Print Services Facility for OS/390

Introduction

Version 3, Release 1.0

G544-5625-00

Print Services Facility for OS/390

Introduction

Version 3, Release 1.0

G544-5625-00

Note

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

First Edition (January 1999)

This edition applies to Version 3 Release 1.0 of the IBM Print Services Facility for OS/390 licensed program, Program Number 5655-B17, and to all subsequent releases and modifications until otherwise indicated in new editions or Technical Newsletters. Be sure to use the correct edition for the level of the product.

Order publications through your IBM representative or the IBM branch office serving your locality. Publications are not stocked at the address given below.

The IBM Printing Systems Company welcomes your comments. A form for reader's comments is provided at the back of this publication. If the form has been removed, you may send your comments to the following address:

INFORMATION DEVELOPMENT
THE IBM PRINTING SYSTEMS COMPANY
DEPARTMENT H7FE BUILDING 003G
PO BOX 1900
BOULDER CO 80301-9191

If you prefer to send comments electronically, use one of the following methods:

- Internet: printpub@us.ibm.com
- Fax: 1-800-524-1519 or 1-303-924-6873

Internet

Visit our home page at **http://www.printers.ibm.com**.

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

Contents

Figures

Notices

References in this publication to products or services of IBM do not suggest or imply that IBM will make them available in all countries where IBM does business or that only products or services of IBM may be used. Noninfringing equivalents may be substituted, but the user must verify that such substitutes, unless expressly designated by IBM, work correctly. No license, expressed or implied, to patents or copyrights of IBM is granted by furnishing this publication. You can send license inquiries, in writing, to the IBM Director of Licensing, IBM Corporation, North Castle Drive, Armonk, NY 10594-1785, USA.

Trademarks

The following are trademarks or registered trademarks of the IBM Corporation:

ACF/VTAM
Advanced Function Presentation
AFP
AIX
Application System/400
AS/400
CICS
DFSMS
eNetwork
ES/3090
ES/9000
ESCON
GDDM
IBM
InfoPrint
Intelligent Printer Data Stream
IPDS
IP PrintWay
JES
MVS
MVS/ESA
NetSpool
Operating System/2
Operating System/400
OS/2
OS/390
OS/400
Print Services Facility
RS/6000
S/390
VTAM

The following terms appear in this publication and are trademarks of other companies:

- DocuRight is a registered trademark of Postalsoft.
- Microsoft, Windows, Windows 95 or 98, Windows NT, and Internet Explorer are trademarks of Microsoft Corporation.
- Netscape Navigator is a trademark of Netscape Communications Corporation.
- Opus is a registered trademark of Elixir Technologies Corporation.
- PostScript is a trademark of Adobe Systems, Incorporated.
- UNIX is a registered trademark in the United States and other countries licensed exclusively through X/Open Company Limited.

Year 2000 Ready

PSF 3.1.0 for OS/390 does not have date dependencies and is therefore Year 2000 ready. When used in accordance with its associated documentation, PSF is capable of correctly processing, providing, and receiving date data within and between the twentieth and twenty-first centuries, provided all other products used with PSF (including software, hardware, and firmware) properly exchange accurate date data with it.

About This Publication

This publication provides an overview of the Print Services Facility (PSF) Version 3 Release 1.0 for OS/390 licensed program (Program Number 5655-B17). This introduction includes an overview of PSF for OS/390 and its benefits, features and related products that are used with PSF, and how you can use PSF for OS/390.

Who Should Read This Publication

This publication is intended for executives and technical personnel who need to understand the benefits and capabilities of PSF 3.1.0 for OS/390. You should read this publication if you are a new customer of Advanced Function Presentation (AFP) printers or an existing user of PSF/MVS Version 2 Release 2.0 who is looking to upgrade.

How This Publication Is Organized

This publication is organized into three chapters to help you obtain the information you need about PSF for OS/390:

- Chapter 1, “Overview of PSF for OS/390” on page 1 summarizes the relationship between AFP and PSF for OS/390, explains how PSF manages AFP printing, and describes the benefits of upgrading from PSF/MVS 2.2.0 to PSF 3.1.0 for OS/390.
- Chapter 2, “Features and Related Products” on page 13 describes the features of PSF and the related products used with PSF for OS/390.
- Chapter 3, “Using PSF for OS/390” on page 21 presents several scenarios that show how PSF for OS/390 is used in various printing situations.

Related Information

These IBM publications provide additional details about PSF for OS/390, its features, and related products:

Title	Order Number
AFP Conversion and Indexing Facility: User’s Guide	S544-5285
IBM IP PrintWay Guide	S544-5379
IBM NetSpool Guide	G544-5301
OS/390 Print Server Overview	G544-5545
PSF for AIX: Upload Configuration Guide for TCP/IP	S544-5423
PSF for AIX: Upload Configuration Guide for SNA	S544-5422
PSF for OS/390: Customization	S544-5622
PSF for OS/390: Diagnosis	G544-5623
PSF for OS/390: Download for OS/390	G544-5624
PSF for OS/390: Messages and Codes	G544-5627
PSF for OS/390: User’s Guide	S544-5630

Title	Order Number
PSF: Security Guide	S544-3291

For additional information about OS/390 and PSF for OS/390, refer to these Web pages:

`http://www.ibm.com/s390/os390`
`http://www.printers.ibm.com/pbin-id/go?/pdocs/psf390/home.html`

To obtain the latest documentation updates for OS/390 base elements and optional features that result from DOC APARs and PTFs, refer to the DOC APARs and ++HOLD DOC Web page:

`http://www.s390.ibm.com/os390/bkserv/new_tech_info.html`

To obtain the latest documentation updates for PSF for OS/390, refer to these members in SYS1.SAMPLIB:

Member	Publication
APSGCUSU	*PSF for OS/390: Customization*, S544-5622
APSGDGNU	*PSF for OS/390: Diagnosis*, G544-5623
APSGDLGU	*PSF for OS/390: Download for OS/390*, G544-5624
APSGMACU	*PSF for OS/390: Messages and Codes*, G544-5627
APSGSECU	*PSF: Security Guide*, S544-3291
APSGUSRU	*PSF for OS/390: User's Guide*, S544-5630

Chapter 1. Overview of PSF for OS/390

Print Services Facility (PSF) for OS/390 is an IBM licensed printer-driver program that manages and controls data transmitted to Advanced Function Presentation (AFP) printers that are channel-attached, SNA-attached, or TCP/IP-attached. PSF 3.1.0 for OS/390 is a replacement for PSF/MVS 2.2.0 and has performance and productivity enhancements, usability enhancements, and new application support, including:

- Attachment of all IBM AFP printers is supported over Transmission Control Protocol/Internet Protocol (TCP/IP).
- TCP/IP printers are easier to define and manage.
- Data buffers are used more efficiently to increase overall data throughput for Enterprise Systems Connection (ESCON) channel-attached printers.
- Resource management and other functions are easier to customize using PSF exits.
- Accounting information gives you better charge-back capability.
- Resident fonts are easier to use.
- Application formatting and output is easier and more flexible.

To understand what PSF for OS/390 can do for you, you must first understand the relationship between AFP and PSF.

Understanding AFP and PSF

AFP is an architected system of hardware and software for creating, formatting, viewing, retrieving, printing, and distributing information on a wide variety of printer and display devices. First introduced in 1984 to support the IBM 3800 Model 3 high-speed printer, AFP now supports new printing technology and new functions. From tabletop printers to high-speed production printers, AFP currently supports a full family of impact and nonimpact printers. These printers include those with both continuous form and cut-sheet capability and those with a choice of channel and communication attachments.

The AFP architecture governs the creation and control of data types (such as text, font, image, graphics, bar code, fax, color, audio, and multimedia) so that computer output is more readable and attractive. AFP's specific interchange architecture, called Mixed Object Document Content Architecture for Presentation (MO:DCA-P), makes information interchange possible among different platforms using different protocols. These platforms include:

- OS/390
- MVS
- VM
- VSE
- OS/2
- OS/400
- AIX

Figure 1 on page 2 shows the platforms on which AFP is supported. The AFP architecture supports a variety of network protocols and numerous input and output data streams.

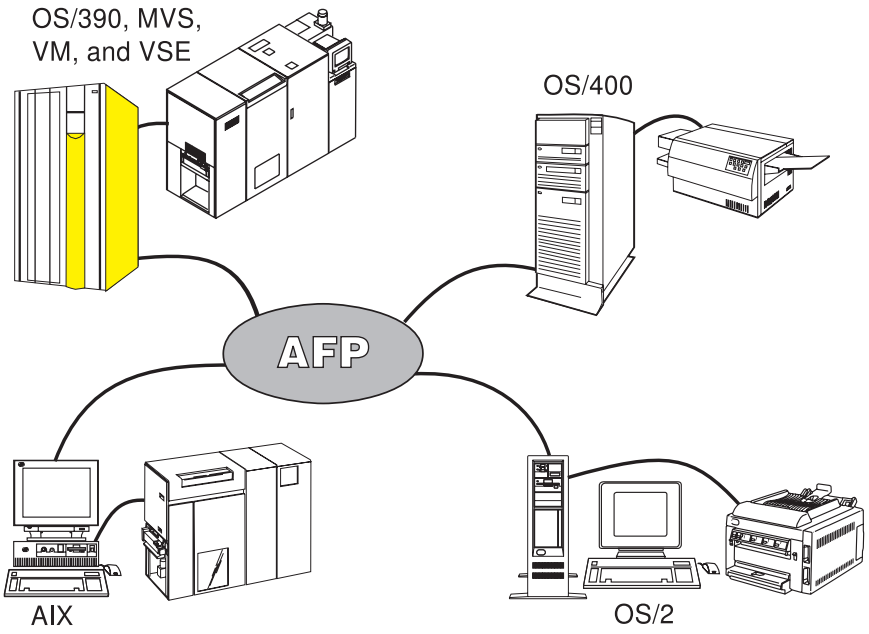

Figure 1. Platforms on Which AFP Is Supported

Components of AFP Printing

Two strategic AFP presentation data streams are key components of the architected AFP printing solution:

- Mixed Object Document Content Architecture for Presentation (MO:DCA-P) data stream is the application data stream through which applications can describe pages composed of text, images, and graphics data. MO:DCA-P is device independent; therefore, applications that produce this data stream can be directed to any of the printers supported by the AFP system or to graphical personal computer displays for viewing. Two IBM products are examples of applications that capitalize on MO:DCA-P:
  - AFP Toolbox produces documents with extended formatting capabilities.
  - Document Composition Facility (DCF) is a host-based publishing product that produces high-quality, complex documents.
- Intelligent printer data stream (IPDS) is the printer device data stream that contains the information necessary to identify, monitor, and control the functions of the printer. IPDS enables a two-way dialog between the printer and the printer driver to create a cooperative print management system. IPDS is device dependent and is unique for each printer.

PSF is the glue between the application and the printer. PSF accepts MO:DCA-P and line data and converts them into IPDS for each AFP printer it manages. Because MO:DCA-P and IPDS are part of the same architecture, this is a very efficient process for applications that produce MO:DCA-P.

PSF products are supported under OS/390, MVS, VSE, VM, OS/2, OS/400, and AIX. PSF has similar capabilities in all environments, plus differences unique to the

operating system on which it is running. Table 1 on page 3 shows the AFP platforms and the PSF products they support.

Table 1. Platforms Supporting PSF Products

Platform	**PSF Product**
OS/390 and MVS	PSF for OS/390
VSE	PSF/VSE
VM	PSF/VM
OS/2	OS/2 Warp Server, PSF/2
AIX	InfoPrint Manager for AIX, PSF for AIX
OS/400	PSF for AS/400

Figure 2 shows the basic components required to print data on AFP printers in an OS/390 environment. The PSF printer-driver program processes data streams from the job entry subsystem (JES) spool, combines the data streams with resources needed to print the data, converts the data into IPDS, and sends the result to the printer.

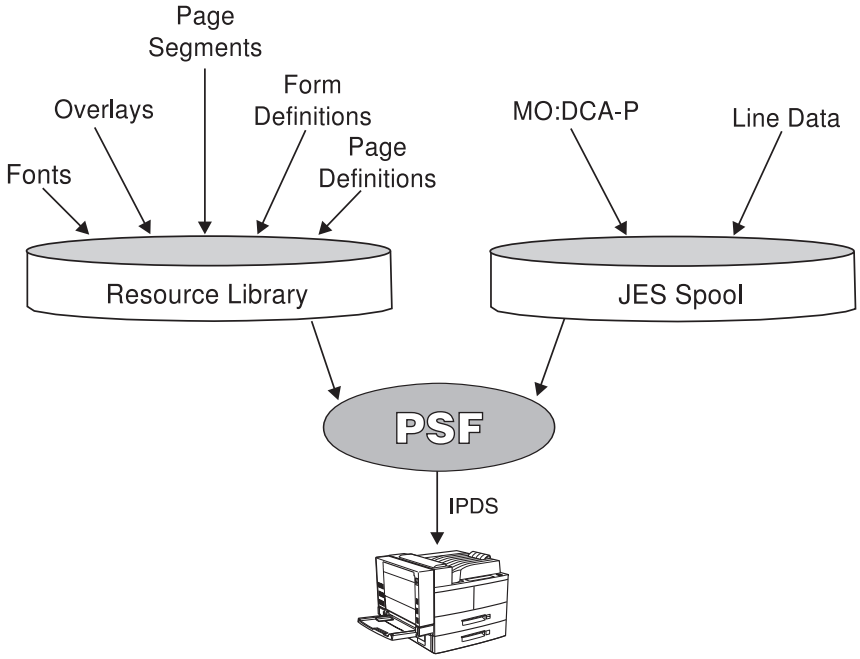

Figure 2. Components Required to Print Data on AFP Printers

Data Streams

The data streams placed on the JES spool are:

Line data Application data prepared on an S/390 for printing on a line printer, such as a 6262 or 3211, without any data placement or presentation information. For printing on page printers, a page definition is required to provide the data placement and presentation information.

MO:DCA-P Data that is already composed into pages, including data placement and presentation information (such as which font to use).

The data stream that PSF produces is:

IPDS Data sent to the printer that contains data and the controls defining how the data is to be presented.

Resources

The resources needed to print the data are:

Fonts Graphics characters of a given style that are used to present text.

Overlays Predefined data objects (such as boxes, lines, shading, text, logos, bar codes, and graphics) that can be merged with application data for presentation. Overlays are often used as electronic forms.

Page segments Image, graphics, and bar code data objects that can be presented at any location on a page. Examples of items that can be page segments include logos, signatures, bar charts, and engineering drawings.

Form definitions Information that defines the presentation of the page on the medium, such as where the page should be placed on the medium and whether the data should be printed on one or both sides of the paper.

Page definitions Information that formats line data into AFP pages.

How PSF for OS/390 Manages AFP Printing

PSF is the printing subsystem that combines print data with resources to manage and control data transmitted to AFP printers. PSF transforms data streams from the JES spool into the data stream required by each printer (using processing and printing options specified by the user and the installation) and then transmits the data to the AFP printer. PSF for OS/390 processes these two types of data from the JES spool:

- Line data from line printer applications. PSF merges line data with formatting instructions in a page definition print resource to produce all-points-addressable page formats completely external to the application program. A form definition print resource is then used to select medium options and place the formatted pages on the medium.
- MO:DCA-P data, which is already fully formatted into pages. PSF combines the formatted pages with any external resources, such as electronic forms or images, and creates commands to drive the AFP printers.

PSF also processes a combination of line data and MO:DCA-P data. This is called a mixed data stream.

Communication between PSF and the Printer

PSF converts MO:DCA-P and line data from the JES spool into IPDS. IPDS contains information about a printer, such as the characteristics of the printer, its resolution, what resources it has, whether it has sufficient memory, and whether it receives and prints a job. PSF communicates back and forth with the printer through IPDS in order to successfully manage and control the data transmitted to the printers. For example:

1. PSF sends a print job to a printer.
2. The printer uses IPDS to tell PSF that it either does not have a resource loaded or it does not have enough memory to print the job.
3. PSF sends the resource to the printer or removes unneeded resources to provide more memory.

This two-way dialog between PSF and the printer provides error recovery unmatched in other print management systems. Because PSF sends IPDS formatted pages to the printer, the printer can tell PSF the status of each page of a print job as it is processed. PSF therefore knows the last successfully printed page and can recover the print job from that page if an error is encountered. This page-level error recovery contrasts with other systems' job-level recovery, where a continuous stream of data is sent through the printer and recovery of a job might or might not be possible. PSF's page-level recovery prevents duplicate or missing pages in such important documents as billing statements, financial statements, and published books, as long as documented operational procedures are followed.

Distributed Printing Options

In addition to ESCON and parallel channel-attachment, PSF provides many options for distributed AFP printing using either SNA or TCP/IP communication protocols. Distributed printing options vary depending on the capabilities of printers and servers. PSF supports these options for sending jobs to AFP printers:

- Use SNA to send print jobs directly to printers through a token-ring LAN or Synchronous Data Link Control (SDLC).
- Use TCP/IP to send print jobs directly to LAN-attached printers.
- Send print jobs over SNA to printers attached to a PSF Direct print server running on an OS/2 Warp server with APS Connect, a PSF/2 server, or an AIX server with InfoPrint Manager for AIX or PSF for AIX. The servers can support multiple printers on a LAN, and printers and print jobs remain under the centralized control of a JES operator.
- Send print jobs over SNA to printers attached to the Distributed Print Function (DPF) running on OS/2. Print jobs are sent to the OS/2 spool, and printers and print jobs are managed at the remote location.
- Send print jobs from LAN and AIX applications to printers attached to OS/390 or MVS through PSF/2, OS/2 Warp Server, InfoPrint Manager for AIX, or PSF for AIX.

Several PSF optional features, such as Download for OS/390, AFP Upload, and IP PrintWay, provide more options for distributed printing. See “Features” on page 13 for information about these optional features.

What Can PSF for OS/390 Do for You?

PSF's system management functions create a fully integrated, automated printing system. You can use PSF for OS/390 to do the following:

- Receive print jobs, access resources required by the print jobs, and send print commands to the printer.
- Manage resources required for the print job, such as form definitions, page definitions, fonts, page segments, and overlays.
- Handle print jobs that are formatted at different resolutions and select the resource libraries with the correct resolution to print the data.
- Provide operator control of printers.
- Provide problem diagnosis and error recovery.
- Restart printing from checkpoints.
- Write accounting records.
- Write separator pages between print jobs or copies of print jobs.
- Let installations manage resources; modify output records, separator pages, and accounting records; and inspect messages.

New Capabilities

PSF has been enhanced in Version 3 Release 1.0 with new capabilities to address your requirements for improved performance, productivity, usability, and application support:

- **Performance and productivity enhancements**
  - PSF 3.1.0 supports TCP/IP attachment of all AFP printer machine types and models that have TCP/IP attachment capability when used with OS/390 2.5 or higher. This includes the InfoPrint 3000 and InfoPrint 4000 printer families. Direct TCP/IP attachment support for IBM's entire family of production printers gives you greater flexibility to generate production print anywhere in the enterprise without requiring a print server for remote attachment. The ability to run production applications at rated speed over TCP/IP attachment depends on the speed of the printer, the content of the application data, and system and network capacity. See "TCP/IP Attachment Considerations" on page 10 for more information.
  - In a TCP/IP environment, PSF now eliminates a restriction that forced all printers to be stopped and restarted when TCP/IP was stopped and restarted. Now, when TCP/IP 3.2 or higher is stopped and restarted, PSF is able to restart its printers automatically, thus improving operator productivity.
  - PSF data buffers for channel-attached printers have been moved above the 16 MB line in PSF 3.1.0. This change, combined with an increase in buffer sizes and the maximum number of buffers, results in increased overall data throughput of up to 65 percent for image applications sent to ESCON channel-attached printers. This might enable some applications, which did not run at rated speed with PSF/MVS 2.2.0, to run at or nearer rated speed with PSF 3.1.0.
- **Usability enhancements**

- TCP/IP printer definition has been enhanced so the printers can be defined with TCP/IP host names and have the device's IP address resolved dynamically using TCP/IP's Domain Name Server. This makes it possible for system administrators to make TCP/IP network changes without having to manually reflect those changes in the PSF printer definitions. Defining printers with host names is supported for PSF TCP/IP-attached printers and for remote servers defined to Download for OS/390.
- Resource management is one of PSF's most important print management functions. The ability to customize resource management using exits gives you increased control over your printing environment. However, writing exits in assembler is not always easy. In Version 3 Release 1.0, PSF is shipped with sample exits for most of the commonly used functions of Resource Exit 7, including:
  - Save resources across data set boundaries.
  - Refresh resources from the host.
  - Substitute a named resource with another one.
  - Terminate a job that asks for a resource for which it is not authorized.
  - Provide miscellaneous functions not related to resource management.
- As printer hardware has been enhanced to use multiple input bins with different paper sizes or to print "two-up" on 18-inch wide forms, it is necessary for print software to provide the information required to charge print users based on their actual usage. The system management facilities (SMF) type 6 accounting record has been enhanced in PSF 3.1.0 to provide the form size (length and width) and number of logical pages per form to enable more precise charge-back of actual print usage.
- As distributed printing environments grow, it has become more important to minimize network traffic associated with printing by using resident fonts in printers whenever possible and capturing host fonts for use as resident fonts. In PSF 3.1.0, the APSRMARK utility and reporting program has been enhanced to provide a long report that contains more information in a more readable form so that activation of resident fonts and host font capture is easier.
- Although PSF is supplied with a large number of "ready-to-use" page and form definitions for many commonly used page formats, most PSF users need to create at least some custom page and form definitions for production jobs and internal documents. In Version 3 Release 1.0, PSF ships with the Page Printer Formatting Aid (PPFA) source code for all of the supplied page and form definitions. You can use these as a model from which to create your own custom definitions.
- PSF 3.1.0 provides 16 new form definitions that contain these finishing operations:
  - Corner staple
  - Edge stitch
  - Saddle stitch
  - Z-fold
  - Insert bin

- **New application support**

– Applications that produce electronic documents are becoming more sophisticated as they make the transition from mass document production to applications based on business intelligence. Output from the new business intelligence based applications is customized for each recipient and every page of the job can be completely unique. To accommodate this type of emerging application, PSF has been enhanced to support internal copy groups that are not predefined in the form definition used with the job. An application can generate a unique copy group for each page and dynamically insert it inline with the data. This greatly increases the flexibility for creating highly customized customer documents.

– Cut-sheet printers and post-processing equipment for continuous form printers have been enhanced in the last few years to support multiple output bins on the printer or post-processor. Applications that produce multiple copies of each page of a job need to be able to direct each copy of the output to a separate bin; in effect, collating the output as it stacks. PSF has been enhanced in Version 3 Release 1.0 to direct multiple page copies in a job to different printer output bins in the form definitions, thus eliminating the need for collating by operators after the job is printed.

– Many of today's applications include overlays that are invoked in a page or form definition. In the past, each overlay had to be created and included in the orientation in which it was needed to print. In Version 3 Release 1.0, PSF has been enhanced to recognize a "Rotation" parameter associated with each overlay and have the printer automatically generate the overlay in the required orientation (subject to printer capability). This allows the same overlay to be used in any required rotation, thus simplifying application maintenance.

Hardware Requirements

PSF runs on the following S/390 hardware:

- All models of the S/390 Parallel Enterprise Server
- All models of the S/390 Multiprise 2000
- All models of the IBM ES/9000 Processor Unit 9021, 9121, or 9221
- IBM ES/3090-9000T processors
- PC Server S/390

Software Requirements

PSF runs in the following S/390 operating system environments:

- OS/390 2.4 (5647-A01) or higher with supported levels of JES2 or JES3
- OS/390 1.1 (5645-001) or higher with supported levels of JES2 or JES3
- MVS/ESA SP 5.2.2 with JES2 (5655-068) or JES3 (5655-069)

One of these system programs is required:

- DFSMS element of OS/390 Version 1 or Version 2
- DFSMS/MVS 1.2.0 or higher (5695-DF1)

One of these system programs is required:

- SMP/E element of OS/390 Version 1 or Version 2
- SMP/E 1.8.1 (5668-949) with PTF UR49485

The following communication programs are required, depending upon the printer attachments:

- ACF/VTAM 4.3 or higher supported release
- MVS TCP/IP 3.2 or higher, or OS/390 eNetwork Communications Server

  If OS/390 1.1 or 1.2 is used, you must upgrade TCP/IP by installing MVS TCP/IP 3.2 or higher.

  For attachment of InfoPrint 3000 and InfoPrint 4000 printers using TCP/IP, OS/390 2.5 or higher with eNetwork Communication Server is required.

  If TCP/IP 3.2 is used, you must apply PTFs associated with these APARs:
  - PQ07866
  - PQ13154
  - PQ17052

  If OS/390 2.5 with eNetwork Communication Server is used, you must apply PTFs associated with these APARs:
  - PQ13154
  - PQ17052

  If OS/390 2.6 with eNetwork Communication Server is used, you must apply the PTF associated with APAR PQ17052.

One of the following is required to provide host fonts:

- AFP Font Collection 2.1.0 for MVS and OS/390 (recommended). This version of the AFP Font Collection (5648-B33) contains character sets and code pages to support printing of the new euro currency symbol.
- AFP Font Collection 1.1.0 (does not contain euro support).
- The optional compatibility fonts feature of PSF (does not contain euro support). See “Compatibility Fonts” on page 13.

Compatibility

PSF 3.1.0 for OS/390 is upwardly compatible with PSF/MVS 2.2.0; however, PSF 3.1.0 does not support TCP/IP 3.1.

The sample PSF startup procedures in Version 3 Release 1.0 have been modified to use the IBM Core Interchange fonts provided in the AFP Font Collection for MVS, OS/390, VM, and VSE (Program Number 5648-B33) or in the Softcopy Print element of OS/390 1.2 or higher. If you use the sample startup procedures and you want to use fonts contained in the optional compatibility fonts feature of PSF for your header or trailer pages, PSF messages, and system default fonts, you should tailor the sample procedures to reference compatibility fonts rather than the Core Interchange Fonts.

Limitations

PSF 3.1.0 supports downloaded and resident AFP outline fonts on IPDS printers with outline font capability. The optional compatibility fonts feature of PSF 3.1.0 contains only 240 dpi and 300 dpi raster font formats (see “Compatibility Fonts” on page 13).

TCP/IP Attachment Considerations

In order to print at rated speed on high speed printers, not only must the printer be capable of processing and imaging the data at high speeds, but the system and communications link must also be able to provide data to the printer fast enough to maintain this speed. PSF 3.1.0, combined with TCP/IP in OS/390 2.5 and higher, provides significant improvement in the ability to deliver data over a TCP/IP link to high-speed production printers. This improvement lets PSF 3.1.0 support TCP/IP-attached InfoPrint 3000 and InfoPrint 4000 printer families. However, TCP/IP might not provide adequate data delivery rates for all applications or all system environments.

The ability to run production printing applications at rated speed on InfoPrint 3000 and InfoPrint 4000 printers attached directly to PSF over TCP/IP depends on these factors:

- Number of printers and the printing speeds
- Density of the application data stream, usually measured in average bytes per page
- Availability of CPU resources
- LAN bandwidth and utilization

Density of the application data stream can be a critical factor. TCP/IP-attached InfoPrint 3000 and InfoPrint 4000 printers are capable of receiving about one megabyte of data per second. While this is adequate for printing text jobs at rated speed on most high-speed printers or jobs with some image content on printers with lower rated speeds, some image intensive jobs might contain too much data to print at rated speed on some printers when TCP/IP-attached.

You can estimate the data rate required to run an application at rated speed on a specific printer with this calculation:

$$\text{bytes per second} = \frac{(\text{average bytes per page}) \times (\text{pages per minute})}{60}$$

Average bytes per page includes bytes of data on the page and AFP control bytes, which vary with the complexity of the application formatting. In addition, loading of AFP resources to the printer can add to the average byte load of a print job.

With PSF 3.1.0, ESCON channel-attachment provides the fastest and most performance efficient attachment for high-speed production printers. As with using TCP/IP for other applications, using TCP/IP to attach PSF 3.1.0 printers requires more CPU resource than using ESCON or parallel channel, for the same printers and applications. In general, TCP/IP attachment uses about the same amount of CPU as attachment through PSF Direct to an InfoPrint Manager for AIX print server (SNA-communication attachment).

For best performance, each TCP/IP-attached InfoPrint 3000 or InfoPrint 4000 printer should be on a dedicated segment of a token-ring or Ethernet LAN, with the TCP/IP maximum transmission unit (MTU) size set to the largest supported value. Attachment through token ring might provide better performance for some applications than attachment through Ethernet, especially if the LAN is not dedicated.

Performance Considerations

The performance of PSF and its attached printers is dependent upon availability and efficiency of memory, storage, DASD, and channel and network resources in the system configuration. Performance is also highly dependent upon the content of the print data streams being processed. In general, data-intensive applications, such as those containing images, require more resources than applications containing plain text. If performance degradation is experienced, normal system performance analysis and tuning should be conducted before contacting IBM service.

Chapter 2. Features and Related Products

Features

These optional and separately orderable IBM features are available with PSF for OS/390:

- AFP Conversion and Indexing Facility (ACIF)
- AFP Upload
- Compatibility Fonts
- Download for OS/390
- IP PrintWay
- NetSpool

Note: AFP Application Programming Interface (API) is not a feature of PSF 3.1.0. See “AFP Toolbox” on page 15 for information about the replacement product for AFP API.

ACIF

ACIF is a tool that lets you convert an S/390 line-data print file into a MO:DCA-P document, retrieve resources used by the document, and index the file for later retrieval and viewing. ACIF provides these functions across systems and platforms:

- Converts line-format print files to MO:DCA-P documents.
- Adds indexing tags to MO:DCA-P documents.
- Creates a separate index object file from the indexing tags in a MO:DCA-P document.
- Retrieves and packages AFP resources needed for printing or viewing a MO:DCA-P document.

Refer to *AFP Conversion and Indexing Facility: User's Guide* for more information about ACIF.

AFP Upload

AFP Upload lets you submit a job to InfoPrint Manager for AIX or PSF for AIX for printing on any printer supported by PSF for OS/390. AFP Upload receives the print data from AIX and places it on the JES spool for printing by PSF. Jobs submitted to PSF can contain any type of data stream that PSF can transform to MO:DCA-P.

Refer to *PSF for AIX: Upload Configuration Guide for TCP/IP* and *PSF for AIX: Upload Configuration Guide for SNA* for more information about AFP Upload.

Compatibility Fonts

IBM compatibility fonts are supplied with PSF 3.1.0 to provide compatibility between PSF applications and those printers and applications that were designed for IBM typewriters, 6670 laser printers, and the IBM 3800 printing subsystem. The compatibility fonts include 240-pel bounded box, 240-pel unbounded box, and 300-pel printer formats.

Download for OS/390

Download for OS/390 automatically transmits data from the JES spool to AIX systems using TCP/IP. This eliminates the need for manual print file transfer using File Transfer Protocol (FTP). A cooperating print server or archive server running on a remote system receives the data sets for printing with InfoPrint Manager for AIX or PSF for AIX, or for archiving using EDMSuite OnDemand. Download for OS/390 provides high-speed data transfer, JES scheduling, job management, data integrity, and job accounting for distributed production print management.

Refer to *PSF for OS/390: Download for OS/390* for more information about Download for OS/390.

IP PrintWay

IP PrintWay automatically routes JES2 or JES3 print data from your OS/390 or MVS system to printers in your TCP/IP network without changing your application program. It is the strategic replacement for the Network Print Facility (NPF) feature of the MVS TCP/IP product, providing improved function, capability, performance, and usability.

IP PrintWay takes any data format on the spool and transmits it to another spool or printer. Depending on the options specified, the data is either left alone (binary option) or transformed from EBCDIC to ASCII using standard or alternate translation tables.

IP PrintWay can route data to your printer in either of two ways:

- For maximum flexibility on JES2 systems and JES3 (OS/390 2.5 or higher) systems, you can specify your host system and printer address directly in your JCL. This gives you dynamic addressing capability for any workstation printer, department printer, or system printer in your TCP/IP network. You can select printer destinations that have not been previously defined by the system administrator, thus relieving you of dependencies on other functions to route print jobs within the network.
- For more centralized control, an update to a routing table can provide the network addressing.

Refer to *IBM IP PrintWay Guide* for more information about IP PrintWay.

NetSpool

NetSpool converts data received from VTAM applications, such as CICS and IMS, to S/390 line data and places the data on the JES2 or JES3 spool. You can then use JES, PSF, or IP PrintWay to print or distribute this output. NetSpool enables most VTAM applications to take advantage of AFP solutions without program changes. NetSpool lets multiple VTAM applications share a single multi-function printer and also lets a single VTAM application broadcast output with the same or different output formats to multiple distributed printers.

Refer to *IBM NetSpool Guide* for more information about NetSpool.

Related IBM Products

You can use any of these IBM products with PSF:

- AFP Font Collection
- AFP Printer Driver
- AFP Toolbox
- AFP Viewer plug-in
- AFP Workbench
- Document Composition Facility (DCF)
- Enterprise Document Management Suite (EDMSuite) OnDemand
- Graphical Data Display Manager (GDDM)
- OS/390 Print Server
- Overlay Generation Language (OGL)
- Page Printer Formatting Aid (PPFA)
- System Display and Search Facility (SDSF)

AFP Font Collection

The IBM AFP Font Collection (Program Number 5648-B33) contains a wide selection of AFP fonts. It is the recommended source of AFP fonts for printing with PSF.

AFP Printer Driver

The AFP Printer Driver creates output in AFP format to allow printing on any of IBM's AFP printers controlled by PSF for OS/390.

The AFP Printer Driver is available for Windows 3.1, Windows 95, and Windows NT. The AFP Printer Driver is a component of the OS/390 Print Server, which supports Windows 95 and Windows NT.

AFP Toolbox

AFP Toolbox (Program Number 5655-A25 for OS/390) assists application programmers in formatting printed output. Without requiring knowledge of the AFP data stream, AFP Toolbox provides access to sophisticated AFP functions through a callable C, C++, or COBOL interface. With AFP Toolbox you can:

- Combine variable data with electronic forms, electronic signatures, and images.
- Define variable length paragraphs.
- Draw fixed or variable depth and width boxes.
- Generate bar code objects.
- Draw horizontal and vertical fixed or variable length lines.
- Include indexing tags for use in efficient viewing, archival, and retrieval.
- Accent printed output with color and shading.
- Dynamically control fonts, including user-defined fonts.
- Precisely position and align text anywhere on a page using a wide variety of fonts.
- Create graphical data objects such as pie charts and bar charts.

AFP Toolbox is available on OS/390, MVS, AIX, OS/2, and OS/400 platforms.

AFP Viewer Plug-in

The AFP Viewer plug-in displays documents that are in AFP format, such as documents downloaded from the OS/390 host or from Web documents.

The AFP Viewer plug-in is available for Windows 95 or 98 and Windows NT, and requires Netscape Navigator (Version 3.01 or later) or Microsoft Internet Explorer (Version 3.01, Level 4.70.1215 or later). The AFP Viewer plug-in is a component of the OS/390 Print Server.

AFP Workbench

AFP Workbench (Program Number 5622-416) contains a viewer application that lets you display AFP files that are in MO:DCA-P format, including page segments and overlays. In addition, you can use the AFP Workbench to:

- Display ASCII files (ignoring graphic controls).
- Print files and parts of files on a printer attached to PSF/2 or Windows.
- Clip a portion of the displayed page and scale it to improve readability.
- Copy one or more pages from an AFP document into a new AFP document.
- Convert a page or page segment to an AFP overlay.
- Convert an AFP overlay or page segment to a page.
- Change the form definition used to display an AFP file.
- View your documents in multiple-up presentation.
- Navigate through or search a document using indexing information, sheet numbers, page identifiers, or keyword strings.

AFP Workbench is available on OS/2, WIN-OS/2, Windows 3.1, Windows 95 or 98, and Windows NT.

DCF

DCF (Program Number 5748-XX9) is an IBM licensed, text-processing program that you can use to create large, complex, printed documents. DCF contains a text formatter, SCRIPT/VS, that can process documents that include SCRIPT/VS control words and Generalized Markup Language (GML) tags, along with the text. DCF lets you add navigation information to your document and then retrieve it with AFP Workbench. DCF also supports HTML through a transform.

DCF runs on OS/390, MVS, VM, and VSE.

EDMSuite OnDemand

EDMSuite OnDemand (Program Number 5622-662) is an IBM licensed, web-enabled program that lets you automatically capture, index, archive, search, retrieve, present, and reproduce stored computer-generated documents and other business-related data. EDMSuite OnDemand supports several types of report file data streams, including MO:DCA-P data streams that contain line data mixed with AFP structured fields and line data formatted with a page definition.

EDMSuite OnDemand runs on OS/390, OS/400, AIX, and Windows NT.

GDDM

GDDM (Program Number 5695-167 for OS/390) is an IBM licensed program that application programs can use to create page segments. GDDM also takes vector graphics data from other application programs and converts it into page segments needed for printing on AFP printers. After the page segment is created or the vector graphics data is converted into a page segment, the page segment can be printed by itself, included in a document by DCF or AFP Toolbox, or included in an overlay by OGL.

GDDM runs on OS/390, MVS, VM, and VSE.

OGL

OGL (Program Number 5688-191) is an IBM licensed program you can use to create and modify electronic versions of your preprinted forms, called *overlays*. After you create an overlay, OGL can store it in a resource library. You can then include the overlay with your form definition to print up to 254 different overlays on a side of paper.

OGL runs on OS/390, MVS, VM, and VSE.

OS/390 Print Server

The OS/390 Print Server (Program Number 5647-A01) is an optional feature of OS/390 2.5 and higher. It supports printing on OS/390 printers, including AFP printers and local and remote printers in a TCP/IP network. The OS/390 Print Server lets you submit print requests from remote workstations in a TCP/IP network, from OS/390 UNIX System Services applications, from batch applications, and from VTAM applications, such as CICS or IMS. The OS/390 Print Server consists of these components:

- OS/390 Print Interface
- NetSpool
- IP PrintWay
- Printing commands for OS/390 UNIX System Services
- AFP Printer Driver
- AFP Viewer plug-in
- OS/390 Printer Port Monitor

Figure 3 on page 18 shows how the various components of the OS/390 Print Server complement PSF for OS/390 in providing an integrated print processing solution:

1. The AFP Printer Driver creates AFP output for printing on AFP printers, the AFP Viewer plug-in lets you view documents in AFP format, and the OS/390 Printer Port Monitor sends files to the OS/390 Print Interface so Windows 95 and Windows NT users can print documents on AFP and other OS/390 printers.
2. The OS/390 Print Interface sends jobs to the JES spool from remote platforms and from OS/390 UNIX System Services.
3. NetSpool sends jobs to the JES spool from VTAM applications, such as CICS or IMS.
4. IP PrintWay takes jobs from the JES spool and sends them to TCP/IP-attached network printers.

5. PSF for OS/390 takes jobs from the JES spool and prints them to local and remote AFP printers.

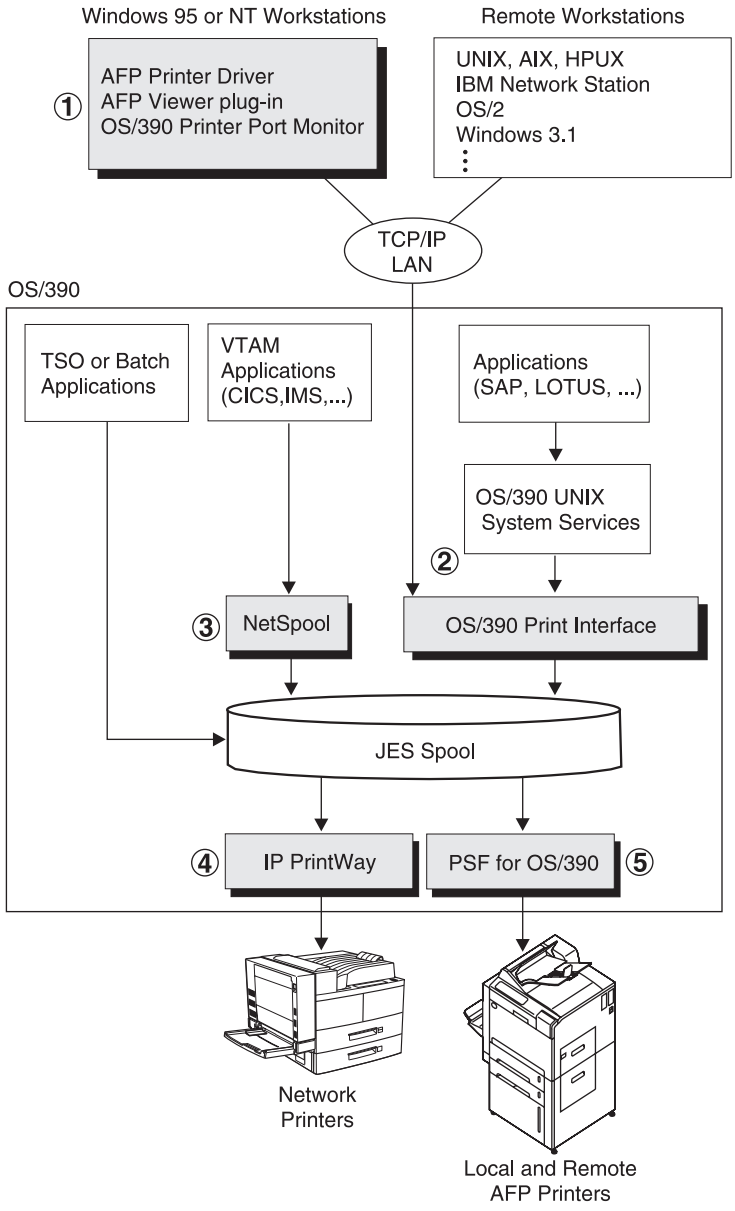

Figure 3. The OS/390 Print Server and PSF for OS/390 Print Processing Solution

The OS/390 Print Server contains the latest versions of IP PrintWay and NetSpool. These components are also available with PSF as optional features, but you must purchase them separately.

Refer to *OS/390 Print Server Overview* for more information about the OS/390 Print Server.

PPFA

PPFA (Program Number 5688-190) is an IBM licensed program you can use to create form definitions and page definitions. After creating these resources, you can store them in a resource library and then use them for printing application data.

PPFA runs on OS/390, MVS, VM, and VSE.

SDSF

SDSF (Program Number 5665-488) provides you with information to monitor, manage, and control jobs, printers, queues, and resources in an JES2 system. With SDSF, you can:

- Control job processing.
- Monitor jobs while they are running.
- Browse jobs without printing.
- Control printers and initiators.
- Control network lines and nodes.
- Control spool offload devices.
- Issue JES2 and MVS commands that affect jobs.

Other Related Products

You can use any of these IBM business partner products with PSF:

- Autograph
- Custom Statement Formatter (CSF)
- DOC1
- DocuRight
- Opus
- Papyrus
- Printer Resource Software (PReS)
- The TransFormer

Note: The Web site addresses referred to in this section are current as of January 1999.

Autograph

Autograph is an integrated family of products from Document Sciences Corporation. Autograph automatically assembles a document from any information source and presents it on a variety of output devices, from printers to online viewing platforms. For more information about Autograph, refer to this Web site: `http://www.docscience.com`.

CSF

CSF is a WYSIWYG software development tool from M&I Data Services that produces and manages high volumes of personalized customer documents, such as bank statements, credit cards, and bills. For more information about CSF, refer to this Web site: `http://www.midata.com`.

DOC1

DOC1 is a WYSIWYG document compostition system from Group 1 Software. DOC1 designs individualized documents, such as statements, directives, bills, and other communications, that can be processed and managed across multiple platforms. For more information about DOC1, refer to this Web site: `http://www.g1.com`.

DocuRight

DocuRight is a document processing tool from Postalsoft that lets you create and print personalized business documents, such as statements, invoices, policies, and newsletters. For more information about DocuRight, refer to this Web site: `http://www.postalsoft.com`.

Opus

Opus is an integrated document composition and production system from Elixir Technologies Corporation. Opus is a product that develops, prints, and presents documents that are tailored to meet individual customer needs. For more information about Opus, refer to this Web site: `http://www.elixir.com`.

Papyrus

Papyrus is a WYSIWYG document automation solution from ISIS. Papyrus enables development, production, and management of business documents. For more information about Papyrus, refer to this Web site: `http://www.isis-papyrus.com`.

PReS

PReS is a PC-based document composition tool from PrintSoft. PReS accepts data from a wide range of systems, formats it into complex, personalized documents, and prints the documents on high-speed, electronic printers. For more information about PReS, refer to this Web site: `http://www.printsoft.com.au`.

The TransFormer

The TransFormer is a mainframe print and data manipulation tool from The Harris Group. The TransFormer lets users quickly and inexpensively modify and enhance output without changing application programs in any way. The TransFormer can:

- Create, reformat, and redesign print and electronic output.
- Apply application output to postal discount software.
- Convert jobs to laser printers from impact printers or another laser printer type.
- Facilitate the use of finishing equipment by merging and combining documents and creating and positioning bar codes.

For more information about The TransFormer, refer to this Web site: `http://www.theharrisgroup.com/products/tform`.

Chapter 3. Using PSF for OS/390

This chapter describes how you can use PSF for OS/390 in your particular environment to meet your printing needs. It includes these printing scenarios:

- Centralized production printing with post processing
- Data transmitted for archiving or printing
- Large documents printed and finished on LAN-based printers
- CICS or IMS output data printed on network printers
- Data printed from the Web
- Formatted output printed on remote printers

Printing Centralized Production Output with Post Processing

An investment brokerage firm delivers thousands of statements a week to its clients. To meet weekly print deadlines and control costs, the brokerage firm wants to use a high-speed printer with an automated output solutions manager, such as the InfoPrint 4000.

Here is how this brokerage firm can use PSF for OS/390 and its related products to meet the firm's requirements:

1. The brokerage firm uses PPFA to create page definitions and form definitions and OGL to create overlays. These resources are then stored in a resource library.
2. A batch application submits print files to the JES spool.
3. JES selects the print job to be printed by PSF. PSF then combines it with the page definition, form definition, and overlay from the resource library, converts the data stream to IPDS, and transmits the IPDS to an InfoPrint 4000 printer.
4. The post-processor attachments on the InfoPrint 4000 slit and merge the statements and then stuff them in envelopes for mailing.

Figure 4 shows how PSF directs a high volume of data to high-speed printers with automated post processing.

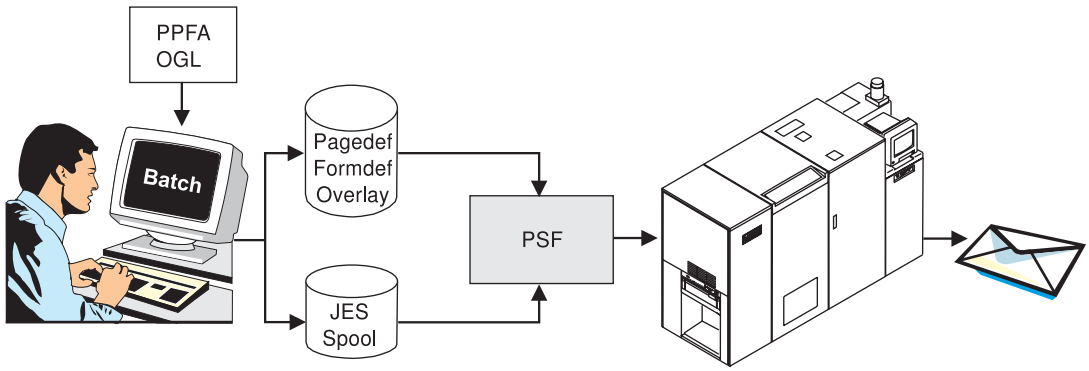

Figure 4. Printing Centralized Production Output with Post Processing

Transmitting Data for Archiving or Printing

A utility company produces monthly statements that it mails to its customers. It archives the statements so that when customers call with questions about their bills, customer service personnel can view the archived statement and print another copy of the statement, if necessary.

Here is how this company can use PSF for OS/390 features and related products to meet its requirements:

1. The utility company uses page definition and line data on OS/390 to generate data for their monthly statements.
2. ACIF creates an indexed archive file from the page definition and line data.
3. The application on OS/390 submits the print file and ACIF submits the archive file to the JES spool.
4. JES selects the print job to be printed by PSF. PSF then transmits it to the InfoPrint 4000 printer for printing and mailing to the customer.
5. JES selects the archive file to be transmitted by the Download for OS/390 feature of PSF. Download for OS/390 then transmits the file from the JES spool across the TCP/IP LAN to EDMSuite OnDemand.
6. EDMSuite OnDemand, on AIX or Windows NT, archives the files on CD-ROM.
7. When a customer calls, customer service personnel use the viewer application of the AFP Workbench to view the customer's statement, use InfoPrint Manager for AIX to print another copy of the statement on an InfoPrint 20, or do both.

Figure 5 shows how PSF automatically transmits data for archiving or printing:

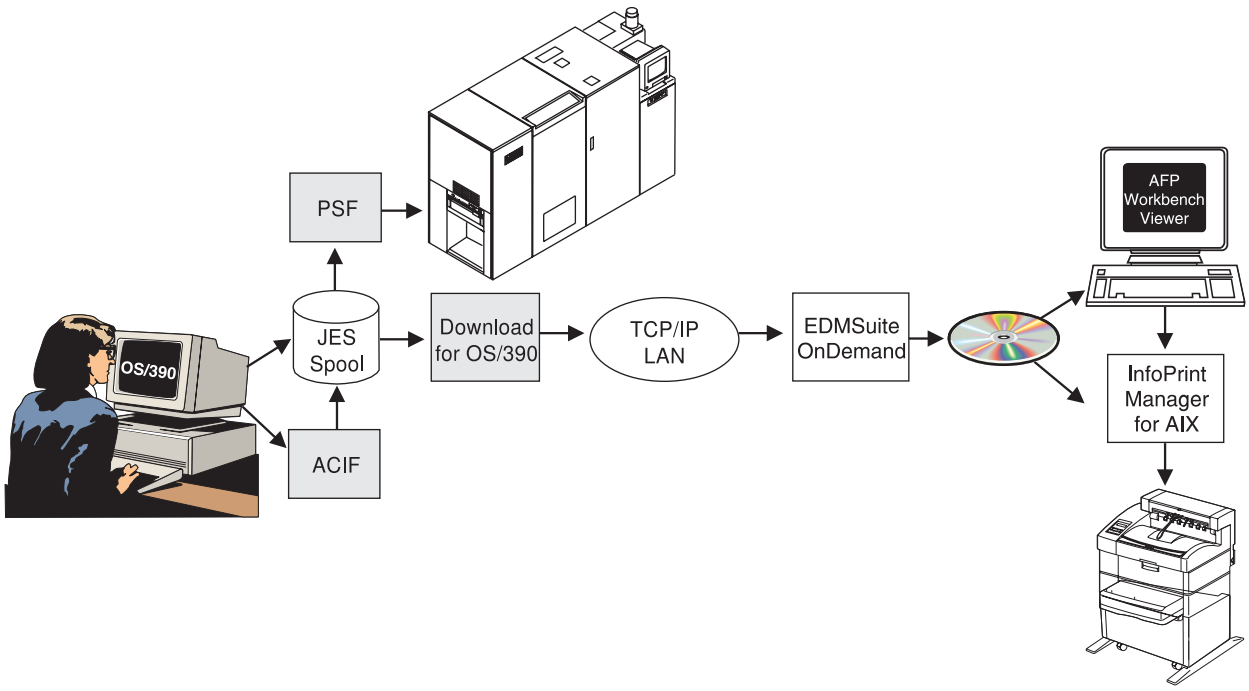

Figure 5. Automatically Transmitting Data for Archiving or Printing

Printing and Finishing Large Documents on LAN-Based Printers

A large production printing company uses a text-processing program, such as DCF, to create large, complex manuals. It then uses LAN-based printers, such as the InfoPrint 60, to print and finish the manuals. This company is very concerned that the manuals it creates do not have any duplicate or missing pages.

Here is how this company can use PSF for OS/390 and its related products to print the company's manuals:

1. A user prepares a manual with DCF and formats the files for printing.
2. The user downloads the document to a workstation system and, using the viewer application of AFP Workbench, displays the document before sending it to the printer.
3. The user submits the print files from DCF to the JES spool with a form definition that specifies finishing.
4. JES selects the print job to be printed by PSF. PSF then transmits the print files to the selected printer on the TCP/IP LAN. The printer notifies PSF through IPDS about any errors encountered while printing. PSF's error recovery capabilities ensure that each page is printed and not duplicated, as long as the documented operational procedures are followed.

Figure 6 shows how PSF directs the data to LAN-based printers.

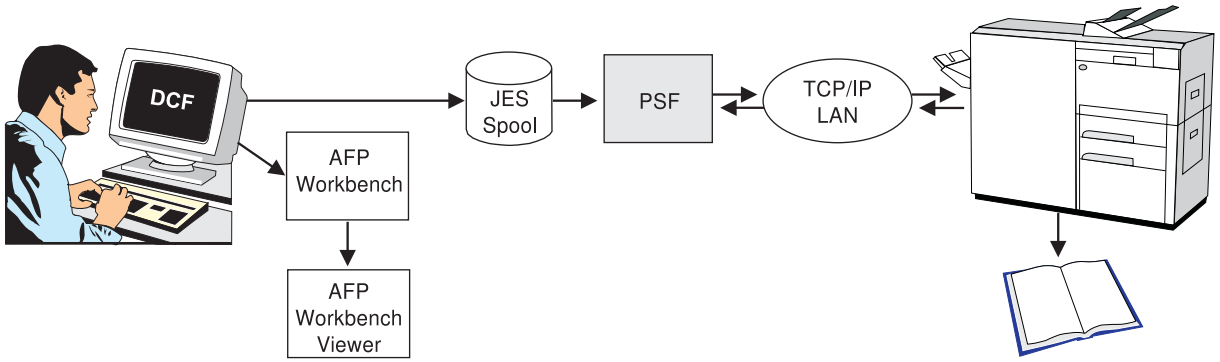

Figure 6. Printing Documents on LAN-Based Printers

Printing CICS or IMS Output Data on Network Printers

An international manufacturing company has a large investment in the IBM S/390. Recently, the company has configured a LAN and has purchased network printers to replace its coaxially-attached SNA printers.

This company wants to print inventory control reports from its CICS and IMS applications to the network printers, instead of to its usual set of SNA printers. The company wants to route the reports to one or more remote locations, such as warehouses, docks, and the plant floor, while taking advantage of the capabilities of PSF for OS/390.

Here is how this company can use the NetSpool and IP Printway features of PSF for OS/390 to meet its requirements:

1. The CICS or IMS applications submit print requests using VTAM in the same way they submit print requests to SNA printers. No changes to the CICS or IMS applications are required.
2. The NetSpool feature intercepts the print requests and creates output data sets on the JES spool, using JES output parameters defined by the administrator. The JES output parameters specify routing information that IP PrintWay uses to transmit the output to a particular network printer.
3. The IP PrintWay feature transmits the output data sets from the JES spool to one or more network printers on the TCP/IP LAN.

Figure 7 shows how PSF directs the data to network printers.

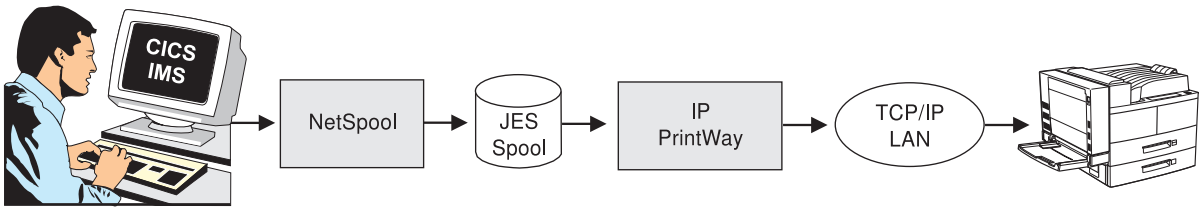

Figure 7. Printing CICS or IMS Output Data on Network Printers

Printing Documents from the Web

A market research firm wants to print Web documents on high-speed AFP printers attached to an S/390, such as the InfoPrint 60.

Here is how this company can use the OS/390 Print Server components and PSF for OS/390 to meet its requirements:

1. From a Windows 95 or Windows NT workstation, a user views a document from the Web using a browser, such as Netscape Navigator, or with the AFP Viewer plug-in if the document is in AFP format.
2. The user submits the document for printing using the standard print-submission method provided with the browser or viewer. The user selects an AFP printer defined to OS/390. The AFP Printer Driver creates an output file in AFP format.

   Note: The user can also download documents from the Web in HTML format and convert them to MO:DCA-P format with DCF. By using this method instead of the AFP Printer Driver, document elements, such as headers, the index, and the table of contents, are still usable.
3. The OS/390 Printer Port Monitor automatically transmits the output file across the TCP/IP LAN to the OS/390 Print Interface component.
4. The OS/390 Print Interface component creates an output data set on the JES spool, using JES output parameters defined by the administrator. The JES output parameters specify printing options that PSF uses to print output.
5. PSF prints the data set on the AFP printer.

Figure 8 shows how the OS/390 Print Server and PSF for OS/390 direct data from the Web to AFP printers.

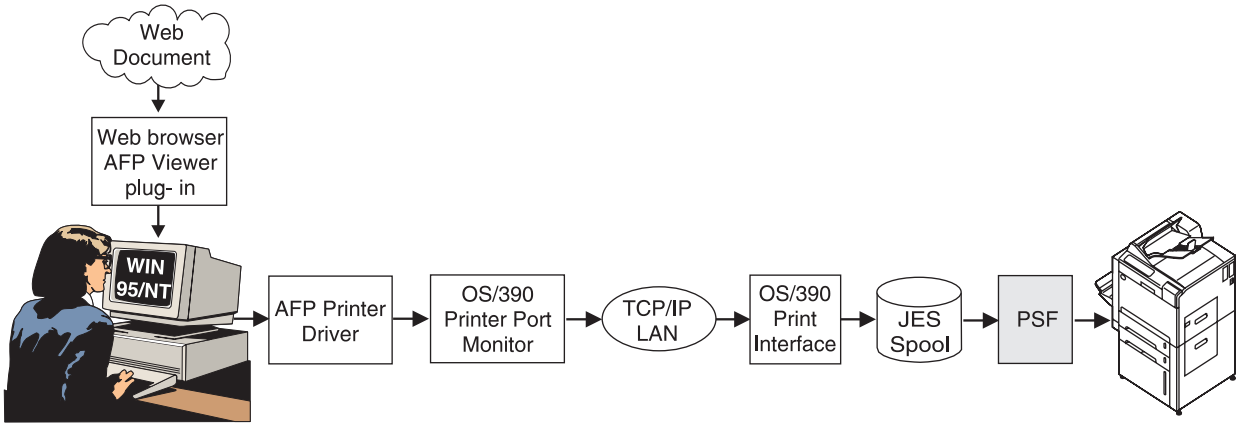

Figure 8. Printing Documents from the Web

Formatting Printed Output for Distribution to Remote Printers

A financial institution wants to use AFP Toolbox to develop all of its statements at one central location. It then wants to print bank statements and reports at each of its branch offices throughout the mid-Atlantic region with the confidence that every statement is printed, but not duplicated.

Here is how this financial institution can use PSF for OS/390 features and related products to meet its requirements:

1. The financial institution uses AFP Toolbox to generate statements, segments the statements by branch office, and stores them in separate files for printing.
2. AFP Toolbox submits the print files to the JES spool.
3. JES selects the print job to be printed by PSF. PSF then transmits the print files to PSF Direct through SNA LU 6.2 protocol for remote printing on an InfoPrint Manager for AIX printer, such as the InfoPrint 20. The printer notifies PSF through IPDS about any errors encountered while printing. PSF's error recovery capabilities ensure that each statement is printed and not duplicated, as long as the documented operational procedures are followed.

Figure 9 shows how PSF directs formatted output to remote printers.

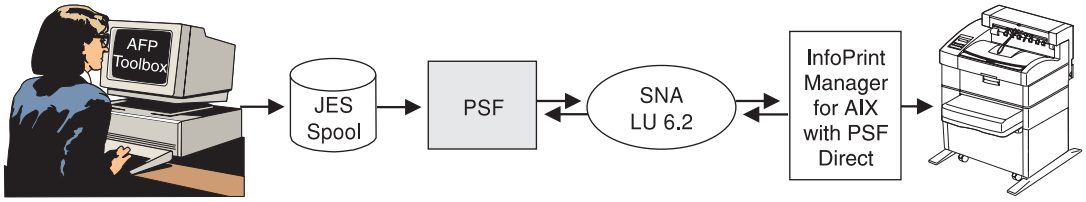

Figure 9. Formatting Printed Output for Distribution to Remote Printers

Glossary

This glossary defines the terms that apply to an overview of PSF for OS/390. If you do not find the term you are looking for, refer to the *IBM Dictionary of Computing,* ZC20-1699.

Definitions reprinted from the *American National Dictionary for Information Processing Systems* are identified by the symbol (A) following the definition.

Definitions reprinted from a published section of the International Organization for Standardization (ISO) *Vocabulary—Information Processing* or from a published section of *Vocabulary—Office Machines* developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Committee (ISO/IEC JTC1/SC1) are identified by the symbol (I) following the definition.

Definitions reprinted from working documents, draft proposals, or draft international standards of ISO Technical Committee 97, Subcommittee 1 (Vocabulary), Joint Technical Committee 1 are identified by the symbol (T) following the definition, indicating that final agreement has not yet been reached among its participating members.

Definitions that are specific to IBM products are so labeled—for example, “In SNA,” or “In the 3820 printer.”

A

ACIF. (1) AFP Conversion and Indexing Facility. (2) An optional feature of PSF for OS/390 that converts a print file into MO:DCA-P (AFP), creates an index file for input data, and collects resources used by an AFP document into a separate file.

Advanced Function Presentation (AFP). A set of licensed programs, together with user applications, that use the all-points-addressable concept to print on presentation devices. AFP includes creating, formatting, archiving, retrieving, viewing, distributing, and printing information.

AFP. Advanced Function Presentation.

AFP data stream. A presentation data stream that is processed in AFP environments. MO:DCA-P is the strategic AFP data stream. IPDS is the strategic AFP printer data stream.

AFPDS. A term formerly used to identify the MO:DCA-P-based data stream interchanged in AFP environments. See also *MO:DCA-P* and *AFP data stream*.

AFP Font Collection. The recommended source of AFP fonts for printing with PSF.

AFP Printer Driver for Windows. A component of the OS/390 Print Server that runs on a Windows 95 or Windows NT workstation and creates output in AFP format for printing on AFP printers.

AFP Toolbox. An IBM product that assists application programmers in formatting printed output. Without requiring knowledge of the AFP data stream, AFP Toolbox provides access to sophisticated AFP functions through a callable C, C++, or COBOL interface. AFP Toolbox is available on OS/390, MVS, AIX, OS/2, and OS/400 platforms.

AFP Upload. An optional feature of PSF for OS/390 that lets you submit a job to PSF for AIX or InfoPrint for AIX for printing on any printer supported by PSF for OS/390.

AFP Viewer plug-in for Windows. A component of the OS/390 Print Server that runs on a Windows 95 or Windows NT workstation and lets you view files in AFP format.

AFP Workbench. An IBM product that lets you display AFP and ASCII files at your workstation in the same format they are printed.

all-points-addressable (APA). The ability to address, reference, and position text, overlays, and images at any defined position or pel on the printable area of the paper. This capability depends on the ability of the hardware to address and to display each picture element.

AIX. Advanced Interactive Executive.

AIX operating system. IBM’s implementation of the UNIX operating system. RS/6000 runs the AIX operating system.

American Standard Code for Information Interchange (ASCII). The standard code, using a coded character set consisting of 7-bit coded characters (8-bit including parity check), that is used for information interchange among data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters.

application program. A program written for or by a user that applies to the user’s work, such as a program that does inventory control or payroll processing.

ASCII. American Standard Code for Information Interchange.

C

channel-attached. In PSF, a device that is linked to the host system exclusively by S/390 channel protocols. For example, a 3800 printer cabled to the host system with an IBM S/390 channel adapter is considered a channel-attached printer. Contrast with *SNA-attached* and *TCP/IP-attached*.

CICS. Customer Information Control System.

communication-attached. In PSF, pertaining to a device that is SNA-attached and that uses a communication controller. For example, a 3812 printer attached to a 3174 control unit that is attached to a 37X5 Communication Controller is considered a communication-attached printer. Contrast with *local-attached*.

compatibility fonts. See *IBM compatibility fonts*.

continuous forms. A series of connected forms that feed continuously through a printing device. The connection between the forms is perforated so that the user can separate them. Before printing, the forms are folded in a stack arrangement, with the folds along the perforations. Contrast with *cut-sheet paper*.

Customer Information Control System (CICS). An IBM licensed program that enables transactions entered at remote terminals to be processed concurrently by user-written application programs. It includes facilities for building, using, and maintaining databases.

cut-sheet paper. Paper that is cut into separate, uniform-size sheets before being loaded into the printer. Contrast with *continuous forms*.

D

DASD. Direct access storage device.

data set. (1) Synonym for *file*. (2) A named set of records stored and processed as a unit.

data stream. (1) All information (data and control commands) sent over a data link usually in a single read or write operation. (2) A continuous stream of data elements being transmitted, or intended for transmission, in character or binary-digit form, using defined format.

DCF. Document Composition Facility.

direct access storage device (DASD). A computer storage device in which access time is, in effect, independent of the location of the data.

Distributed Print Function (DPF). A component of PSF/2 that you can install and use to print jobs from OS/390, MVS, VSE, VM, or OS/400 systems. DPF receives PSF output and resources for spooling and printing with PSF/2. DPF allows PSF for OS/390, PSF/VSE, PSF/VM, and PSF for AS/400 to send print files to a PS/2. DPF also stores PSF for OS/390 and PSF/VSE resources in the DPF resource library, so that the host system does not have to send PSF resources each time documents are spooled.

document. (1) One or more pages collected into a single job. (2) In word processing, a collection of one or more lines of text that can be named and stored as a separate entity. (3) A publication or other written material pertaining to a specific subject or related subjects.

Document Composition Facility (DCF). An IBM licensed program that provides a text formatter called SCRIPT/VS. SCRIPT/VS can process files marked up with a unique set of controls and tags.

download. To transfer data from a processing unit to an attached device such as a microcomputer for processing.

Download for OS/390. An optional feature of PSF for OS/390 that automatically transmits data from the JES spool to AIX systems using TCP/IP.

DPF. Distributed Print Function.

E

EBCDIC. Extended binary-coded decimal interchange code.

EDMSuite OnDemand. An IBM program that lets you automatically capture, index, archive, search, retrieve, present, and reproduce stored computer-generated documents and other business-related data.

electronic forms. A collection of constant data that is electronically composed in the host processor and can be merged with variable data on a page during printing.

electronic overlay. A collection of constant data, such as lines, shading, text, boxes, bar codes, logos and graphics, that is electronically composed in the host processor and stored in a library, and that can be merged with variable data during printing. Contrast with *page segment*.

ESCON. Enterprise system connection.

Ethernet. A 10 MB baseband local area network that allows multiple stations to access the transmission medium at will without prior coordination, avoids contention by using carrier sense and deference, and resolves contention by using collision detection and transmission. Ethernet uses carrier sense multiple access with collision detection.

extended binary-coded decimal interchange code (EBCDIC). A coded character set of 256 eight-bit characters.

F

file. (1) A set of related records treated as a unit. (2) A collection of related data that is stored and retrieved by an assigned name. (3) Linear data that can be opened, written, read, and closed. A file can also contain information about the file, such as authorization information. The name used to obtain a file includes the directories in the path to the file. (4) Strings of characters with no additional structure. Structure is assumed only by the processing programs. Files can be located relative to the current directory or by an absolute path name. (5) An object that can be written to, or read from, or both. A file has certain attributes, including access permissions and type. File types include regular file, character special file, block special file, FIFO special file, and directory. Other types of files may be defined by the implementation. In the OS/390 UNIX System Services implementation, the file system does not support block special files, but it does support symbolic link files. (6) A collection of information or data that is organized by some method (relative, indexed, or serial, for example) and stored on a device such as a disk.

font. (1) A family or assortment of characters of a given size and style—for example, 9-point Bodoni Modern. (A) (2) One size and one typeface in a particular type family, including letters, numerals, punctuation marks, special characters, and ligatures. (3) A paired character set and code page that can be used together for printing a string of text characters. A double-byte font can consist of multiple pairs of character sets and code pages.

format. (1) A specified arrangement of such things as characters, fields, and lines; usually used for displays, printouts, or files. (2) To arrange such things as characters, fields, and lines. (3) (v) To prepare a document for printing in a specified format.

form definition. A resource used by PSF that defines the characteristics of the form, which includes such functions as overlays to be used (if any), paper source (for cut-sheet printers), duplex printing, text suppression, the position of MO:DCA-P data on the form, and the number and modifications of a page.

G

GDDM. Graphical Data Display Manager.

Graphical Data Display Manager (GDDM). An IBM licensed program that application programs can use to create page segments.

H

hardcopy. (1) A copy of a display image generated on an output device such as a printer or a plotter, in a form that can be carried away. (T) (2) A printed copy of machine output in a visually readable form—for example, printed reports, listings, documents, and summaries.

host system. (1) A data processing system that prepares programs and the operating environments for another computer or controller. (2) The data processing system to which a network is connected and with which the system can communicate.

I

IBM compatibility fonts. A group of fonts supplied as part of Print Services Facility, Print Management Facility, and AS/400. Many of these fonts are derived from fonts created for specific IBM printers (such as the IBM 3800 Model 1) or applications (such as Document Composition Facility). The fonts are called compatibility fonts because they make it possible for applications created for the 3800 Model 1 printer to be migrated to page printers with no need to change the fonts specified in the applications. Examples of IBM compatibility fonts are APL, Boldface, Document, Essay, Format, Gothic, Letter Gothic, Orator, Prestige, Roman, Script, Serif, and Text type families, as well as a set of Proprinter Emulation fonts.

InfoPrint Manager. A comprehensive software solution that combines print management technology with file management and spooling capabilities to address the requirements of a variety of print markets.

installation exit. A subcomponent, installed and maintained for or by a customer installation, that provides control or functions specific to that installation, such as calling exits; providing defaults for job header, trailer, and data-set header separator-page exits; and supporting customer-written exits for logical records, SMF records, message processing, and resource management. PSF invokes these exits at certain predetermined times.

intelligent printer data stream (IPDS). An all-points-addressable data stream that makes it

possible to position text, images, and graphics at any defined point on a printed page.

Internet Protocol (IP). A protocol that routes data from its source to its destination in an Internet environment.

IP. Internet Protocol.

IP address. (1) In the Internet suite of protocols, the 32-bit address of a machine, expressed in dotted decimal notation, for example: 9.99.9.143. (2) Host name.

IPDS. Intelligent printer data stream. This is the strategic AFP printer data stream.

IP PrintWay. A component of the OS/390 Print Server that transmits output data sets from the JES spool to printers in a TCP/IP network.

J

JCL. Job control language.

JES. Job entry subsystem.

JES spool. A program that performs a peripheral operation, such as printing, while the computer is busy with other work. A common name for the JES2 or JES3 spool.

JES2. An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for execution, processes their output, and purges them from the system. In an installation with more than one processor, each JES2 processor independently controls its job input, scheduling, and output processing.

JES3. An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for execution, processes their output, and purges them from the system. In complexes that have several loosely coupled processing units, the JES3 program manages processors so that the global processor exercises centralized control over the local processors and distributes jobs to them via a common job queue.

job. One or more documents submitted together in one print request. Since the user may query, release, or cancel one or more of the documents within a job, each document within a job may have a different status.

job control language (JCL). A language of control statements used to identify a computer job or describe its requirements to an operating system.

job entry subsystem (JES). An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for execution, processes their output, and purges them from the system.

L

LAN. Local area network.

line data. Data prepared for printing on a line printer such as a 3800 Model 1 Printing Subsystem. Line data is usually characterized by carriage-control characters and table reference characters. Contrast with *MO:DCA-P data*.

line printer. A device that prints a line of characters as a unit. Contrast with *page printer*.

local area network (LAN). (1) A computer network located on a user's premises within a limited geographical area. Communication within a local area network is not subject to external regulations; however, communication across the LAN boundary may be subject to some form of regulation. (T) (2) A network in which a set of devices are connected to one another for communication and that can be connected to a larger network.

local-attached. In PSF, an SNA-attached device that does not have a communications controller in its configuration. For example, a 3812 printer connected to a channel-attached 3174 control unit that is defined to the host system through VTAM is considered a local-attached printer. Contrast with *communication-attached*.

M

Mixed Object Document Content Architecture for Presentation (MO:DCA-P). An IBM-architected, device-independent data stream for interchanging documents.

MO:DCA-P. Mixed Object Document Content Architecture for Presentation.

MO:DCA-P data. Print data that has been composed into pages. Text-formatting programs (such as DCF) can produce composed text data consisting entirely of structured fields.

Multiple Virtual Storage (MVS). An IBM operating system consisting of MVS/System Product Version 1 and the MVS/370 Data Facility Product operating on a S/390 processor.

MVS. Multiple Virtual Storage.

MVS/ESA. Multiple Virtual Storage/Enterprise System Architecture.

N

NetSpool. A component of the OS/390 Print Server that allows an installation to automatically direct VTAM application data targeted for a network printer to the JES spool, without changing the VTAM applications. From the JES spool, the data set can be printed on a JES or PSF for OS/390 printer or sent to another location for printing.

network. A collection of data processing products that are connected by communication lines for information exchange between locations.

Network Print Facility (NPF). In IBM TCP/IP for MVS, a feature that routes VTAM, JES2, or JES3 printer output to printers in a TCP/IP network.

NPF. Network Print Facility.

O

OGL. Overlay Generation Language.

Operating System/2 (OS/2). IBM's operating system for the IBM Personal System/2.

Operating System/400 (OS/400). IBM's operating system for Application System/400.

OS/2. Operating System/2.

OS/390 Printer Port Monitor for Windows. A component of the OS/390 Print Server that runs on a Windows 95 or Windows NT workstation and sends a file for printing to the OS/390 Print Interface running on the OS/390 system.

OS/390 Print Interface. A component of the OS/390 Print Server that accepts input from remote workstations that have TCP/IP access and from OS/390 UNIX System Services printing commands and creates output data sets on the JES spool.

OS/390 Print Server. A feature of OS/390 that supports printing on OS/390 printers, including local and remote printers in a TCP/IP network. The OS/390 Print Server allows you to submit print requests from remote workstations in a TCP/IP network, from OS/390 UNIX System Services applications, from batch applications, and from VTAM applications, such as CICS or IMS applications. The OS/390 Print Server consists of the following components:

- OS/390 Print Interface
- NetSpool
- IP PrintWay
- Printing commands for OS/390 UNIX System Services
- AFP Printer Driver for Windows
- AFP Viewer plug-in for Windows
- OS/390 Printer Port Monitor for Windows

OS/390 UNIX System Services. OS/390 services that support an environment within which operating systems, servers, distributed systems, and workstations share common interfaces. OS/390 UNIX System Services supports standard application development across multivendor systems. It is required if you want to create and use applications that conform to the POSIX standard. OS/390 UNIX System Services combines the personal power of the workstation, the flexibility of open systems, and the strength of MVS. It supports and fosters a superenvironment of larger operating systems or servers and of distributed systems and workstations that share common interfaces. Users can switch back and forth between the traditional TSO/E interface and the OS/390 UNIX System Services interface.
UNIX-skilled users can interact with the system, using a familiar set of standard commands and utilities.
MVS-skilled users can interact with the system, using familiar TSO/E commands and interactive menus to create and manage hierarchical file system files and to copy data back and forth between MVS data sets and files. Application programmers and users have both sets of interfaces to choose from and, by making appropriate trade-offs, can choose to mix these interfaces.

OS/400. Operating System/400.

overlay. See *electronic overlay*.

Overlay Generation Language (OGL). An IBM licensed program you can use to create and modify electronic versions of your preprinted forms, called overlays. See also *electronic overlay*.

P

page. (1) A collection of data that can be printed on a one side of a physical sheet of paper or form. (2) The boundary for determining the limits of printing.

page definition. A resource used by PSF that defines the rules for transforming line data into MO:DCA-P data and text controls.

page printer. Any of a class of printers that accepts MO:DCA-P pages, constructed of page data and images, among other things. A page printer is a device that prints one page as a unit. (I) (A) Contrast with *line printer*.

Page Printer Formatting Aid (PPFA). An IBM licensed program used to create form definitions and page definitions.

page segment. A resource containing MO:DCA-P data and images, prepared before formatting and included

during printing. A page segment assumes the environment of an object in which it is included.

pel. Picture element.

PostScript. A page description language with graphics capabilities developed by Adobe Systems, Incorporated.

PPFA. Page Printer Formatting Aid.

preprinted form. A sheet of paper containing a preprinted design of constant data into which variable data can be printed. See also *electronic overlay*.

print file. A file created by an application program that contains the actual information to be printed and some of the data that controls the format of the printing. Print files can contain MO:DCA-P data, line data, or a combination of MO:DCA-P and line data.

print job. The data that the user submits to PSF to be printed. The user can request that a print job be printed as though it were multiple data sets.

Print Services Facility (PSF). A licensed program that manages and controls the input data stream and output data stream required by supported IBM page printers. PSF combines print data with other resources and printing controls to produce AFP output.

protocol. The meanings of and the sequencing rules for requests and responses by which network addressable units (PU, LU, SSCP, and VTAM programs) in a communication network coordinate and control data transfer operations and other operations.

PSF. Print Services Facility.

PSF Direct. A function of PSF/2, PSF for AIX, or InfoPrint Manager for AIX that enables another PSF program—PSF/VM, PSF for OS/390, PSF/VSE, or PSF for AS/400—to print remotely, using the SNA LU 6.2 protocol, on PSF/2, PSF for AIX, or InfoPrint Manager for AIX printers. The PSF program sends the print data stream directly to the PSF/2, PSF for AIX, or InfoPrint Manager for AIX printer, bypassing the OS/2 or AIX spool. The operator of the originating system controls printing on the PSF/2, PSF for AIX, or InfoPrint Manager for AIX printers as if the printers were attached to the originating system.

R

resource. A collection of printing instructions used by Print Services Facility in addition to the print data set, to produce the printed output. PSF resources include coded fonts, font character sets, code pages, page segments, overlays, form definitions, and page definitions.

S

SCS. SNA character string.

SDLC. Synchronous Data Link Control.

SDSF. System Display and Search Facility.

SNA. Systems Network Architecture.

SNA-attached. In PSF, pertaining to a device that is linked to the host system through VTAM and uses an SNA protocol to transfer data. It does not need to be physically connected to the host; some printers are attached to a control unit, a communication controller, or both, and they can transfer data over telecommunication lines. For example, a 3820 attached to a communication network that uses the LU 6.2 communication protocol to receive data from a communication controller is considered an SNA-attached printer. Contrast with *channel-attached* and *TCP/IP-attached*.

SNA character string (SCS). In SNA, a character string composed of EBCDIC controls, optionally intermixed with end-user data, that is carried within a request/response unit.

Systems Network Architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through, and controlling the configuration and operation of, networks.

T

TCP. Transmission Control Protocol.

TCP/IP. Transmission Control Protocol/Internet Protocol.

TCP/IP-attached. In PSF, a device that is linked to the OS/390 or MVS system through a TCP/IP network and receives data from the OS/390 or MVS system using the application-layer IBM protocol for IPDS printers. Some TCP/IP-attached printers require the i-data 7913 IPDS Printer LAN Attachment. Contrast with *SNA-attached* and *channel-attached*.

Transmission Control Protocol (TCP). A communications protocol used in the Internet and in any network that follows the U.S. Department of Defense standards for inter-network protocol. TCP provides a reliable host-to-host protocol between hosts in packet-switched communications networks and in interconnected systems of such networks. It uses the Internet protocol as the underlying protocol.

Transmission Control Protocol/Internet Protocol (TCP/IP). A set of communications protocols that support peer-to-peer connectivity functions for both local and wide area networks.

U

UNIX. A highly portable operating system originally developed by Bell Laboratories that features multiprogramming in a multiuser environment. UNIX is implemented in the C language. UNIX was originally developed for use on minicomputers but has been adapted on mainframes and microcomputers. It is especially suitable for multiprocessor, graphics, and vector-processing systems. Many of the commands in the OS/390 UNIX System Services shell are based on similar commands available with UNIX System V.

V

Virtual Telecommunications Access Method (VTAM). A set of programs that maintains control of the communication between terminals and application programs running under DOS/VS, OS/VS1, and OS/VS2 operating systems.

VTAM. Virtual Telecommunications Access Method.

W

WYSIWYG. (1) What-you-see-is-what-you-get. A capability of a text editor to continually display pages exactly as they will be printed. (2) In word processing and desktop publishing, a capability that allows a user to display page characteristics such as fonts, type size, and format as they will appear when they are printed.

Communicating Your Comments to IBM

Print Services Facility for OS/390
Introduction
Version 3, Release 1.0

Publication No. G544-5625-00

If you especially like or dislike anything about this book, please use one of the methods listed below to send your comments to IBM. Whichever method you choose, make sure you send your name, address, and telephone number if you would like a reply.

Feel free to comment on specific errors or omissions, accuracy, organization, subject matter, or completeness of this book. However, the comments you send should pertain to only the information in this manual and the way in which the information is presented. To request additional publications, or to ask questions or make comments about the functions of IBM products or systems, you should talk to your IBM representative or to your IBM authorized remarketer.

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you.

If you are mailing a readers' comment form (RCF) from a country other than the United States, you can give the RCF to the local IBM branch office or IBM representative for postage-paid mailing.

- If you prefer to send comments by mail, use the RCF at the back of this book.
- If you prefer to send comments by FAX, use this number:

  1-800-524-1519
- If you prefer to send comments electronically, use this network ID:

  printpub@us.ibm.com

Make sure to include the following in your note:

- Title and publication number of this book
- Page number or topic to which your comment applies.

Readers' Comments — We'd Like to Hear from You

Print Services Facility for OS/390
Introduction
Version 3, Release 1.0

Publication No. G544-5625-00

Overall, how satisfied are you with the information in this book?

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Overall satisfaction	□	□	□	□	□

How satisfied are you that the information in this book is:

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Accurate	□	□	□	□	□
Complete	□	□	□	□	□
Easy to find	□	□	□	□	□
Easy to understand	□	□	□	□	□
Well organized	□	□	□	□	□
Applicable to your tasks	□	□	□	□	□

Please tell us how we can improve this book:

Thank you for your responses. May we contact you? □ Yes □ No

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you.

Name _____ Address _____

Company or Organization _____

Phone No. _____

Readers' Comments — We'd Like to Hear from You
G544-5625-00

Cut or Fold
Along Line

Fold and Tape | **Please do not staple** | Fold and Tape

NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 40 ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

IBM Corporation
Information Development
IBM Printing Systems Company
Department H7FE Building 003G
Boulder, CO 80301-9817

Fold and Tape | **Please do not staple** | Fold and Tape

G544-5625-00

Cut or Fold
Along Line

Program Number: 5655-B17

Printed in the United States of America
on recycled paper containing 10%
recovered post-consumer fiber.

G544-5625-00

Spine information:

Print Services Facility for OS/390 Introduction *Version 3, Release 1.0*