB.PSFVMDP" 6  5
  partner_lu_alias                        = "PSFVMDP"         5
  session_security_supp                   = no
  parallel_session_supp                   = no
  conversation_security_level             = none
  comments                                = ""

side_info:
  prof_name                               = "SLRISC3"         9
  local_lu_or_control_pt_alias            = "SLRISC3"         9
  partner_lu_alias                        = "PSFVMDP"         5
  fq_partner_lu_name                      = ""
  mode_name                               = "MODDPFC2"
  remote_tp_name_in_hex                   = no
  remote_tp_name                          = ""
  comments                                = "Side info for VM attach"
```

Figure 55. RS/6000 definitions for VM host

3.10 Installation of the Network Print Facility

This section describes the NPF installation for distributing printing.

3.10.1 Hardware Installation

The TCP/IP connection from the MVS system to the RISC System/6000 was through an IBM 3172 Controller. On RISC System/6000 side, a token-ring adapter card is needed.

3.10.2 Software Installation

NPF is included as a separataly orderable feature in MVS TCP/IP Version 3 Release 1.

To get TCP/IP Version 3 Release 1 and NPF working, a lot of corrective service is needed. Check for the recommended service with your IBM representative.

3.11 NPF customization

Perform the following steps (see Network Print Facility, SC31-8074).

1. Allocate the NPF datasets; refer to pages 57-60.

2. Initialize them; refer to pages 61-63.

3. Set up the ISPF interface; refer to pages 67-72.

4. Update the files using the panels.

5. Define a JES printer and a FSS for NPF; refer to pages 125-129.

6. Set up JCL for the FSS; refer to pages 123-124.

7. Set up JCL for the NPF queue manager; refer to page 136.

3.12 Parameter Relationships for NPF

Note that the use of reversed numbers (like ■1■) refers to values, which must match. Every occurrence of the same number must have equal value.

```
//OUT   OUTPUT FORMS=STD     1
//SYSPRINT DD SYSOUT=9,       2
//      OUTPUT=*.OUT
```

Figure 56. JCL Definitions

```
PRT(5)   FSS=FSS5,MODE=FSS,CLASS=9     2
FSS(FSS5) PROC=NPFPROC
```

Figure 57. JESPARM Definitions

NPFPROC contains a DD statement referring to a dataset, which is updated by following the ISPF panel (selection UR from NPF primary option menu).

```
     ROUTING FILE RECORD INFO UPDATE PANEL - NORMAL RECORD
ENTER THE APPROPRIATE FIELD FOR UPDATE:

MAJOR NAME      ===> LOCAL        MINOR NAME     ===> 9STD  1  2
LUCLASS         ===>


NO OF DEST      ===> 1
RETAIN TIME(S)  ===> 0000005      RETAIN TIME(U)  ===> 0000010
RETRY TIME      ===> 0000002      RETRY LIMIT     ===> 5
DEF PAGE FORMAT ===>              EOFILE NAME     ===>
OPTIONS NAME    ===> OPTION1      ROUTING EXIT    ===>
INTERNET NAME   ===> 9.12.0.41


PRINTER NAME    ===> p4029


          PRESS ENTER TO UPDATE THE ABOVE RECORD
```

Figure 58. NPF Panel for Routing Information

3.13 Experiences from Installation and Customization

A beta version of PSF/2 Version 2 was used, and no errors related to the code were detected.

Some problems with OS/2 were encountered. We suggest that you obtain the latest level of OS/2. We suggest also that you ensure that enough memory is installed. We encountered some problems with memory management in situations where a lot of simultaneous activities took place.

Set the MGMTMODE parameter in the host into OUTAVAIL. Value IMMED interfered the PSF/2 severely.

Be careful with names; remember that uppercase and lowercase characters are not the same.

Verify that DISCINTV at the host PSF and the host receiver inactivity timer do not conflict.

Although we had a rather early version of the PSF/6000 enhancements, we did not face any problems in PSF/6000 installation and operation. The biggest problem in installing PSF Direct in PSF/6000 was to find out how the parameters in SNA Server/6000 have to be set. After a lot of experiments, everything finally worked.

TCP/IP for MVS needed several fixes before it worked. NPF worked as expected after we finally got TCP/IP fixes applied. The exit supplied as an PTF in PSF/6000 seems to work fine if the TCP/IP is working properly. The lack of feedback from NPF makes it difficult to know whether the print job printed correctly or not.

Chapter 4. Operation

This chapter describes the differences in host system and workstation operation with different types of distributed printing.

4.1 MVS Operation

This section describes how to operate a PSF/2 or PSF/6000 controlled printer from an MVS system.

4.1.1 Print Submission

The print submission for distributed printing under MVS does not differ from any other print tasks. You must set into your spool file such characteristics that some JES Printer will select it.

Some sysout class should be allocated for distributed printing, and a JES printer customized to select that class and to invoke PSF/MVS for the printing.

4.1.2 Controlling the Printing

Just as with print submission, the controlling of remote printers does not differ from the controlling of local printers. All the same commands are used for both.

The only difference is within error recovery, and it is different if you are using DPF or Direct.

When the host PSF first establishes the connection with a printer, the message on the console tells how the printer is attached to the system. It is either PSF (printers directly controlled by PSF, either local or remote), RPM (for PSF Direct), or DPF (for DPF controlled printers). (If the host APARs are installed, PSF Direct connection shows PSFDIRECT instead of RPM.)

4.1.2.1 DPF

Printing using DPF is actually writing to a spool in PSF/2. As soon as all pages have been written into the spool, PSF/2 tells PSF/MVS that the file has been successfully printed. After that MVS, does not know the print file any longer.

PSF/2 then starts the actual printing and possible printer errors are handled by PSF/2. Thus, the host operator knows nothing about the physical printing. Another operator is required at the printer site.

4.1.2.2 PSF Direct

PSF Direct connects PSF/MVS, PSF/2 and the printer all together. PSF/2 only passes information between the host and the printer. All error recovery is handled by PSF/MVS, just as for local printers, with the exception that the host operator cannot physically operate the printer. Errors, such as paper jams, out of paper and so on, are reported to PSF Direct/2 or PSF Direct/6000, and the operator at the printer should handle them within the time set in the printer intervention timer. If the printer intervention timer at the workstation expires, the the host system is notified. Another operator is required at the printer site, and both operators must communicate with each other.

4.2 VSE Operation

This section describes how to operate a PSF/2 or PSF/6000 controlled printer from a VSE system.

4.2.1 Print Submission

The print submission for distributed printing under VSE does not differ from any other print tasks. You must set into your spool file such characteristics that some VSE POWER printer will select it.

Some classes should be allocated for distributed printing and a PSF printer customized to select that class and to invoke PSF/VSE for the printing.

4.2.2 Controlling the Printing

Just as with print submission, the controlling of remote printers does not differ from the controlling of local printers. All the same commands are used for both.

The only difference is within error recovery, and it is different if you are using DPF or Direct.

When the host PSF first establishes the connection with a printer, the message on the console tells how the printer is attached to the system. It is either PSF (printers directly controlled by PSF, either local or remote), RPM (for PSF Direct), or DPF (for DPF controlled printers). (If the host APARs are installed, PSF Direct connection shows PSFDIRECT instead of RPM.)

4.2.2.1 DPF

Printing using DPF is actually writing to a spool in PSF/2. As soon as all pages have been written into the spool, PSF/2 tells PSF/VSE that the file has been successfully printed. After that, VSE does not know the print file any longer.

PSF/2 then starts the actual printing. Possible printer errors are handled by PSF/2. Thus, the host operator knows nothing about the physical printing. Another operator is required at the printer site.

4.2.2.2 PSF Direct

PSF Direct connects PSF/VSE, PSF/2 and the printer all together. PSF/2 only passes information between the host and the printer. All error recovery are handled by PSF/VSE, just as for local printers, with the exception that the host operator cannot physically operate the printer. Errors, such as paper jams, out of paper and so on, are reported to PSF Direct/2 or PSF Direct/6000, and the operator at the printer should handle them within the time set in the printer intervention timer. If the printer intervention timer at the workstation expires, the the host system is notified. Another operator is required at the printer site, and both operators must communicate with each other.

4.3 VM Operation

This section describes how to operate a PSF/2 or PSF/6000 controlled printer from an VM system.

4.3.1 Print Submission

The print submission for distributed printing under VM does not differ from any other print tasks. You must set into your spool file such characteristics that a printer will select it.

Some classes should be allocated for distributed printing and a PSF printer customized to select that class and to invoke PSF/VM for the printing.

4.3.2 Controlling the Printing

Just as with print submission, the controlling of remote printers does not differ from the controlling of local printers. All the same commands are used for both.

The only difference is within error recovery, and it is different if you are using DPF or Direct.

When the host PSF first establishes the connection with a printer, the message on the console tells how the printer is attached to the system. It is either PSF (printers directly controlled by PSF, either local or remote), RPM (for PSF Direct), or DPF (for DPF controlled printers). (If the host APARs are installed, PSF Direct connection shows PSFDIRECT instead of RPM.)

4.3.2.1 DPF

Printing using DPF is actually writing to a spool in PSF/2. As soon as all pages have been written into the spool, PSF/2 tells PSF/VM that the file has been successfully printed. After that, VM does not know the print file any longer.

PSF/2 then starts the actual printing. Possible printer errors are handled by PSF/2. Thus, the host operator knows nothing about the physical printing. Another operator is required at the printer site.

4.3.2.2 PSF Direct

PSF Direct connects PSF/VM, PSF/2 and the printer all together. PSF/2 only passes information between the host and the printer. All error recovery is handled by PSF/VM just as for local printers, with the exception that the host operator cannot physically operate the printer. Errors, such as paper jams, out of paper and so on, are reported to PSF Direct/2 or PSF Direct/6000, and the operator at the printer should handle them within the time set in the printer intervention timer. If the printer intervention timer at the workstation expires, the the host system is notified. Another operator is required at the printer site, and both operators must communicate with each other.

4.4 AS/400 Operation

This section describes how to operate a PSF/2 or PSF/6000 controlled printer from an AS/400 system.

4.4.1 Print Submission

The print submission for distributed printing under AS/400 does not differ from any other print tasks. You must define your spool file with such characteristics that an AS/400 printer will select it.

Some queues should be allocated for distributed printing and an AFP printer customized to select that class and to invoke PSF in the AS/400 system for the printing.

4.4.2 Controlling the Printing

Just as with print submission, the controlling of remote printers does not differ from the controlling of local printers. All the same commands are used for both.

The only difference is within error recovery, and it is different if you are using DPF or Direct.

The system operator does not even see a difference between different ways of connecting the printer to the system.

4.4.2.1 DPF

Printing using DPF is actually writing to a spool in PSF/2. As soon as all pages have been written into the spool, PSF/2 tells AS/400 that the file has been successfully printed. After that, AS/400 does not know the print file any longer.

PSF/2 then starts the actual printing. Possible printer errors are handled by PSF/2. Thus, the host operator knows nothing about the physical printing. Another operator is required at printer site.

4.4.2.2 PSF Direct

PSF Direct connects the AS/400 PSF component, PSF/2 and the printer all together. PSF/2 only passes information between the host and the printer. All error recovery is handled by AS/400, just as for local printers, with the exception that the host operator cannot physically operate the printer. Errors, such as paper jams, out of paper and so on, are reported to PSF Direct/2 or PSF Direct/6000, and the operator at the printer should handle them within the time set in the printer intervention timer. If the printer intervention timer at the workstation expires, the the host system is notified. Another operator is required at the printer site, and both operators must communicate with each other.

4.5 PSF/2 Operation

Installation of PSF/2 will put icon PSF/2 onto the Desktop. Double-click it to start PSF/2. You will get the icon view of the PSF/2 folder:
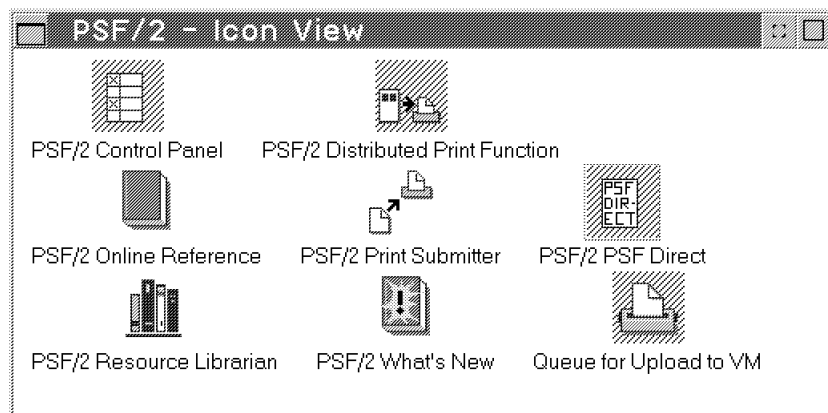
Figure 59. Icon View of PSF/2 Folder

The items for operating and controlling the PSF/2 are:

PSF/2 Control Panel
Used to operate the physical printer.

PSF/2 Distributed Print Function
Used to operate the DPF component of PSF/2.

PSF/2 PSF Direct
Used to operate the PSF Direct component of PSF/2.

4.5.1 Printer Operation

Double-clicking on the control panel icon will display the following control panel:
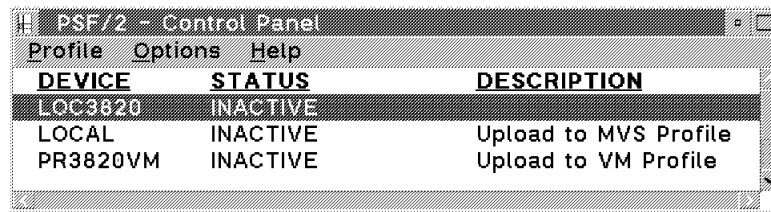
Figure 60. PSF/2 Control Panel

All the physical printers defined during customization will be shown in the panel. Also all dummy printers defined for Upload to Host -printing are shown.

The status field describes the current status of a printer; it should be either ACTIVE or INACTIVE.

This is the only task required for local printing initiated from the OS/2 system itself.

4.5.2 DPF Operation

Double-clicking on the Distributed Print Function will display the following panel:
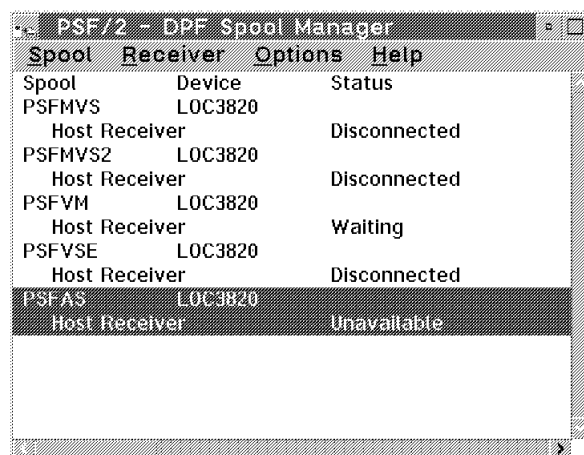
Figure 61. DPF Spool Manager Panel

This panel shows all the host receivers defined during customization. Each receiver has got a status, which is one of following:

Unavailable   The host receiver alias LU is not controlled by DPF.

Disconnected   The host receiver alias LU session to the host PSF is disconnected.

Connected   The host receiver alias LU session to the host PSF is connected.

Waiting   The session with host PSF is active, but DPF is waiting for data from the host PSF.

Receiving   Host PSF is transferring data.

Active-PSF Direct The receiver is active using PSF Direct.

To display the contents of a spool related to a host receiver, select the host receiver by clicking on it. Then click on Spool at the menu bar and click on Show jobs. You will have a panel showing all the print jobs currently in that spool:

```
 DPF All Jobs - PSFVM                                ▫ □
   Job   View   Options   Help
 Job name          User ID         Status          Retain
 PRINTDEF          RSJR            Submitted         No
```
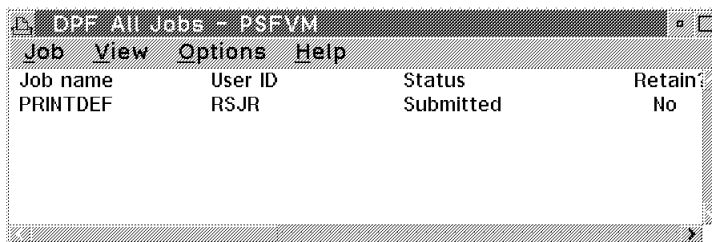
Figure 62. DPF Spool Jobs

4.5.3 PSF Direct Operation

Double-clicking on the PSF Direct will display the following panel:

```
 PSF/2 - PSF Direct                                  ▫ □
   Receiver   Options   Help
   NAME        DEVICE      STATUS       DESCRIPTION
   PSF2ND      LOC3820     Unavailable
   RECAS       LOC3820     Disconnected
   RECVM       LOC3820     Unavailable
   RECVMVS     LOC3820     Unavailable
   RECVSE      LOC3820     Unavailable
```
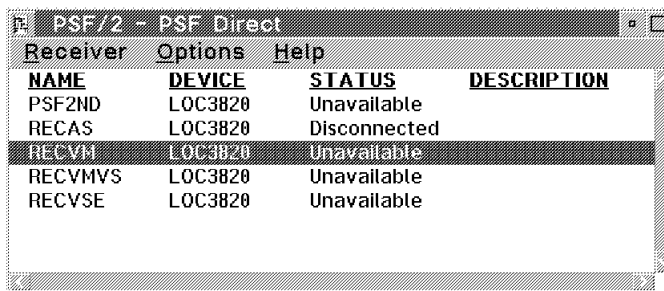
Figure 63. PSF Direct Panel

This panel shows all the host receivers defined during customization. Each receiver has a status explained above under DPF.

4.5.4 Switching between DPF and Direct

You may have several different combinations:

1. One host PSF and one host receiver (either DPF or Direct)

2. One host PSF and two receivers (both DPF and Direct)

3. Two host PSFs and two receivers (one for each)

Case 1 is static and no switching ever takes place.

Case 3 is also static and no switching is required.

Case 2 is the case where we may wish to do switching. You must know the customization and know that host receivers PSFMVS (DPF) and RECVMVS (Direct) both use the same LU alias and, thus, connect to same host PSF.

One of them can be active at one time and the other is in Unavailable status.

Now to switch the PSF/MVS (see Figure 61 on page 53 and Figure 63 on page 54), you must do following (You can do the switching also by using the timers):

 1. Note that DPF (PSFMVS) is active, and Direct (RECVMVS) is unavailable, so you would like to switch MVS from DPF to PSF Direct.

 2. Select the unavailable receiver by clicking on the line RECVMVS.

 3. Click Receiver at menu bar.

 4. Click Change. You will get the screen shown in Figure 6 on page 15.

 5. The screen contains a box labelled Change control of LU alias to PSF Direct. Click on that box and then on OK.

The actual switching takes place when current host activities have ended. Then, the statuses will change, from Unavailable to Disconnected and from Disconnected to Unavailable. The next print file being printed by host the PSF would be printed using PSF Direct.

4.6 RISC System/6000 Workstation Operation

This section describes how to operate the RISC System/6000 system with different types of distributed printing.

4.6.1 PSF Direct Operation

When PSF/6000 has been installed and customized, it is automatically active. There is no way to operate the host receiver; it is automatic.

You can control the printers defined for PSF/6000 queues with the psfctl command. Its syntax is:

```
psfctl [-d] [-k] [-t] [-u] printername
```

Refer to PSF/6000 Print Administration, S544-3817 for further information.

You may wish to print locally in the AIX system to the same printer used by PSF Direct. For that, you must ensure that the host receiver has a low value defined for inactivity timer. It causes PSF to disconnect the printer when the time has expired.

When the printer becomes free, then local print files created by command

```
enq -P printername filename
```

will start printing.

When all local files have been printed, the printer is automatically freed when the device inactivity timer has expired.

Host printing will then start automatically provided that host parameters make it possible.

4.7 NPF Operation

NPF has three components:

- JES FSS

- VTAM capture point

- Queue manager

The JES FSS does not have its own operation tasks. It is operated by operating the JES printer.

The VTAM capture point is an address space started by JCL or as a started task. It issues a WTOR, and it is operated by responding to the WTOR.

The queue manager is also an address space and is started by JCL or as a started task. It also uses a WTOR for operation.

To start NPF operation; you must:

Start JES printer (optional)

    $sprt5

The FSS is automatically started by JES.

Start VTAM Capture Point (optional)

    s npfvtam

Start NPF Queue Manager

    s npfqmgr

When using printers controlled by PSF/6000 or PSF/2, the user can see when the printing has been completed, or in the DPF case, when it has been succesfully transferred to the workstation.

When using NPF, this capability is missing. The basic idea of using TCP/IP is to send a print job to the server and expect that the job will be printed. In our tests, when we had some errors in our options, the print job seemed to be OK, but nothing was found. The procedure ended with an error inside the RISC/6000 workstation, for example, the page definition referred was not found. No information about this is passed to the originating MVS system.

Chapter 5. Performance Considerations

This chapter deals with performance considerations for the different ways of distributing printing.

5.1 Performance Factors

There are several things which may impact the performance of a distributed printing system. In addition to the host itself and the physical printer, the following items may impact the performance of the overall system:

- Capacity of communication connections

- Capacity of the workstation

- Additional steps performed in the workstation, like:

    - Spooling
    - Conversions

- Status of the host to workstation connection

The communication capacity must be planned to meet the needs of the printing application. One single page may need up to one megabyte to be transferred from host to printera and the network should transfer it while the previous page is being printed for continuous printing.

The workstation may have to communicate with one or more hosts and one or more printers at the same time. Thus, the workstation must be fitted with enough resources, especially relating to real storage.

Also, the workstation may have to do extra work due to the way it is customized for the practical work. Some solutions make the workstation write the print files to the spool and afterwards retrieve them from the spool.

Both PSF/2 and PSF/6000 support printers other than IPDS printers and perform a data stream conversion for non-IPDS printers.

Establishing and releasing the logical connection between the host and the workstation is time consuming and may significantly slow down the system if the connections are changed frequently.

5.2 PSF/2 Performance

The PSF/2 system has two basic alternatives:

- DPF - Distributed Print Function

- PSF Direct

DPF communicates with the host PSF and receives all data and puts it into a spool of it's own. Then it informs the host PSF that the job is finished, and after that, the print file is written to the printer from the spool. For small files the delay is small but visible. As file size increases, the delay grows more and more visible. Finally it becomes also a question of spool space within PSF/2.

PSF Direct forms a direct path from the host PSF through PSF/2 to the printer. No spooling takes place.

5.2.1 DPF

The time used in DPF processing can be divided into following components:

Host connection
Changing the host receiver from status ″Disconnected″ into ″ ″Waiting″ or ″Receiving″ (establish a LU6.2 session from host PSF to PSF/2)

Device activation
Changing the local printer device from status ″Inactive″ to ″Active″

File processing
Spooling and processing of the IPDS created by host PSF

5.2.2 PSF Direct

The time spent in PSF/Direct can be divided into following components:

Host connection
Changing the host receiver from status ″Disconnected″ into ″Connected″, ″Waiting″ or ″Receiving″. Due to nature of PSF/Direct this includes device activation (establish a LU6.2 session from host PSF to the printer).

File processing
Processing of the IPDS created by the host PSF

5.2.3 Conclusions

PSF Direct is much faster, as can be expected, because DPF uses intermediate spooling. It will print the first page earlier than DPF.

If the print job requires large amounts of AFP resources that are used throughout the job, there may be a situation when the host has to download the same resources over and over again. In these cases, DPF may have better overall performance than PSF Direct. As in DPF, resources may be stored in the workstation if the host system is either an MVS or a VSE system.

If the host system is an MVS system, it is possible to force the resources to stay in the printer by coding a user exit in PSF/MVS.

Capacity of the OS/2 workstation may be a critical aspect. We suggest that a model with a fast processor is used and enough memory installed. Refer to Chapter 2, "Requirements" on page 5 and especially the memory requirements on page 6. Ensure that you have at least that amount of memory installed.

Both the host connection and device activation are rather slow operations and can take a minute of elapsed time.

Startup times are longer than processing times for smaller files. Switching from one combination to another may take several minutes each time. Therefore, you should consider solutions other than frequent switching.

If you have a single host and several printers attached to the workstation, then you will need one host receiver for each printer and definition of a host printer driver for each host receiver.

5.3 NPF Performance

The time elapsed between the submission of a print job and the time when the printing starts on a printer depends on the characteristics of the print job. If a line print data set is sent to the PSF/6000 spool, the AFP Conversion and Indexing Facility (ACIF) program is invoked for converting the file to an AFP data stream format. This operation may cause a significant delay if the file is large or complex.

Chapter 6. SNA Upload Facility

This chapter describes the SNA upload and print facility included in PSF/2 Version 2.

6.1 Installation

To perform installation, we followed the instructions given in the "What's New" section of the online help. These instructions are quite clear and detailed, and there was no problem following the directions. We used the previously installed host definitions for DPF in the Communication Manager/2.

On the workstation side, the procedure is as follows.

First, from the Control Panel, we select **Profile**, and click on **New**. See Figure 64 and Figure 65.
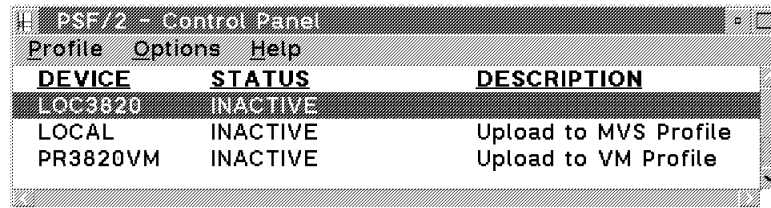
Figure 64. Control Panel
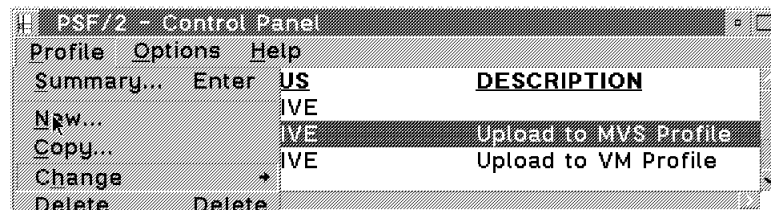
Figure 65. Defining a New Profile for Upload-n-Print

The new device profile must have a profile name which matches the printer ID as it is known at the host. This is the same name that has to appear in the PRINTDEF TABLE (VM) or the PRINTDEF.TABLE (MVS). See Figure 66 on page 62 and Figure 67 on page 62.
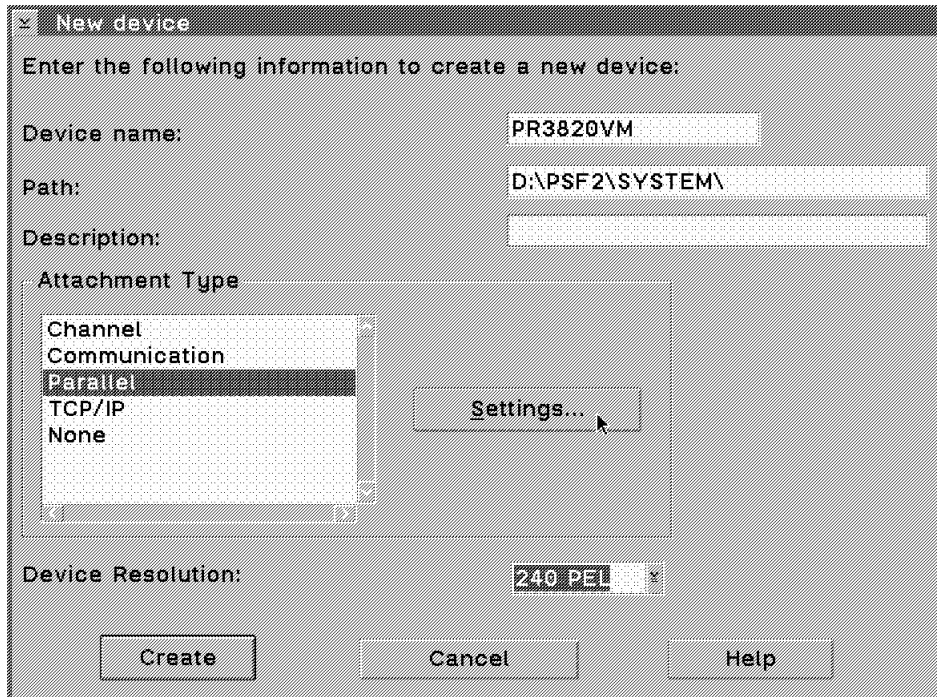
Figure 66. New Device Profile Definition

Figure 67. PRINTDEF TABLE at the HOST

At this point, the instructions correctly suggest to use the parallel connection for the "dummy" queue needed for the Upload-n-Print function. This queue never activated, even when being used by the Upload-n-Print. We used LPT1 as the port, which is an existing port. But as this port might be in use by a locally attached printer, we redefined it to LPT2 in the VM queue and to LPT3 in the MVS queue. As expected, as they are "dummy" queues, this worked. In fact, both queues can be Upload-n-printing at the same time. See Figure 68 on page 63.
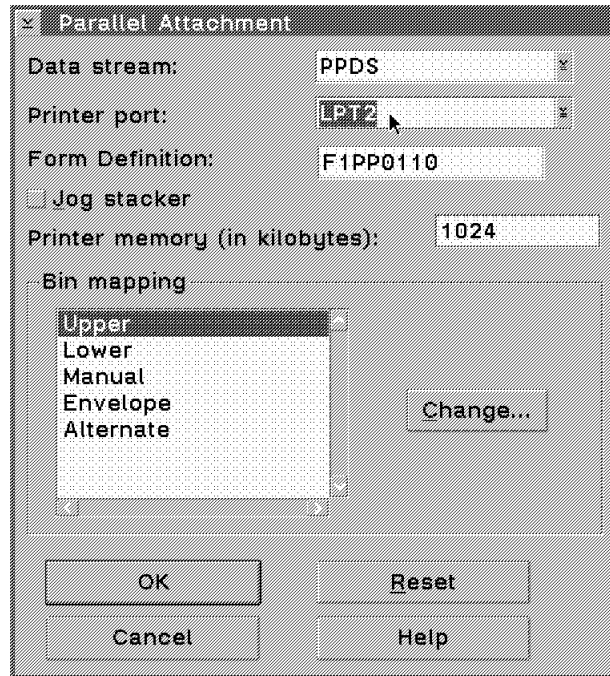
Figure 68. Printer Port Selection

The next step is to set up the transforms. Please refer to Figure 69 and
Figure 70 on page 64 and Figure 71 on page 64. We also tested the use of two
or more different transforms, for example, to upload print files to different hosts.
In such a case, we must depart from the instructions given in Step One of the
Workstation setup, Add the Upload-n-Print transform to PSF/2. In here we are
supposed to have the transform named ″Upload-n-Print″. Since we have this
name already defined for the upload to the VM system, then we must have a
different name for the MVS upload. We did so and it works. The DLL name
must always be AINHU370.
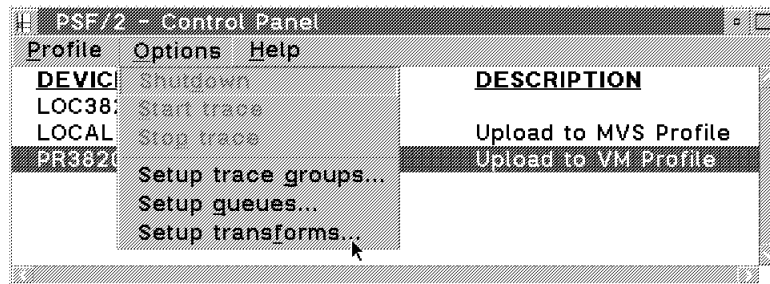
Figure 69. Setup Transforms at the Options Menu
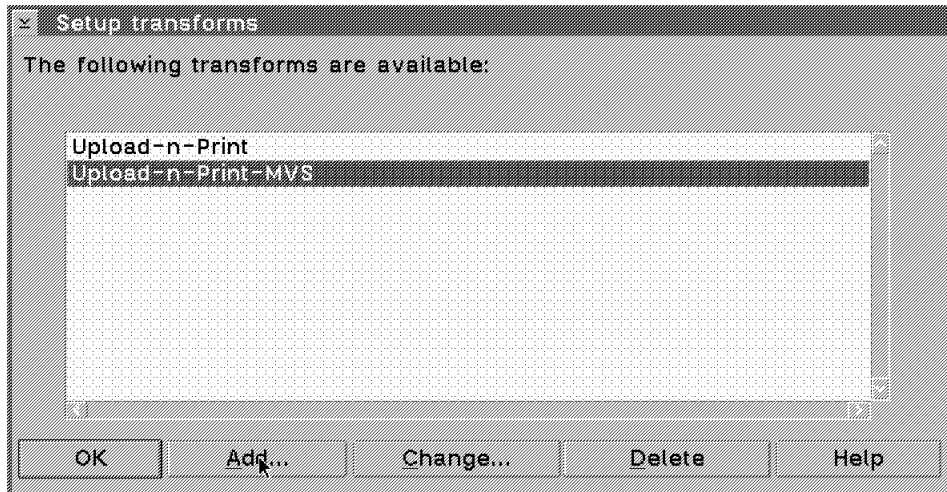
Figure 70. Setup Transforms
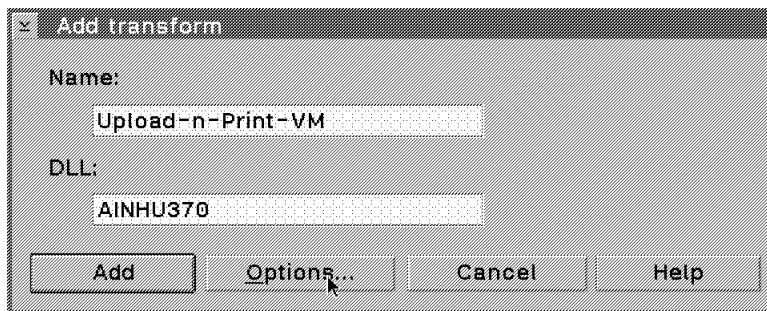
Figure 71. Add Transforms

Then the communications method must be selected. In our case, the Communications Manager is used. And it is important to notice that the settings call for a choice of the host system here, VM or MVS, and that the printer name must match the device name in the profile (Figure 66 on page 62). See Figure 72 and Figure 73 on page 65.
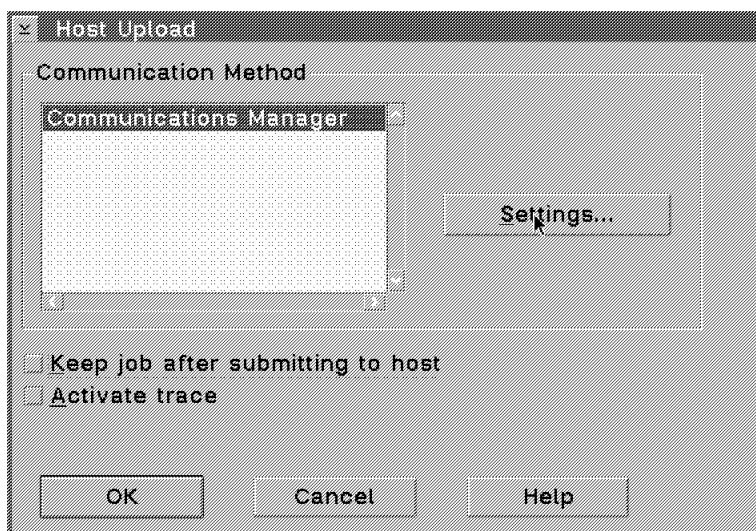
Figure 72. Host Upload
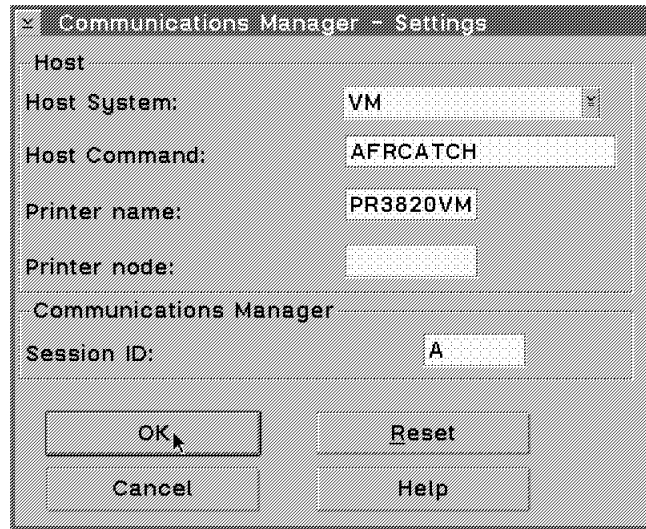
Figure 73. Communication Manager Settings

The next step is to setup the queues. Queue name should also match the device name. See Figure 74 and Figure 75.
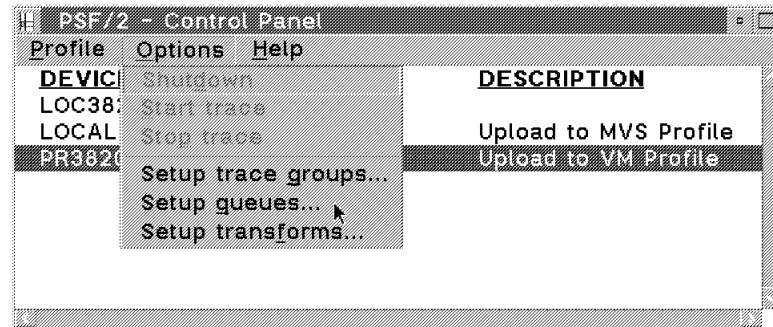
Figure 74. Setup Queues from Control Panel
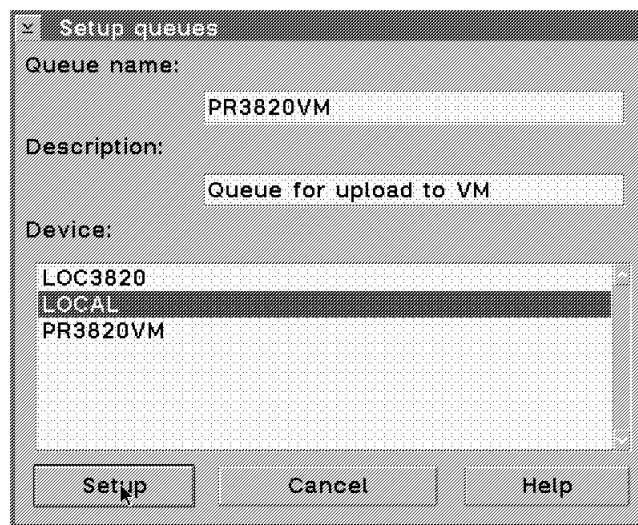
Figure 75. Setup Queues

The last step at the workstation side, STEP FOUR, Activate the Upload-n-Print transform is very important. We did a redefinition of the Upload-n-Print queue (STEP THREE) and forgot to re-do STEP FOUR, and the Upload-n-Print did not work at all. See Figure 76 on page 66 and Figure 77 on page 66.
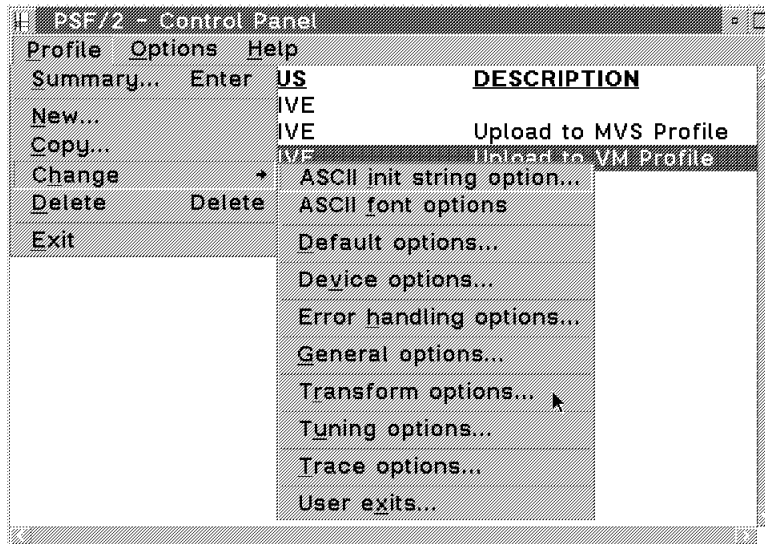
Figure 76. Activating the Upload-n-Print
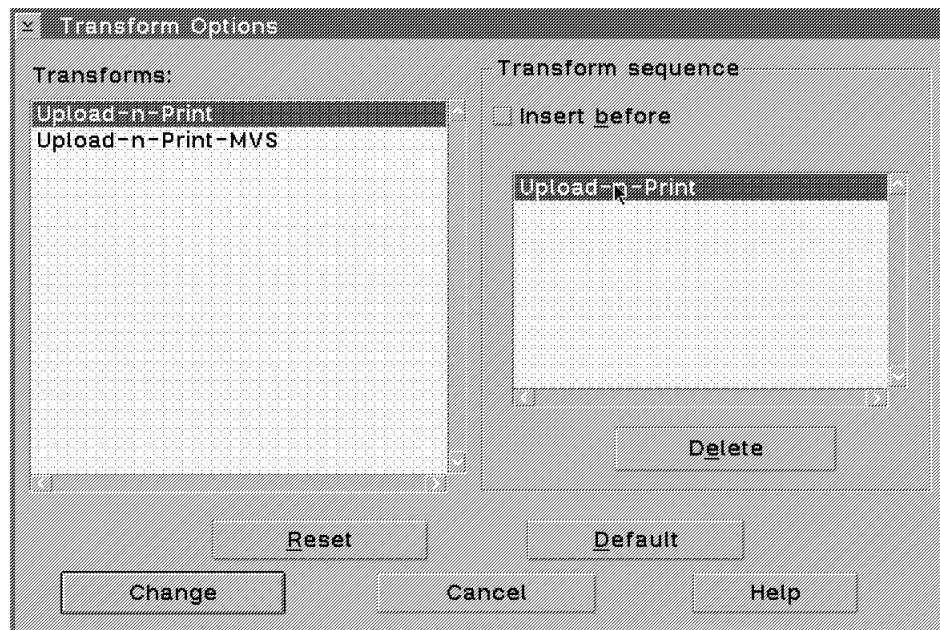
Figure 77. Transform Options

The customization on the host side is simple. It requires a file transfer from the workstation to the host of four files, three EXECs and the Printer Table (Figure 67 on page 62). Worth noticing, there was a small problem in the procedure: In Step Two for VM, sending the Upload-n-Print files to the VM host, we found out that two of the three EXECs sent to the host had a line at the end containing extraneous characters which caused the EXEC to fail. We deleted this line from the EXECs and they run okay. The EXECs affected were AFRREBLK and AFRREMSG. The same EXEC modification had to be performed at the MVS side.

The problem exists in the original ASCII files. This problem has been fixed in the latest CSD.

Then the sample PRINTDEF TABLE transferred to the host has to be changed so that the name of the printer in the PRINTDEF TABLE for VM *must be* the destination name of the printer for PSF/VM. The same is applicable to MVS.

6.2 Operation

Operating the Upload-n-Print facility is straightforward. Once an AFPDS file is ready at the workstation, no matter its origin (Windows application, OS/2 PM application, or host application), the procedure is to issue the APRINT command for the file and select the destination desired. This destination is a "dummy" device in PSF/2 with the same name as a valid host printer destination. The upload is fast. As it involves a file transfer, the receiving side (host) must be ready for reception. This means a READY status in CMS or TSO. Besides, all incoming messages to the host session receiving the printout should be blocked. This is accomplished with SET MSG OFF in VM and with PROFILE NOINTERCOM NOWTPMSG in MVS.

Chapter 7. When to Use Which Way

This chapter summarizes the advantages and disadvantages of different ways of distributing printing. There is also a list of recommendations about which method to use.

7.1 PSF/2 versus PSF/6000

This discussion assumes that these alternatives are equally available. You might already have one of them installed, and you might want to use the installed equipment.

Table 4. PSF/2 and PSF/6000 Comparison		
Subject	**PSF/2**	**PSF/6000**
PSF Direct	Supported	Supported
Distributed Print Function	Supported	Not supported
Switching between PSF Direct and local printing	Automatic with inactivity and job interval shutdown timers	Automatic with inactivity and job interval shutdown timers

7.2 DPF versus Direct

This discussion covers the possibilities within PSF/2.

Table 5. PSF Direct and Distributed Print Function Comparison		
Subject	**Distributed Print Function**	**PSF Direct**
Spooling at PSF/2	yes	no
First page prints on printer	when all pages have been copied to spool and first page resources transferred to printer	when resources for the first page transferred to printer
One host and one printer	spooling causes delay	fastest alternative
Several hosts and one printer	easy with multiple host receivers	extra delays when switching from host to host
Simultaneous use of APRINT	no restrictions	not possible while Direct is active
Saving resources at PSF/2	supported in MVS and VSE	not supported

7.3 Recommendations

For the following requirements, you should consider:

7.3.1 Single Host System

Many big files to be printed
PSF Direct, possibly several host printer drivers and several printers

Some big files and some small files
PSF Direct. Consider also having several printers and a host printer driver for each of them. It would allow you to use Direct for the big jobs and DPF for the small ones.

Few big files with many small files
DPF. Consider also having several printers and a host printer driver for each of them. It would allow you to use Direct for the big jobs and DPF for the small ones.

Just many small files
DPF, possible several printers and host printer drivers

Frequently used AFP resources
DPF allows you to store the resources at the workstation if the host system is either an MVS system or a VSE system.

Resources that are used often may be retained in the printer by preventing the deletion at the end of a print job. This is only possible if the host is MVS.

Need for simultaneous printing from LAN
DPF allows you to print locally.

7.3.2 Several Host Systems

Single printer
DPF. Avoid PSF Direct as it causes switching overhead.

Several printers
Dedicate printers to hosts and refer to 7.3.1, "Single Host System"

7.4 Migrating from RPM to PSF Direct

Many Remote PrintManager users may want to migrate from the RPM environment to the PSF Direct. RPM is no longer orderable, as the product has been withdrawn from marketing.

To migrate from RPM to PSF Direct, there are some major things to remember.

- Operating system. RPM is running under DOS in a PC or PS. For PSF Direct, either an OS/2 or AIX/6000 workstation is needed.

- Communications software. RPM uses APPC support in DOS, PSF Direct requires Communications Manager. In RISC System/6000, PSF Direct/6000 requires SNA Server/6000.

- Hardware. To run OS/2, the workstation has to be upgraded significantly from what was good for DOS. For PSF Direct/6000, a RISC System/6000 with AIX/6000 operating system is needed, see 2.4, "Requirements in the RISC System/6000 Workstation" on page 9.

- Printers. RPM supports only IPDS printers. With PSF Direct, it is possible to use any PSF/2 or PSF/6000 supported printer, including TCP/IP or parallel/serial attached printers.

- Printer sharing. With RPM, it is not possible to share a printer between host and local applications. With PSF Direct, the same printer may be used for both host and local printing.

- Flexibility. Although upgrading the workstation to run OS/2 may cause some extra costs, the flexibilility achieved by migrating from RPM to PSF Direct may justify the costs. The same type of operation available in RPM is also available in PSF Direct, but at the same time, PSF/2 or PSF/6000 can be used in many other ways. The user has the choice between PS/2 and RISC System/6000 CPUs for PSF Direct.

- Changes in the host systems. Almost no or minor changes are required in the host system software to run PSF Direct instead of RPM. For optimal performance, the parameters related to tuning, such as RU sizes and VTAM pacing values, may have to be changed.

List of Abbreviations

AFP	advanced function printing (program product)		**NCP**	network control program
AIX	advanced interactive executive (IBM's flavor of UNIX)		**NFS**	network file server
			NPF	network print facility (TCP/IP MVS)
APPC	advanced program-to-program communication		**PC/AT**	IBM Personal Computer model AT (advanced technology)
CMS	conversational monitor system (VM-based software, IBM)		**PDM**	printer driver machine
			POWER	priority output writers, execution processor, and input readers (DOS)
CPU	central processing unit		**PSF**	Print Services Facility (IBM program product)
CSD	corrective service delivery			
DPF	distributed print function		**PSF/MVS**	Print Services Facility/MVS
EXEC	execution program		**PSF/VM**	Print Services Facility/VM
HP	Hewlett-Packard Co.		**PSF/VSE**	Print Services Facility/virtual storage extended
IBM	International Business Machines Corporation		**PTF**	program temporary fix
INTERNET	a worldwide network of TCP/IP-based networks		**RISC**	reduced instruction set computer/cycles
IPDS	intelligent printer data stream (IBM)		**RPM**	remote print manager
ISPF	interactive system productivity facility (MVS & VM)		**SDLC**	synchronous data link control (teleprocessing)
			SMIT	System Management Interface Tool (see also DSMIT)
ITSO	International Technical Support Organization			
JCL	job control language (MVS and VSE)		**SNA**	systems network architecture (IBM)
JES	job entry subsystem (MVS counterpart to VM's RSCS)		**TCP/IP**	Transmission Control Protocol/Internet Protocol (USA, DoD, ARPANET; TCP=layer 4, IP=layer 3,
LAN	local area network			
LPD	line printer daemon (AIX)		**TSO**	time sharing option
LPR	line printer control program and spooler (AIX)		**VM/ESA**	virtual machine/enterprise systems architecture (IBM)
LU	logical unit		**VSE**	virtual storage extended (IBM System/370)
MB	megabyte, 1,000,000 bytes (1,048,576 bytes memory) case should be Mb			
			VSE/ESA	virtual storage extended/enterprise systems architecture (IBM)
MVS	multiple virtual storage (IBM System 370 & 390)		**VTAM**	virtual telecommunications access method (IBM) (runs under MVS, VM, & DOS/VSE)
MVS/ESA	multiple virtual storage/enterprise systems architecture (IBM)			
			WTOR	write to operator with reply

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Distributing AFP Printing from a Host System

Publication No. GG24-4493-00

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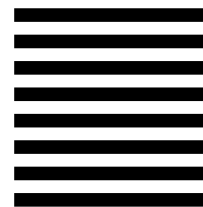
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Runtime values:

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        Document fileid  ....................................................................  EG244493 SCRIPT
        Document type  ...................................................................... USERDOC
        Document style  ..................................................................... IBMXAGD
        Profile  ............................................................................... EDFPRF40
        Service Level  ....................................................................... 0022
        SCRIPT/VS Release  ............................................................... 4.0.0
        Date  .................................................................................. 94.11.29
        Time  ................................................................................. 06:37:43
        Device  ............................................................................... 3820A
        Number of Passes  ................................................................. 3
        Index  ................................................................................ YES
        SYSVAR D  .......................................................................... YES
        SYSVAR G  .......................................................................... INLINE
        SYSVAR V  ........................................................................... ITSCEVAL
        SYSVAR X  ........................................................................... YES
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Formatting values used:

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        Annotation  ......................................................................... NO
        Cross reference listing  ........................................................... YES
        Cross reference head prefix only  ............................................... NO
        Dialog  .............................................................................. LABEL
        Duplex  .............................................................................. YES
        DVCF conditions file  .............................................................. (none)
        DVCF value 1  ...................................................................... (none)
        DVCF value 2  ...................................................................... (none)
        DVCF value 3  ...................................................................... (none)
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        DVCF value 5  ...................................................................... (none)
        DVCF value 6  ...................................................................... (none)
        DVCF value 7  ...................................................................... (none)
        DVCF value 8  ...................................................................... (none)
        DVCF value 9  ...................................................................... (none)
        Explode  ............................................................................ NO
        Figure list on new page  .......................................................... YES
        Figure/table number separation  ................................................. YES
        Folio-by-chapter  .................................................................. NO
        Head 0 body text  ................................................................. Part
        Head 1 body text  ................................................................. Chapter
        Head 1 appendix text  ............................................................. Appendix
        Hyphenation  ....................................................................... NO
        Justification  ....................................................................... NO
        Language  .......................................................................... ENGL
        Keyboard  .......................................................................... 395
        Layout  ............................................................................. OFF
        Leader dots  ....................................................................... YES
        Master index  ...................................................................... (none)
        Partial TOC (maximum level)  ..................................................... 4
        Partial TOC (new page after)  .................................................... INLINE
        Print example id's  ................................................................ NO
        Print cross reference page numbers  .............................................. YES
        Process value  ..................................................................... (none)
        Punctuation move characters  ..................................................... .,
        Read cross-reference file  ......................................................... (none)
        Running heading/footing rule  .................................................... NONE
        Show index entries  ................................................................ NO
        Table of Contents (maximum level)  ............................................... 3
        Table list on new page  ........................................................... YES
        Title page (draft) alignment  ..................................................... RIGHT
        Write cross-reference file  ........................................................ (none)
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