Print Services Facility for z/OS
Version 4, Release 7.0

Introduction

IBM

Note

Before using this information and the product it supports, read the information in "Notices" on page 31.

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About this publication

This publication provides an overview of the Print Services Facility (PSF) Version 4 Release 7 for z/OS® licensed program (Program Number 5655-M32). This introduction includes information about PSF for z/OS and its benefits; features and related products that are used with PSF; and how you can use PSF for z/OS.

PSF Version 4.7 runs on a z/OS operating system, Version 2.2 or later.

Who should read this publication

This publication is intended for executives and technical personnel who need to understand the benefits and capabilities of PSF V4.7 for z/OS or who want to evaluate the use of Infoprint Server Printer Inventory with PSF. You need to read this publication if you are a new customer of Advanced Function Presentation (AFP) printers or you are an existing user of an earlier version of PSF for z/OS who wants to learn about the enhancements in V4.7.

How this publication is organized

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

- Chapter 1, "Overview of PSF for z/OS," on page 1 summarizes the relationship between AFP and PSF for z/OS, explains how PSF manages AFP printing, and describes the benefits of upgrading to PSF V4.7 for z/OS.
- Chapter 2, "Features and related products," on page 11 describes the features of PSF and the related products that are used with PSF for z/OS.
- Chapter 3, "Using PSF for z/OS," on page 19 presents several scenarios that show how PSF for z/OS is used in various printing situations.

This publication also includes an accessibility appendix, notices, glossary, and bibliography.

Related information

Publications that are referred to in this document or that contain more information about AFP and related products are listed in the "Bibliography" on page 49. For information about all z/OS product publications, see *z/OS Information Roadmap*.

For more information about z/OS and PSF for z/OS, see these web pages:

- z/OS home page (www.ibm.com/systems/z/os/zos)
- IBM Knowledge Center (www.ibm.com/support/knowledgecenter)

To obtain the latest documentation updates for PSF for z/OS, see the appropriate SYS1.SAMPLIB members in Table 1 on page ix.

Table 1. SYS1.SAMPLIB members for PSF documentation updates	
Member	**Publication**
APSGADP7	*PSF for z/OS: AFP Download Plus*
APSGCUS7	*PSF for z/OS: Customization*
APSGDGN7	*PSF for z/OS: Diagnosis*

Table 1. SYS1.SAMPLIB members for PSF documentation updates (continued)	
Member	**Publication**
APSGDLG7	*PSF for z/OS: Download for z/OS*
APSGMAC7	*PSF for z/OS: Messages and Codes*
APSGSEC7	*PSF for z/OS: Security Guide*
APSGUSR7	*PSF for z/OS: User's Guide*

How to send your comments to IBM

We invite you to submit comments about the z/OS product documentation. Your valuable feedback helps to ensure accurate and high-quality information.

Important: If your comment regards a technical question or problem, see instead "If you have a technical problem" on page xi.

Submit your feedback by using the appropriate method for your type of comment or question:

Feedback on z/OS function
> If your comment or question is about z/OS itself, submit a request through the IBM RFE Community (www.ibm.com/developerworks/rfe/).

Feedback on IBM® Knowledge Center function
> If your comment or question is about the IBM Knowledge Center functionality, for example search capabilities or how to arrange the browser view, send a detailed email to IBM Knowledge Center Support at ibmkc@us.ibm.com.

Feedback on the z/OS product documentation and content
> If your comment is about the information that is provided in the z/OS product documentation library, send a detailed email to mhvrcfs@us.ibm.com. We welcome any feedback that you have, including comments on the clarity, accuracy, or completeness of the information.
>
> To help us better process your submission, include the following information:
>
> - Your name, company/university/institution name, and email address
> - The following deliverable title and order number: PSF V4R7 for z/OS: Introduction, G550-0430-06
> - The section title of the specific information to which your comment relates
> - The comprehensive content collection title: PSF V4R7 for z/OS: Introduction
> - The text of your comment.

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If you have a technical problem

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- Go to the IBM Support Portal (support.ibm.com).
- Contact your IBM service representative.
- Call IBM technical support.

Summary of changes

PSF for z/OS Version 4 Release 7

This content includes terminology, maintenance, and editorial changes to information previously presented in *PSF V4R6 for z/OS: Introduction*, G550-0430-05. Technical additions or changes to the text and illustrations are indicated by a vertical line to the left of the change.

General changes

- References to PSF for z/OS 4.5 and z/OS 2.1 are removed because those releases are no longer in service.

New information

- "New capabilities" on page 6 lists the functional enhancements in PSF V4.7.

Changed information

- "Components of AFP printing" on page 2 is updated with information about ISO standard document interchange sets.
- "Hardware requirements" on page 8 is updated.
- "Software requirements" on page 8 is updated.
- "AFP Printer Driver" on page 13, "AFP Viewer Plug-in" on page 13, and "AFP Workbench" on page 13 are updated with a new or changed link to the Ricoh AFP Workbench download website.
- Updates are made to "Glossary" on page 35.

PSF for z/OS Version 4 Release 6

This content includes terminology, maintenance, and editorial changes to information previously presented in *PSF V4R5 for z/OS: Introduction*, G550-0430-04.

General changes

- References to these products are removed because the releases are no longer in service:
  - PSF V4.3 for z/OS
  - PSF V4.4 for z/OS
  - z/OS V1.12
  - z/OS V1.13
- "System z" is changed to "IBM Z".
- References to Ricoh products, including "InfoPrint Manager" and "Ricoh ProcessDirector" are removed.
- "Distributed Print Function (DPF)", "PSF Direct", and "Workstation Print Manager (WPM)" are changed to "distributed print function (DPF)", "PSF direct", and "workstation print manager (WPM)".
- "InfoPrint AFP Resource Installer" is removed or changed to "AFP resource installer".

New information

- PSF accepts new MO:DCA interchange sets. See "Data streams" on page 4.
- "New capabilities" on page 6 lists the functional enhancements in PSF V4.6.

Changed information

- "Hardware requirements" on page 8 is updated.
- "Software requirements" on page 8 is updated.
- "Compatibility" on page 10 is updated.
- "Content Manager OnDemand" on page 14 is updated.
- "Upgrading print operations for MO:DCA IS/3" on page 25 is updated.
- Updates are made to "Glossary" on page 35.

Deleted information

- "Limitations" and "Compatibility Fonts" sections are removed because IBM Compatibility Fonts is included in z/OS Font Collection V2.3 and is no longer a feature of PSF 4.6.
- "Other related products" section, which includes "DesignPro Tools for AFP", "InfoPrint AFP Resource Installer", "InfoPrint Manager", and "Ricoh ProcessDirector" is removed.

Chapter 1. Overview of PSF for z/OS

Print Services Facility (PSF) for z/OS is an IBM licensed printer-driver program. PSF manages and controls data that is transmitted to Advanced Function Presentation (AFP) printers that are channel-attached, SNA-attached, or TCP/IP-attached. PSF V4.7 for z/OS is a replacement for PSF V4.6 for z/OS and has functional enhancements that can benefit you.

To understand what PSF for z/OS 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 improved printing technology and functions. From tabletop printers to high-speed production printers, AFP currently supports a full family of impact and nonimpact printers. These printers include ones with both continuous form and cut-sheet capability and ones 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 (MO:DCA), makes information interchange possible among different operating systems by using different protocols. These operating systems support AFP:

- AIX®
- IBM i
- Linux
- VM
- VSE
- Windows
- z/OS

Figure 1 on page 2 shows the operating systems on which AFP is supported. The AFP architecture supports various network protocols and numerous input and output data streams.
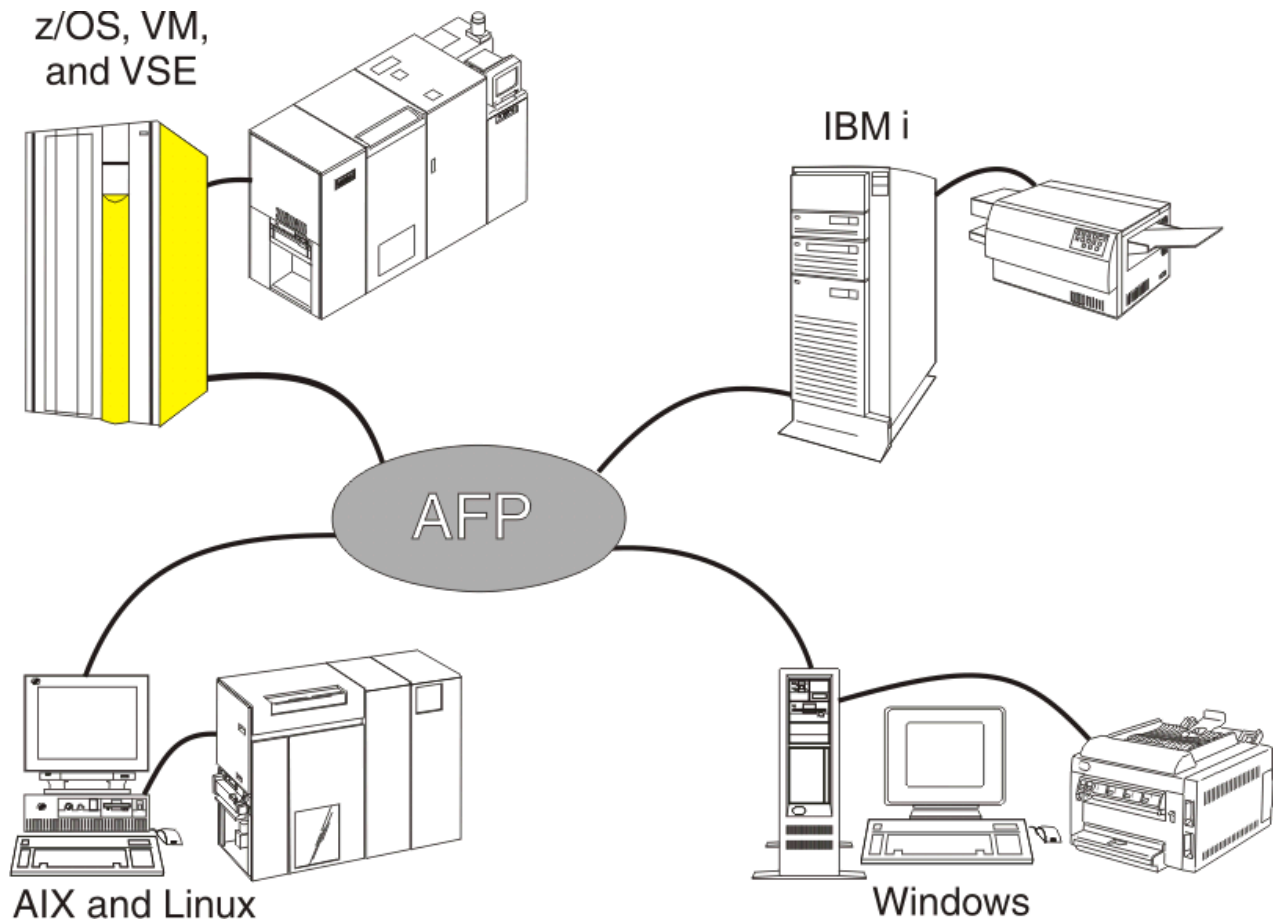
Figure 1. Operating systems on which AFP is supported

Components of AFP printing

Two strategic AFP 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 that are composed of text, images, and graphics data. MO:DCA-P is a subset of MO:DCA and is device independent; therefore, applications that produce this data stream can be directed to any of the printers that are supported by the AFP system or to graphical personal computer displays for viewing. These IBM products are examples of applications that generate 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.

  In addition, many independent software vendor products generate MO:DCA-P output. For links to companies that support AFP, see the AFP Consortium (www.afpcinc.org).

  MO:DCA-P includes these ISO standard document interchange sets:

  - AFP/Archive specifies the AFP document architecture by defining a subset appropriate for long-term preservation and retrieval. This subset will avoid ambiguity by assuring page independence and eliminating the use of resolution dependent fonts and images, device default fonts and external resources. For more information. see ISO 18565:2015 Document management—AFP/Archive (https://www.iso.org/standard/62901.html).
  - AFP interchange for PDF defines the AFP file format. It includes a means of identifying support for specifically including single and multi-page PDF document objects as a container function set. It also includes a mechanism for pairing and managing resources associated with PDF. For more

- Intelligent Printer Data Stream (IPDS) is the printer device data stream that contains the information necessary to identify, monitor, and control the printer's functions. 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, line data, and Extensible Markup Language (XML) data streams and converts them into IPDS for each AFP printer it manages. Because MO:DCA-P and IPDS are part of the same architecture, this process is efficient for applications that produce MO:DCA-P.

PSF products are supported under z/OS, VM, VSE, IBM i, AIX, Windows, and Linux operating systems. PSF has similar capabilities in all environments, plus differences unique to the operating system on which it is running. Table 2 on page 3 shows the operating systems that run AFP printers and the PSF products they support.

Table 2. IBM operating systems for AFP printers and corresponding PSF products

Operating System	PSF Product
z/OS	PSF for z/OS
VM	PSF/VM
VSE	PSF/VSE
IBM i	PSF for IBM i

Figure 2 on page 3 shows the basic components that are required to print data on AFP printers in a z/OS environment. The PSF printer-driver program processes data streams from the Job Entry Subsystem (JES) spool, combines the data streams with resources that are needed to print the data, converts the data into IPDS, and sends the result to the printer.
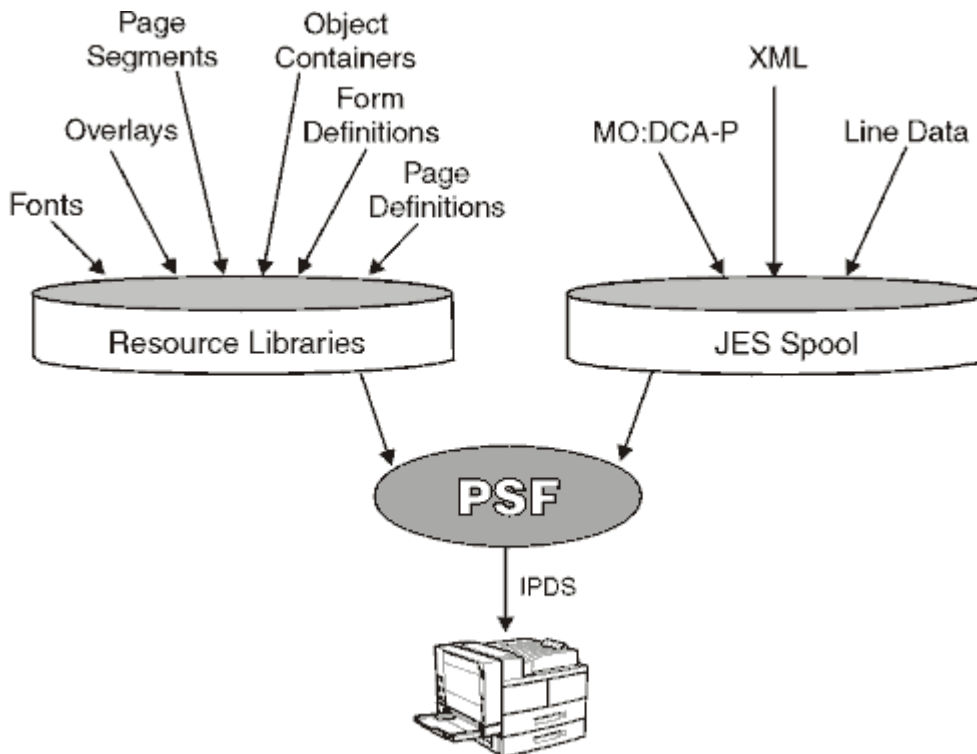

Figure 2. Components that are required to print data on AFP printers

Data streams

These data streams are placed on the JES spool:

Line data
Application data that is prepared for printing, without any data placement or presentation information. Line data can be traditional, which is prepared for printing on a line printer, such as a 6262 or 3211, or record format, where each record is preceded by a 10-byte identifier. 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). PSF accepts MO:DCA Presentation Interchange Set (IS) data streams, including:

MO:DCA AFP/Archive (AFP/A)
MO:DCA AFP/A is an AFP document architecture interchange set that is used for long-term preservation and retrieval. This subset ensures page independence and eliminates images without clearly specified resolution, device default fonts, and external resources.

MO:DCA Interchange Set 3 (IS/3)
MO:DCA IS/3 provides interoperability among AFP products that are MO:DCA IS/3 compliant. It also provides enhanced functions, including support for color and the latest fonts, images, and graphics.

MO:DCA AFP/A, IS/3
MO:DCA AFP/A, IS/3 is an AFP document architecture interchange set that complies with the rules and restrictions of both the AFP/Archive and IS/3 interchange sets.

MO:DCA Graphic Arts Function Set (GA)
MO:DCA GA is an extension of MO:DCA IS/3 that adds PDF presentation object support.

For more information, see *Mixed Object Document Content Architecture Reference*.

XML
Data that is identified by using XML standards from the World Wide Web Consortium. XML does not describe data placement or presentation information. For printing on page printers, a page definition is required to provide the data placement and presentation information. The XML data that is processed by PSF can be encoded in EBCDIC, ASCII, UTF-8, or UTF-16.

PSF produces this data stream:

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

Resources

These resources are needed to print the data:

Fonts
Graphics characters of a specific 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 is placed on the medium and whether the data is printed on one or both sides of the paper.

Page definitions
Information that formats line data or XML data into AFP pages.

Object containers
> A MO:DCA structure that carries object data. An example is an encapsulated PostScript (EPS) object container.

How PSF for z/OS manages AFP printing

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

- Line data, which is not formatted into pages. PSF merges line data with formatting instructions in a page definition print resource to produce all-points-addressable page formats that are external to the application program. A form definition print resource is then used to select media options and place the formatted pages on the medium.

- XML data, which is not formatted into pages. PSF merges line data with formatting instructions in a page definition print resource to produce all-points-addressable page formats that are external to the application program. A form definition print resource is then used to select media 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 combination is called a mixed data stream.

Communication between PSF and the printer

PSF converts MO:DCA-P, line data, and XML 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 to successfully manage and control the data that is 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 loaded resource 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. Therefore, PSF 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. If documented operational procedures are followed, PSF's page-level recovery prevents duplicate or missing pages in such important documents as billing statements, financial statements, and published books.

Distributed printing options

In addition to FICON®, ESCON, and parallel channel-attachment, PSF provides many options for distributed AFP printing by 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 TCP/IP to printers attached to a distributed print function (DPF) product running on a Windows print server. Print jobs are sent to the print server spool, and printers and print jobs are managed at the receiving location.
- Send print jobs from LAN and AIX applications to printers attached to z/OS through PSF on another z/OS system.

Several PSF optional features, such as AFP Download Plus, Download for z/OS, and AFP Upload, provide more options for distributed printing. For more information about these optional features, see "Features" on page 11.

What PSF for z/OS can do for you

PSF's system management functions create a fully integrated, automated printing system. You can use PSF for z/OS to do these tasks:

- Receive print jobs, access resources that are required by the print jobs, and send print commands to the printer.
- Manage resources that are required for the print job, such as form definitions, page definitions, object containers, 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.
- Perform finishing operations, such as stapling or binding.
- 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.
- Optimize and manage color output across IPDS color printers.
- Use high-quality grayscale color emulation when printing on black and white or color printers.

New capabilities

PSF Version 4 Release 7

PSF is enhanced in Version 4 Release 7 with these functional capabilities:

- PSF supports Scalable Vector Graphics (SVG) as an object container. SVG is a vector graphics format that produces graphics that cannot be produced with AFP Graphic Object Content Architecture (GOCA).
- PSF lets the system programmer specify that inline resources are stored above the 2 GB bar (64-bit storage) during job processing. By default, inline resources are stored in the region area (31-bit storage, above the 16 MB line and below the 2 GB bar). If a job contains very many or very large inline resources, the region area might not be large enough, causing the job to end with message APS515I. Storing resources above the bar decreases region area storage requirements and might allow the job to print. This support adds these new parameters:
  - On the AFPPARMS control statement, **`above-the-bar-storage`**
  - In the Printer Inventory, **`Above the bar storage`**
- PSF supports generic secondary resources. This generic mechanism provides the ability to reference a TrueType or OpenType font (TTF/OTF) from non-OCA objects (currently limited to PDF and SVG objects). This allows the same TTF/OTF to be used on a page and with non-OCA objects to improve performance of the job.

- PSF supports Presentation Text Object Content Architecture (PTOCA) objects with encrypted text strings. This allows the secure transmission and printing of PIN and TAN codes for payment card mailings.
- PSF supports the Intelligent Mail Package Barcode.
- PSF supports Image Object Content Architecture (IOCA) transparency masks with existing IOCA function sets, such as FS11 and FS42.
- PSF supports the new IOCA function set FS48, which adds the nColor color model to allow IOCA images to have up to 15 separate color planes.

The ACIF, AFP Download Plus, and Download for z/OS features of PSF also have new capabilities. For more information, see *AFP Conversion and Indexing Facility User's Guide*, *PSF for z/OS: AFP Download Plus*, and *PSF for z/OS: Download for z/OS*.

PSF Version 4 Release 6

PSF is enhanced in Version 4 Release 6 with these functional capabilities:

- PSF supports these new MO:DCA interchange sets:
  - AFP Archive (AFP/A) interchange set, a MO:DCA subset for long-term preservation and retrieval. AFP/A ensures page independence and eliminates images without clearly specified resolution, device default fonts, and external resources.
  - AFP/A, IS/3 interchange set, a MO:DCA intersection of the AFP/A and IS/3 interchange sets.
  - Graphic Arts Function Set (GA), an extension of MO:DCA IS/3 that adds PDF presentation object support.
- PSF supports the crease finishing option, which uses existing fold operations to do crease operations.
- PSF and AFP Download Plus support new AFPPARMS control statement parameters:

  message-files-read-access
    AFP Download Plus parameter so that users who are not a member of the APSADMIN group can view the .msg UNIX file.

  resource-deletion-ratio
    PSF parameter to specify the ratio of the user and inline resources to the total resources loaded; used when PSF is deleting resources at end of the data set.

  snmp-enabled
    PSF parameter to specify whether PSF operator commands use Simple Network Management Protocol (SNMP) Version 1 for TCP/IP-attached printers for faster response times.

  trace-user-data
    AFP Download Plus and PSF parameter to specify whether user data is traced when a trace function is requested.
- The Printer Inventory is updated with these AFPPARMS control statement parameters for PSF and AFP Download Plus:

  - **Message files read access**
  - **Resource deletion ratio**
  - **SNMP enabled**
  - **Trace user data**
- PSF supports an Exit 7 End Data Set Call that mirrors the Begin Data Set Call. The End Data Set Call occurs after the Resource Deletion Calls are completed.
- AFP Download Plus is updated to detect JES operator commands during both the transmission and transformation of files.
- The IO-Image Command-Set Vector section in the printer information report is updated with a new IOCA FS48 function set.

- The ACIF, AFP Download Plus, and Download for z/OS features of PSF also have new enhancements. For more information, see *AFP Conversion and Indexing Facility User's Guide*, *PSF for z/OS: AFP Download Plus*, and *PSF for z/OS: Download for z/OS*.

Formatting and media capabilities

PSF provides output formatting that is independent of an application. Therefore, changes to an application do not affect formatting, and formatting changes do not affect an application. PSF supports these formatting and media capabilities:

- Print in different orientations.
- Specify where the printer positions the page origin.
- Select different fonts for lines or fields of data.
- Specify lines or fields to be printed in color.
- Specify outline fonts to be scaled by the printer in any size or aspect ratio.
- Print in any position on a page.
- Position print lines relative to other objects on a page.
- Specify data fields to be printed as bar codes.
- Specify data fields to be suppressed on some page copies of a document.
- Include electronic forms.
- Include page overlays and segments (images) anywhere on a page.
- Change formatting on a page-by-page basis within a job.
- Position multiple logical pages on a single sheet.
- Specify duplex printing.
- Draw vertical and horizontal rules.
- Vary line spacing.
- Select overlays, images, and formatting controls.
- Mix fonts within a line, page, or print record.
- Download FOCA outline and raster fonts, and TrueType and OpenType fonts to a printer.
- Print with outline and raster fonts resident in the printer.
- Offset copy groups or print files in the stacker.
- Print edge marks on copy groups.
- Select finishing options, such as stapling or binding.
- Select paper from multiple input bins, or route pages of the output to different output bins.
- Include color resource objects with color fidelity management.

Hardware requirements

PSF runs on IBM processors capable of supporting z/OS V2.2 or later operating systems.

PSF supports TrueType fonts on printers with a TrueType rasterizer, which provides Unicode support. See your printer's documentation to determine whether it has this support.

Software requirements

PSF runs on z/OS V2.2 (Program Number 5650-ZOS) or later with supported levels of JES2 or JES3:

One of these system programs is required:

- SMP/E element of z/OS V2.2 or later
- SMP/E for z/OS, V3.5 or later (Program Number 5655-G44)

The Communications Server element of z/OS is required with these functions, depending on printer attachments:

- SNA Services for SNA-attached printers
- IP Services for TCP/IP-attached printers

z/OS Font Collection, a base element of z/OS V2.2 and later, is required to provide host fonts. z/OS Font Collection contains AFP outline and raster fonts, and WorldType (TrueType and OpenType) fonts, which replace the fonts from these IBM products:

- AFP Font Collection
- APL2® Fonts
- Data1 Fonts
- Infoprint Fonts for z/OS
- Sonoran Sans Serif Fonts
- Sonoran Serif Fonts
- WorldType Fonts from Infoprint Fonts for Multiplatforms

See "z/OS Font Collection" on page 17.

On z/OS V2.2, one or more of these products may also be required to provide host fonts:

- AFP Font Collection V1.1.0 (does not contain euro support).
- AFP Font Collection V2.1.1 or later. This version of the AFP Font Collection (Program Number 5648-B33) contains character sets and code pages to support printing of the euro currency symbol. See "AFP Font Collection" on page 12.
- Infoprint Fonts for z/OS, V1.1 (Program Number 5648-E76). This product provides outline fonts only. See "Infoprint Fonts" on page 14.
- Infoprint Fonts for Multiplatforms, V1.1 (Program Number 5648-E77). The WorldType Fonts for AFP Print Servers feature of this product is needed to use TrueType and OpenType fonts with PSF.

To use TrueType and OpenType fonts, you must have one of these products:

- A product that supplies TrueType and OpenType fonts, such as WorldType Fonts for AFP Print Servers. WorldType Fonts for AFP Print Servers is an optional feature of Infoprint Fonts for Multiplatforms. You also need an AFP resource installer program, such as Font Installer for AFP Systems (available as a priced feature of Infoprint Fonts for Multiplatforms).
- z/OS Font Collection, a base element of z/OS V2.2 and later, which includes a prebuilt resource access table (RAT).

To use color management support in PSF, you must have these products:

- An AFP resource installer program.
- A document composition product that supports the AFP color management architecture. For links to companies that provide color management support for AFP, see the AFP Consortium (www.afpcinc.org).
- The current service level of Page Printer Formatting Aid (PPFA) to use color management resources (CMRs).

z/OS V2.2 or later is required to use the **Save auxiliary files** Infoprint Server Printer Inventory parameter.

z/OS V2.3 or later is required to use these Infoprint Server Printer Inventory parameters:

- **Auxiliary files MO:DCA level=BPF match**
- **Message files read access**
- **Resource deletion ratio**
- **SNMP enabled**
- **Trace user data**

PSF 4.7 finishing functions can be used only if the printer also supports them.

Compatibility

PSF V4.7 for z/OS is upwardly compatible with PSF V4.6 for z/OS and earlier.

The sample startup procedures in PSF use the IBM Core Interchange raster fonts that are provided in the AFP Font Collection (Program Number 5648-B33) or z/OS Font Collection (Program Number 5650-ZOS), a base element of z/OS V2.2 and later.

TCP/IP attachment considerations

To print at rated speed on high-speed printers, not only must the printer be able to process and image 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 provides significant improvement in the ability to deliver data over a TCP/IP link to high-speed production printers. This improvement lets PSF support TCP/IP-attached InfoPrint 3000, InfoPrint 4000, and InfoPrint 4100 printer families, and the InfoPrint 5000.

The ability to run production printing applications at rated speed on printers that are attached directly to PSF over TCP/IP depends on these factors:

- Number of printers and the printing speeds
- Density of the application data stream, typically measured in average bytes per page
- Availability of processor resources
- LAN bandwidth and use

Density of the application data stream can be a critical factor. TCP/IP-attached printers are able to receive about 1 megabyte of data per second. Although this amount 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 that is required to run an application at rated speed on a specific printer with this calculation:

```
bytes per second = (average bytes per page) x (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, AFP resources that are loaded on the printer can add to the average byte load of a print job.

With PSF, FICON channel-attachment provides the fastest and most performance efficient attachment for high-speed production printers. As with using TCP/IP for other applications, using PSF with TCP/IP-attached printers requires more processor resource than using ESCON or parallel channel, for the same printers and applications. In general, TCP/IP attachment uses about the same amount of processor as SNA-communication attachment.

For best performance, each TCP/IP-attached printer needs to be on a dedicated segment of a token-ring or Ethernet LAN, with the TCP/IP maximum transmission unit (MTU) size that is 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 that contain plain text. If performance degradation is experienced, standard system performance analysis and tuning should be conducted before you contact IBM service.

Chapter 2. Features and related products

This information lists and describes features of PSF and IBM products that are related to PSF.

Features

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

- "AFP Conversion and Indexing Facility (ACIF)" on page 11
- "AFP Download Plus" on page 11
- "AFP Upload" on page 12
- "Download for z/OS" on page 12

AFP Conversion and Indexing Facility (ACIF)

ACIF is a tool that you can use to convert a line data, mixed data, unformatted ASCII, or XML print file into a MO:DCA-P document, retrieve resources that are used by the document, and index the file for later retrieval and viewing. ACIF provides these functions across systems and operating systems:

- Converts traditional and record format line data, mixed data, and XML print files 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 that are needed for printing or viewing a MO:DCA-P document
- Accepts the MO:DCA interchange set data streams

For more information about ACIF, see *AFP Conversion and Indexing Facility User's Guide*.

AFP Download Plus

AFP Download Plus accepts line data, XML data, and MO:DCA-P data (including MO:DCA IS/3, MO:DCA AFP/A, MO:DCA AFP/A, IS/3, and MO:DCA GA) as input. It automatically transforms line data or XML data to MO:DCA-P data and transmits MO:DCA-P data from the JES spool to receiving systems through TCP/IP connections. This process eliminates the need for manual print file transfer with File Transfer Protocol (FTP). A cooperating print server that is running on a receiving system receives the data sets for printing, emailing, or faxing with PSF for z/OS or AIX, Linux, or Windows programs, or for archiving with Content Manager OnDemand. AFP Download Plus provides high-speed data transfer, JES scheduling, job management, data integrity, and job accounting for distributed production print management.

For more information about AFP Download Plus, see *PSF for z/OS: AFP Download Plus*.

These are the advantages of AFP Download Plus over a combination of Download for z/OS and ACIF:

- AFP Download Plus converts line data or XML data to MO:DCA-P format and transmits it to the receiving system in a single step.
- The downloaded print file includes all resources that are required for printing.
- The entire downloaded print file, both data and resources, is encoded by using an internal algorithm.
- The downloaded print file reflects PSF-style installation exit processing.
- AFP Download Plus produces SMF type 6 records that contain transformation statistics in the same format as PSF SMF type 6 records.
- AFP Download Plus does Resource Access Control Facility (RACF®) checking for user resource libraries.

AFP Upload

AFP Upload receives print data from AIX and places it on the JES spool for printing on any printer that is supported by PSF for z/OS. Jobs that are submitted to AFP Upload can contain any type of data stream that the print server can transform to MO:DCA-P, except XML.

Download for z/OS

Download for z/OS automatically transmits line data, mixed mode, XML data, MO:DCA-P data (including MO:DCA IS/3, MO:DCA AFP/A, MO:DCA AFP/A, IS/3, and MO:DCA GA), and many other data streams from the JES spool to receiving systems through TCP/IP connections. This process eliminates the need for manual print file transfer with File Transfer Protocol (FTP). A cooperating print server or archive server that is running on a receiving system receives the data sets for printing with PSF for z/OS or AIX, Linux, or Windows programs, or for archiving with Content Manager OnDemand. Download for z/OS provides high-speed data transfer, JES scheduling, job management, data integrity, and job accounting for distributed production print management.

For more information about Download for z/OS, see *PSF for z/OS: Download for z/OS*.

These are the advantages of Download for z/OS, with ACIF if you need to transform data, over AFP Download Plus:

- Download for z/OS transmits any data stream that you can transfer or archive, including line data, mixed data, XML data, MO:DCA-P data, PostScript data, and TIFF data.
- MO:DCA-P data can include required resources inline if they are not present on the receiving system, or not include them if they are present. Not including inline resources produces a smaller file and allows more efficient transmission.

Related IBM products

You can use any of these IBM products and offerings with PSF:

AFP Font Collection

The IBM AFP Font Collection (Program Number 5648-B33) contains a wide selection of outline and raster AFP fonts.

Notes:

1. If you do not need raster fonts, use IBM Infoprint Fonts for z/OS.
2. z/OS Font Collection, a base element of z/OS V2.2 and later (Program Number 5650-ZOS), includes outline, raster, and TrueType and OpenType fonts, and is the recommended source of AFP fonts for printing with PSF.

AFP Printer Driver

The AFP Printer Driver runs on a Windows workstation and creates output in AFP format to allow printing on any of IBM's AFP printers that are controlled by PSF for z/OS.

You can obtain the AFP Printer Driver at no extra charge from the Ricoh My Downloads: AFP Workbench Family website (dl.ricohsoftware.com/downloads/aa9a248e-101c-4aa6-b109-1cf7403f3b4f).

AFP Toolbox

AFP Toolbox (Program Number 5655-A25) 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. These are the tasks that you can do with AFP Toolbox:

- 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 by using a wide variety of fonts.
- Create graphical data objects such as pie charts and bar charts.
- Create tables of any complexity.
- Draw circles, partial circles, ellipses, and partial ellipses.

AFP Toolbox is available on z/OS. For more information, see *AFP Toolbox User's Guide*.

AFP Viewer Plug-in

The AFP Viewer plug-in runs on a Windows workstation and displays documents that are in AFP format, such as documents downloaded from the z/OS host or from web documents.

The AFP Viewer plug-in requires Microsoft Internet Explorer (Version 3.01, Level 4.70.1215 or later). The AFP Viewer plug-in is available with "Content Manager OnDemand" on page 14; or you can obtain it at no extra charge from the Ricoh My Downloads: AFP Workbench Family website (dl.ricohsoftware.com/downloads/aa9a248e-101c-4aa6-b109-1cf7403f3b4f).

AFP Workbench

AFP Workbench contains a viewer application that you can use to display AFP files that are in MO:DCA-P format, including page segments and overlays. In addition, you can use AFP Workbench to do these:

- Display ASCII files (ignoring graphic controls).
- Print files and parts of files on a printer that is attached to 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 that is used to display an AFP file.
- View your documents in multiple-up presentation.
- Navigate through or search a document by using indexing information, sheet numbers, page identifiers, or keyword strings.

AFP Workbench is available on Windows workstations.

You can obtain the AFP Workbench at no extra charge from the Ricoh My Downloads: AFP Workbench Family website (dl.ricohsoftware.com/downloads/aa9a248e-101c-4aa6-b109-1cf7403f3b4f).

Content Manager OnDemand

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

Content Manager OnDemand runs on z/OS (Program Number 5697–CMD); IBM i (Product Number 5770-RD1); and AIX, Linux, and Windows (Program Number 5724-J33).

Document Composition Facility (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. You can use DCF to add navigation information to your document and then retrieve it with AFP Workbench. DCF also supports HTML through a transform.

DCF runs on z/OS, VM, and VSE.

Graphical Data Display Manager (GDDM)

GDDM is a base element of z/OS 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 that are 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 z/OS, VM, and VSE.

Infoprint Fonts

IBM Infoprint Fonts for z/OS (Program Number 5648-E76) contains a wide selection of outline AFP fonts. IBM Infoprint Fonts for Multiplatforms (Program Number 5648-E77) has the WorldType Fonts for AFP Print Servers optional feature that contains TrueType and OpenType fonts.

Notes:

1. If you need raster fonts, use IBM AFP Font Collection or z/OS Font Collection.
2. z/OS Font Collection, a base element of z/OS V2.2 and later (Program Number 5650-ZOS), includes outline, raster, and TrueType and OpenType fonts, and is the recommended source of AFP fonts for printing with PSF.

Infoprint Server

Infoprint Server is an optional feature of z/OS (Program Number 5650-ZOS). It supports printing on z/OS printers, including AFP printers and local and receiving printers in an Internet Protocol or SNA network. You can use Infoprint Server to submit print requests from receiving workstations in an Internet Protocol network, from z/OS UNIX System Services applications, from batch applications, and from VTAM® applications, such as CICS® or IMS. Infoprint Server consists of several components. shows how some of the components of Infoprint Server, including Infoprint Port Monitor, Print Interface,

Infoprint Transforms to AFP, NetSpool, and IP PrintWay, complement PSF for z/OS in providing an integrated print processing solution:

1. The Infoprint Port Monitor sends files to Print Interface so Windows users can print documents on AFP and other z/OS printers.

2. Print Interface sends jobs to the JES spool from remote operating systems and from z/OS UNIX System Services.

3. Print Interface uses data transforms provided by Infoprint Transforms to AFP for z/OS to transform HP Printer Control Language (PCL), Adobe Portable Document Format (PDF), Adobe PostScript, or SAP R/3 System Generic Output Format (SAPGOF) data streams to AFP format. It also uses other transform products, such as the Infoprint XT transform product.

4. NetSpool sends jobs to the JES spool from VTAM applications, such as CICS or IMS.

5. IP PrintWay takes jobs from the JES spool and sends them to network printers in an Internet Protocol or SNA network.

6. PSF for z/OS takes jobs from the JES spool and prints them to local and remote AFP printers.
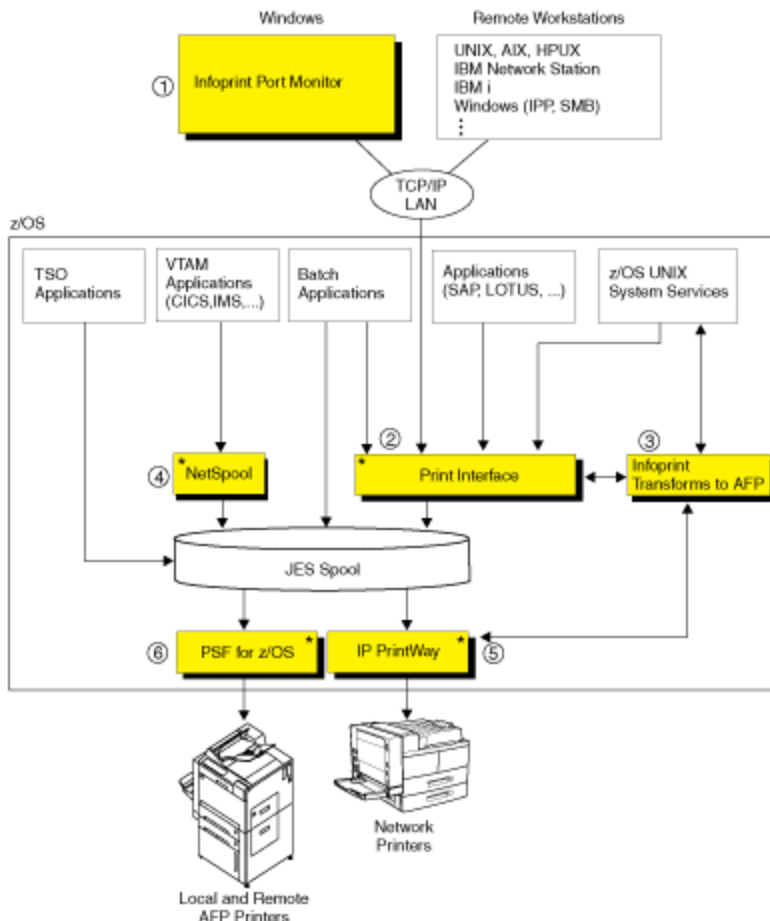
Figure 3. Infoprint Server and PSF for z/OS print processing solution

Infoprint Server has a Printer Inventory that manages the inventory of printer information that is used by IP PrintWay, NetSpool, Print Interface, and PSF. PSF users can define printer initialization parameters, trace parameters, and optional functions in the Printer Inventory instead of in the PSF startup procedure, installation Exit 7, and the AFPPARMS control statement. Using the Printer Inventory avoids the need to restart all the printers in a startup procedure when you change parameters. Only the printer for which parameters are changed needs to be restarted.

Infoprint Server includes Infoprint Central, a print management application that runs on the web. Operators can use Infoprint Central to display information about and work with printers that are defined in the Printer Inventory. Operators can do these tasks in Infoprint Central:

- Display the properties of a PSF printer by searching on the printer's FSA name.
- Display the properties of any printer that is defined in the Printer Inventory by searching on the printer definition name or the printer location.
- Display the status of a PSF printer to see whether it is stopped (drained) or waiting for operator intervention.
- Change job-selection criteria for PSF printers.
- Start, stop, space, interrupt, pause (JES2 only), and ping PSF printers.

If PSF is writing messages to the Infoprint Server common message log, operators can also:

- View FSA and print job messages that PSF wrote to the common message log.
- Search for print jobs and view the properties for each job.
- Release held print jobs, delete jobs, change the priority of jobs, and move jobs (while PSF is not processing the jobs).

You can use the Printer Inventory with PSF even if you do not have an Infoprint Server license. See *z/OS Infoprint Server Printer Inventory for PSF*.

Note: If you want to use Infoprint Central, you must have a license for the Infoprint Server feature.

For more information about Infoprint Server, see *z/OS Infoprint Server Introduction*. For more information about using Infoprint Central, see *z/OS Infoprint Server Operation and Administration*.

Infoprint Transform Products for z/OS

These products provide transforms for Infoprint Server:

- IBM Infoprint Transforms to AFP for z/OS (Program Number 5655-N60)
- IBM Print Transform from AFP to PCL for Infoprint Server for z/OS (Program Number 5655-TF2)
- IBM Print Transform from AFP to PDF for Infoprint Server for z/OS (Program Number 5655-TF1)
- IBM Print Transform from AFP to PostScript for Infoprint Server for z/OS (Program Number 5655-TF3)

Infoprint Transforms to AFP convert PCL, PDF, PostScript, or SAPGOF data streams to AFP format so that these data streams can be printed on AFP printers that are controlled by PSF for z/OS.

The other programs convert data in AFP format to PCL, PDF, or PostScript data streams so that you can print AFP data on your PCL and PostScript network printers. You can transform to PDF to post your AFP documents on the web. For more information about the Infoprint Transforms, see *IBM Infoprint Transforms to AFP for z/OS* and *IBM Print Transforms from AFP for Infoprint Server for z/OS*.

Infoprint XT for z/OS

Infoprint XT (Program Number 5655-O15) transforms Xerox line-conditioned data stream jobs and metacode jobs into AFP for printing on IPDS printers. Infoprint XT can convert Xerox print resources, including forms, fonts, logos, and images, into AFP while it retains copies of the originals. It can also store formatting information from Xerox non-print resources, such as Job Descriptor Entries and Page Descriptor Entries, to process and format jobs correctly. All resources are centrally stored on z/OS, so you do not need to coordinate the correct version of each resource on every printer.

For more information about Infoprint XT for z/OS, see *IBM Infoprint XT for z/OS*.

Overlay Generation Language (OGL)

OGL (Program Number 5688-191) is an IBM licensed program that 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 z/OS, VM, and VSE. For more information, see *Overlay Generation Language/370 User's Guide and Reference*.

Page Printer Formatting Aid (PPFA)

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

PPFA runs on z/OS, VM, and VSE. For more information, see *Page Printer Formatting Aid: User's Guide*.

System Display and Search Facility (SDSF)

SDSF is an optional feature of z/OS (5650-ZOS). It provides you with information to monitor, manage, and control jobs, printers, queues, and resources in a JES2 system. With SDSF, you can do these tasks:

- 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.

For more information, see *z/OS SDSF Operation and Customization*.

z/OS Font Collection

z/OS Font Collection is a base element of z/OS V2.2 and later (Program Number 5650-ZOS) that consists of character sets, coded fonts, and AFP code pages for printing standard documents that use familiar typefaces such as Helvetica, Times New Roman, and Courier. The z/OS Font Collection contains a comprehensive set of fonts, including these fonts:

- AFP outline fonts
- AFP raster fonts, including a complete set of IBM expanded core fonts, a set of APL2, DATA1, Math, and PI, Sonoran 240-pel and 300-pel raster fonts, and compatibility fonts
- TrueType and OpenType fonts, including a prebuilt resource access table (RAT) that can be used for AFP printing

z/OS Font Collection is the recommended source of AFP fonts for printing with PSF. For more information, see *z/OS Font Collection*.

Chapter 3. Using PSF for z/OS

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

- "Printing centralized production output with post-processing" on page 19
- "Transmitting data for printing and archiving" on page 20
- "Securely transmitting data for printing" on page 20
- "Printing and finishing large documents on LAN-based printers" on page 21
- "Printing CICS or IMS output data on network printers" on page 22
- "Printing documents from the web" on page 22
- "Formatting printed output for distribution to remote printers" on page 23
- "Using TrueType fonts in AFP documents" on page 23
- "Printing customized statements with color" on page 24
- "Upgrading print operations for MO:DCA IS/3" on page 25
- "Using preprinted form overlays" on page 26

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 z/OS 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 split and merge the statements and then stuff them in envelopes for mailing.

Figure 4 on page 19 shows how PSF directs a high volume of data to high-speed printers with automated post-processing.
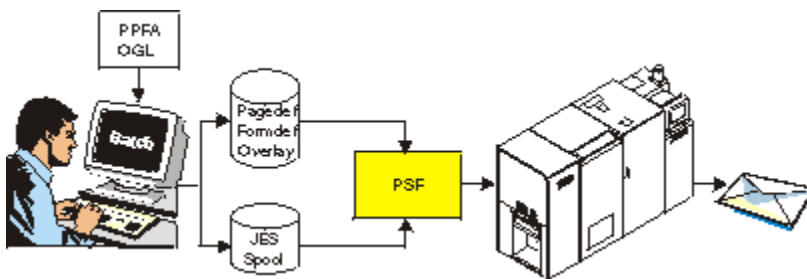

Figure 4. Printing centralized production output with post-processing

Transmitting data for printing and archiving

A utility company produces monthly statements that it prints and 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 z/OS features and related products to meet its requirements:

1. The utility company uses a page definition and line data on z/OS to generate data for their monthly statements.

2. ACIF creates an AFP document file, a resource file, and an index object file from the page definition and line data; the files are optionally concatenated to make an indexed archive file.

3. The application on z/OS submits the AFP document file to the JES spool for printing. The files that are created by ACIF are submitted to the JES spool for printing, archiving, or both.

4. JES selects the document file 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 ACIF created files to be transmitted by the Download for z/OS feature of PSF. Download for z/OS then transmits the files from the JES spool across the TCP/IP LAN to Content Manager OnDemand.

6. Content Manager OnDemand on AIX or Windows archives the files on optical media, such as a CD-ROM, or on an OnDemand server.

7. When a customer calls, customer service personnel use the AFP Web Viewer on OnDemand to view the customer's statement, print another copy of the statement, or both.

Figure 5 on page 20 shows how PSF and its features automatically transmit data for archiving or printing:
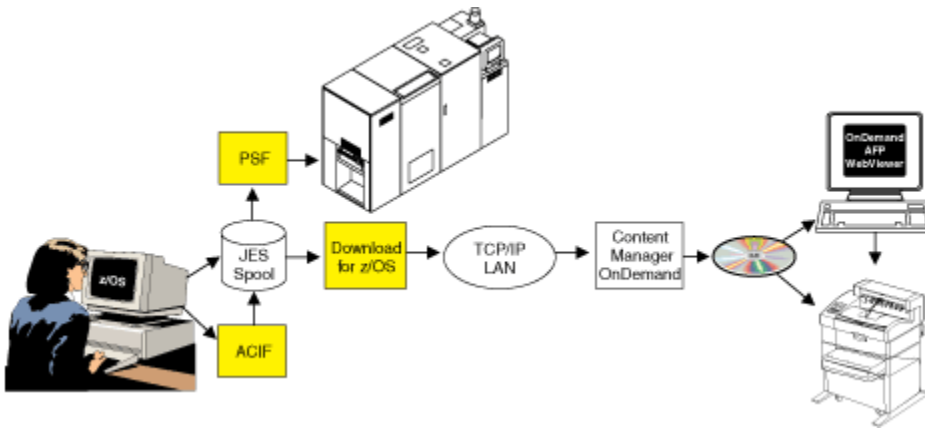

Figure 5. Automatically transmitting data for printing and archiving

Securely transmitting data for printing

A major brokerage company decided to outsource the printing of its customer statements. Because of extreme privacy and security concerns for their clients' financial information, the company needs to closely control the print resources and the variable data, while it implements an efficient and cost-effective print outsourcing process.

The company can use AFP Download Plus to create a single print-ready file that includes print data, attributes, and print resources. Because the print-ready file is created by using the same PSF process that would be used to print it locally, they can be sure that all of the required resources are present in the file, and that it can be printed successfully at the outsourcer's location. They can keep their AFP resources secure in their z/OS system rather than sending duplicate copies to the outsourcer's location. The entire

file is encoded on z/OS before it is sent to the outsourcer's location, so security is ensured during transmission. Only the intended receiver can open and use the encoded print file.

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

1. The company uses a page definition and line data on z/OS to generate data for customer statements.
2. The application on z/OS submits the print file to the JES spool.
3. JES selects the print job to be transmitted to a print site by the AFP Download Plus feature of PSF.
4. AFP Download Plus gathers all required resources, such as fonts, bar codes, and overlays, and incorporates them into the document. It converts the line data to MO:DCA-P format, then encodes the data and resources by using an internal algorithm.
5. AFP Download Plus transmits the print job from the JES spool across the TCP/IP LAN to an AIX print server at a remote site for printing on an InfoPrint 4000 and mailing to the customer.

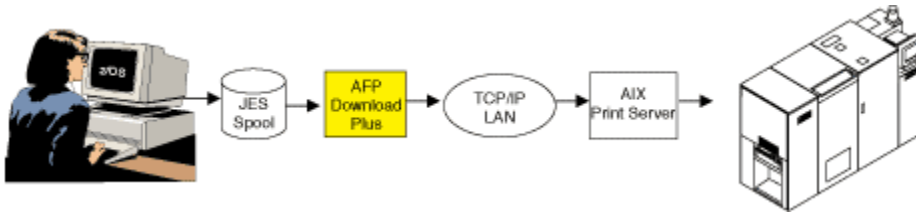Figure 6 on page 21 shows how AFP Download Plus securely transmits data for printing.

Figure 6. Securely transmitting data for 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 2000, to print and finish the manuals. This company is concerned that the manuals it creates do not have any duplicate or missing pages.

Here is how this company can use PSF for z/OS 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, by using the viewer application of AFP Workbench, displays the document before it is sent 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 that are encountered while printing. If the documented operational procedures are followed, PSF's error recovery capabilities ensure that each page is printed and not duplicated.

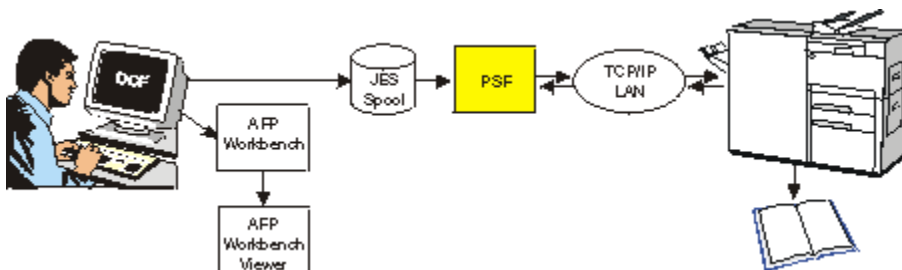Figure 7 on page 21 shows how PSF directs the data to LAN-based printers.

Figure 7. Printing documents on LAN-based printers

Printing CICS or IMS output data on network printers

An international manufacturing company has a large investment in IBM Z hardware. Recently, the company configured a LAN and purchased IPDS 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 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.

Here is how this company can use the NetSpool component of Infoprint Server and PSF for z/OS to meet its requirements:

1. The CICS or IMS applications submit print requests by 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 component of Infoprint Server intercepts the print requests and creates output data sets on the JES spool, by using JES output parameters that are defined by the administrator. The JES output parameters specify routing information that PSF uses to transmit the output to a particular network printer.

3. PSF transmits the output data sets from the JES spool to one or more IPDS network printers on the TCP/IP LAN, with the full system management and error recovery capabilities of PSF.

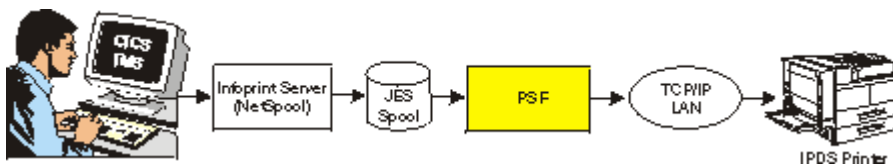Figure 8 on page 22 shows how PSF directs the data to network printers.

Figure 8. 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 that are attached to an IBM Z server, such as the InfoPrint 2000.

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

1. From a Windows workstation, a user views a document from the web by using a browser, such as Internet Explorer, or with the AFP Viewer plug-in if the document is in AFP format.

2. The user submits the document for printing by using the standard print-submission method that is provided with the browser or viewer. The user selects an AFP printer that is defined to z/OS. 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 Infoprint Port Monitor component of Infoprint Server automatically transmits the output file across the TCP/IP LAN to the Print Interface component.

4. The Print Interface component creates an output data set on the JES spool, by using parameters that are defined by the administrator in the Printer Inventory or JES output statements. These parameters specify printing options that PSF uses to print output.

5. PSF prints the data set on the AFP printer.

Figure 9 on page 23 shows how the Infoprint Server and PSF for z/OS direct data from the web to AFP printers.
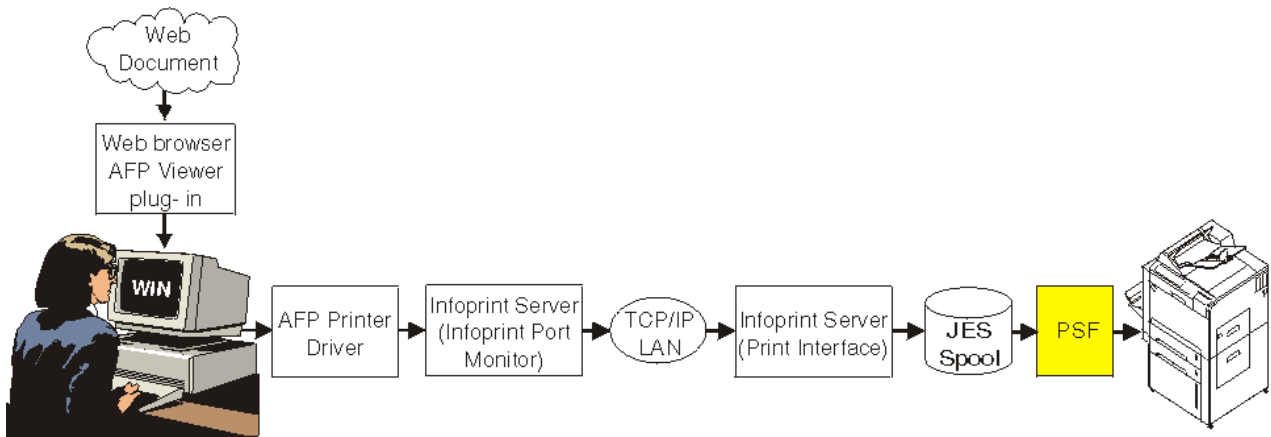
Figure 9. Printing documents from the web

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 z/OS 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 across the TCP/IP LAN to a distributed print function (DPF) product for remote printing on a workgroup printer. The printer notifies the print server through IPDS about any errors that are encountered while printing. If the documented operational procedures are followed, the print server's error recovery capabilities ensure that each statement is printed and not duplicated.

Figure 10 on page 23 shows how PSF directs formatted output to remote printers.
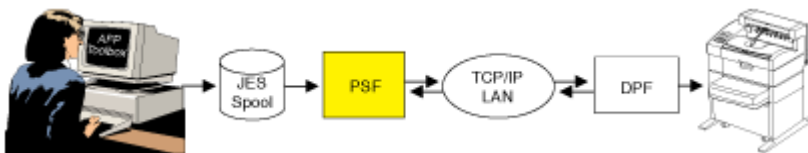

Figure 10. Formatting printed output for distribution to remote printers

Using TrueType fonts in AFP documents

The marketing department of a large insurance company is developing a campaign to sell new services to existing clients. Their AFP statement application incorporates specific marketing messages to sell other services they offer. The marketing department uses standard Windows or Macintosh-based word-processing products to create the marketing messages. The department wants to use these messages in the AFP statements and it wants the messages to look the same, but it also wants to minimize the conversion effort.

Here is how this insurance company can use PSF for z/OS to meet its requirements:

1. The marketing department creates the marketing messages by using various TrueType and OpenType fonts commonly available in PC-based word-processing applications, such as Microsoft Word.

2. A programmer merges the marketing messages into the AFP application, referencing the same TrueType and OpenType fonts that are used in the original marketing messages and sends the messages to the printer.

3. PSF uses a resource access table to map the font references to the fonts on the z/OS system.

4. The TrueType rasterizer in the InfoPrint 4100 prints the text by using the original TrueType fonts.

Figure 11 on page 24 shows how PSF sends AFP documents that contain TrueType and OpenType fonts to printers.
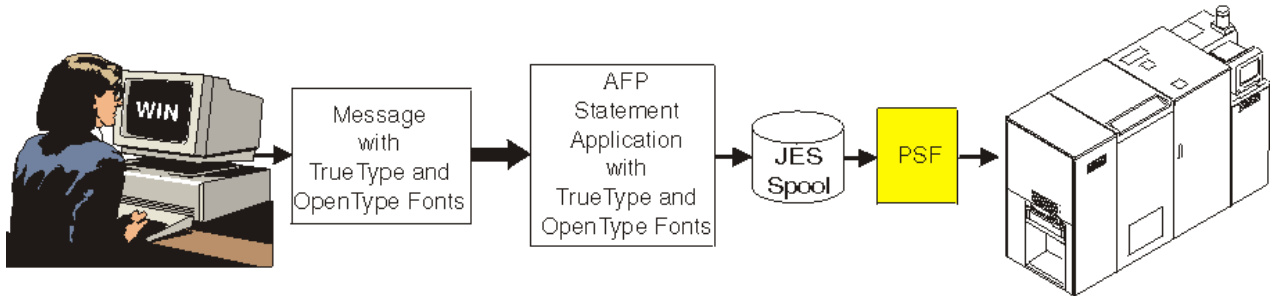

Figure 11. Using TrueType fonts in AFP documents

Printing customized statements with color

A bank creates highly customized statements. The statements are currently printed on black and white printers, but the bank would like to add color images to some statements and have the option of printing them on color printers. The bank wants to produce high-quality color statements on high-speed, industrial-strength color printers. The bank also wants to enhance the black and white printing on monochrome printers by tailoring the grayscale appearance with custom halftone and tone transfer curves.

Here is how this customer can use AFP color management with PSF for z/OS to meet its requirements:

1. The bank uses a Windows or Macintosh-based document composition tool to create an AFP statement application. The tool also creates the AFP color management resources (CMRs), such as halftone and tone transfer curves, that are used to print the statements with high-quality grayscale emulation.

2. An AFP resource installer stores CMRs in AFP resource libraries on z/OS. The resource installer is used to install CMRs created from halftones and tone transfer curves, install data object resources that are created from color images, and associate the correct halftone and tone transfer curve CMRs with image resources to produce the best quality output.

3. The AFP statement application is submitted to the JES spool for printing.

4. JES selects the job to be printed by PSF. PSF combines the job with AFP resources from the resource libraries, converts the data stream to IPDS, and transmits the IPDS and AFP CMRs to an InfoPrint 4100 for black and white printing or an InfoPrint 5000 for color printing.

Figure 12 on page 25 shows how PSF uses AFP color management to send color statements to black and white or color printers.
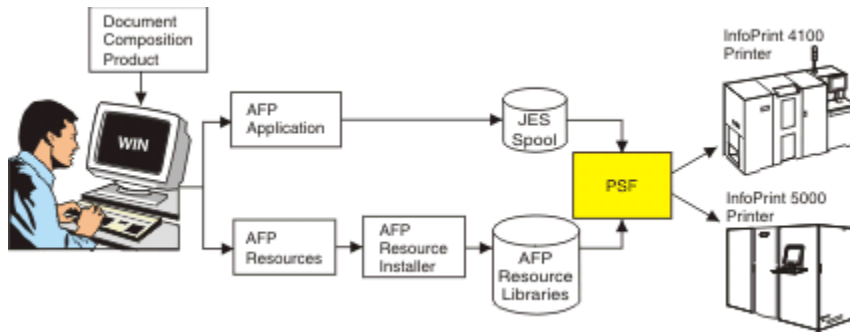
Figure 12. Printing customized statements with color

Upgrading print operations for MO:DCA IS/3

Two banks merged and want to consolidate their print operations. To achieve consistency and interoperability between their numerous branch offices and to produce high-quality printed statements, the banks decide to upgrade their applications and customer documents to be compliant with MO:DCA IS/3. A document that is MO:DCA IS/3 compliant prints with absolute fidelity on any IPDS printer that supports MO:DCA IS/3 and any functions that are required to print the job, such as color and finishing.

Here is how the banks can upgrade documents and applications at their branch offices so that printing with PSF for z/OS features and related products is MO:DCA IS/3 compliant:

1. The banks identify the applications that are used to produce the strategic customer documents that need upgrading to MO:DCA IS/3. For example, AFP Download Plus is used to distribute an AFP print file for a customer statement to an AIX print server for printing.

2. Programmers upgrade the identified applications on all operating systems to product release levels that support MO:DCA IS/3; for example, PSF V4.7 for z/OS. The programmers also make sure that all operating systems from which customer documents are generated and printed have access to TrueType and OpenType fonts; the only font technology that MO:DCA IS/3 supports.

3. The banks upgrade their AFP files by using an application that produces MO:DCA IS/3 data streams. To make sure z/OS messages files or separator pages for a job are MO:DCA IS/3 compliant when sent to the receiver, the banks configure AFP Download Plus to specify a page definition that uses TrueType and OpenType fonts, and sets the auxiliary files MO:DCA level parameter in the AFPPARMS control statement or the Printer Inventory to the IS/3 level. The banks also manually convert line data documents to AFP or use a product that supports MO:DCA IS/3 data streams.

4. The banks submit the MO:DCA IS/3 print file to the JES spool.

5. AFP Download Plus transmits the print job and its resources from the JES spool to an AIX print server for printing on an IPDS printer that supports TrueType and OpenType fonts. When the banks upgrade the printers, only ones that have support for MO:DCA IS/3 are purchased.

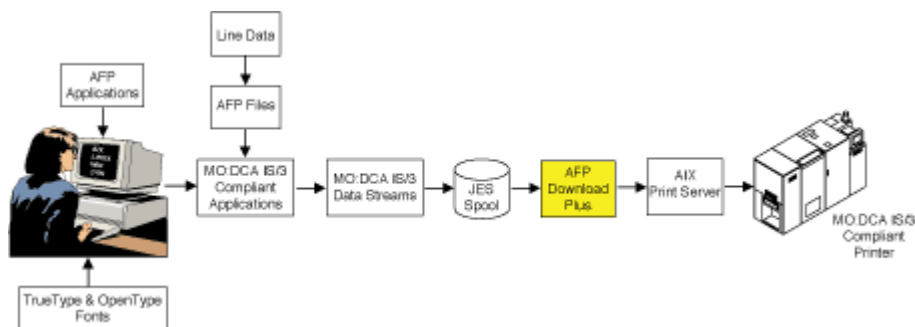shows how the banks create and send MO:DCA IS/3 compliant files to printers.

Figure 13. Upgrading print operations to MO:DCA IS/3

Using preprinted form overlays

A company wants to reduce the cost, storage space, and time that is required to use preprinted forms for their invoices and financial statements. The company decides to simulate preprinted forms by creating electronic overlays that put boxes, lines, shading, text, and logos on a page. These electronic overlays, which are designated as preprinted form overlays, are then merged with variable data and printed on plain paper. By using electronic preprinted form overlays instead of preprinted forms, the company saves costs that are associated with ordering, stocking, storing, loading, and unloading preprinted forms, and updating and scrapping obsolete forms. Designating a preprinted form overlay instead of using a traditional overlay better simulates a preprinted form because special mixing rules are used to merge the overlay with page data.

Here is how this company can use PSF for z/OS to meet its requirements to print with electronic preprinted form overlays instead of preprinted forms:

1. The company uses an overlay generation product to create overlays that simulate three-part preprinted forms with a background color. The overlays are stored in a resource library on z/OS.

2. The company uses an AFP application program to generate a form definition that identifies a medium or page overlay as a preprinted form overlay.

3. z/OS submits the AFP statement application to the JES spool for printing.

4. JES selects the job to be printed by PSF. PSF combines the job with the preprinted form overlay and other resources from the resource libraries, converts the data stream to IPDS, and transmits the IPDS to a printer that supports color and preprinted form overlays.

shows how PSF sends print jobs with preprinted form overlays to color printers.
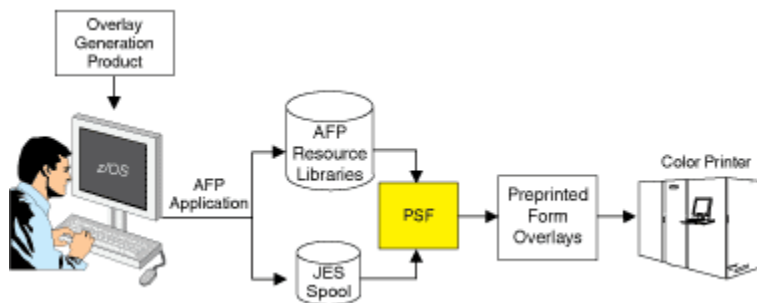

Figure 14. Printing jobs with preprinted form overlays

Appendix A. Accessibility

Accessible publications for this product are offered through IBM Knowledge Center (www.ibm.com/support/knowledgecenter/SSLTBW/welcome).

If you experience difficulty with the accessibility of any z/OS information, send a detailed message to the Contact the z/OS team web page (www.ibm.com/systems/campaignmail/z/zos/contact_z) or use the following mailing address.

IBM Corporation
Attention: MHVRCFS Reader Comments
Department H6MA, Building 707
2455 South Road
Poughkeepsie, NY 12601-5400
United States

Accessibility features

Accessibility features help users who have physical disabilities such as restricted mobility or limited vision use software products successfully. The accessibility features in z/OS can help users do the following tasks:

- Run assistive technology such as screen readers and screen magnifier software.
- Operate specific or equivalent features by using the keyboard.
- Customize display attributes such as color, contrast, and font size.

Consult assistive technologies

Assistive technology products such as screen readers function with the user interfaces found in z/OS. Consult the product information for the specific assistive technology product that is used to access z/OS interfaces.

Keyboard navigation of the user interface

You can access z/OS user interfaces with TSO/E or ISPF. The following information describes how to use TSO/E and ISPF, including the use of keyboard shortcuts and function keys (PF keys). Each guide includes the default settings for the PF keys.

- *z/OS TSO/E Primer*
- *z/OS TSO/E User's Guide*
- *z/OS ISPF User's Guide Vol I*

Dotted decimal syntax diagrams

Syntax diagrams are provided in dotted decimal format for users who access IBM Knowledge Center with a screen reader. In dotted decimal format, each syntax element is written on a separate line. If two or more syntax elements are always present together (or always absent together), they can appear on the same line because they are considered a single compound syntax element.

Each line starts with a dotted decimal number; for example, 3 or 3.1 or 3.1.1. To hear these numbers correctly, make sure that the screen reader is set to read out punctuation. All the syntax elements that have the same dotted decimal number (for example, all the syntax elements that have the number 3.1) are mutually exclusive alternatives. If you hear the lines 3.1 USERID and 3.1 SYSTEMID, your syntax can include either USERID or SYSTEMID, but not both.

The dotted decimal numbering level denotes the level of nesting. For example, if a syntax element with dotted decimal number 3 is followed by a series of syntax elements with dotted decimal number 3.1, all the syntax elements numbered 3.1 are subordinate to the syntax element numbered 3.

Certain words and symbols are used next to the dotted decimal numbers to add information about the syntax elements. Occasionally, these words and symbols might occur at the beginning of the element itself. For ease of identification, if the word or symbol is a part of the syntax element, it is preceded by the backslash (\) character. The * symbol is placed next to a dotted decimal number to indicate that the syntax element repeats. For example, syntax element *FILE with dotted decimal number 3 is given the format 3 * FILE. Format 3* FILE indicates that syntax element FILE repeats. Format 3* * FILE indicates that syntax element * FILE repeats.

Characters such as commas, which are used to separate a string of syntax elements, are shown in the syntax just before the items they separate. These characters can appear on the same line as each item, or on a separate line with the same dotted decimal number as the relevant items. The line can also show another symbol to provide information about the syntax elements. For example, the lines 5.1*, 5.1 LASTRUN, and 5.1 DELETE mean that if you use more than one of the LASTRUN and DELETE syntax elements, the elements must be separated by a comma. If no separator is given, assume that you use a blank to separate each syntax element.

If a syntax element is preceded by the % symbol, it indicates a reference that is defined elsewhere. The string that follows the % symbol is the name of a syntax fragment rather than a literal. For example, the line 2.1 %OP1 means that you must refer to separate syntax fragment OP1.

The following symbols are used next to the dotted decimal numbers.

? indicates an optional syntax element
The question mark (?) symbol indicates an optional syntax element. A dotted decimal number followed by the question mark symbol (?) indicates that all the syntax elements with a corresponding dotted decimal number, and any subordinate syntax elements, are optional. If there is only one syntax element with a dotted decimal number, the ? symbol is displayed on the same line as the syntax element, (for example 5? NOTIFY). If there is more than one syntax element with a dotted decimal number, the ? symbol is displayed on a line by itself, followed by the syntax elements that are optional. For example, if you hear the lines 5 ?, 5 NOTIFY, and 5 UPDATE, you know that the syntax elements NOTIFY and UPDATE are optional. That is, you can choose one or none of them. The ? symbol is equivalent to a bypass line in a railroad diagram.

! indicates a default syntax element
The exclamation mark (!) symbol indicates a default syntax element. A dotted decimal number followed by the ! symbol and a syntax element indicate that the syntax element is the default option for all syntax elements that share the same dotted decimal number. Only one of the syntax elements that share the dotted decimal number can specify the ! symbol. For example, if you hear the lines 2? FILE, 2.1! (KEEP), and 2.1 (DELETE), you know that (KEEP) is the default option for the FILE keyword. In the example, if you include the FILE keyword, but do not specify an option, the default option KEEP is applied. A default option also applies to the next higher dotted decimal number. In this example, if the FILE keyword is omitted, the default FILE(KEEP) is used. However, if you hear the lines 2? FILE, 2.1, 2.1.1! (KEEP), and 2.1.1 (DELETE), the default option KEEP applies only to the next higher dotted decimal number, 2.1 (which does not have an associated keyword), and does not apply to 2? FILE. Nothing is used if the keyword FILE is omitted.

* indicates an optional syntax element that is repeatable
The asterisk or glyph (*) symbol indicates a syntax element that can be repeated zero or more times. A dotted decimal number followed by the * symbol indicates that this syntax element can be used zero or more times; that is, it is optional and can be repeated. For example, if you hear the line 5.1* data area, you know that you can include one data area, more than one data area, or no data area.

If you hear the lines 3* , 3 HOST, 3 STATE, you know that you can include HOST, STATE, both together, or nothing.

Notes:

1. If a dotted decimal number has an asterisk (*) next to it and there is only one item with that dotted decimal number, you can repeat that same item more than once.

2. If a dotted decimal number has an asterisk next to it and several items have that dotted decimal number, you can use more than one item from the list, but you cannot use the items more than once each. In the previous example, you can write HOST STATE, but you cannot write HOST HOST.

3. The * symbol is equivalent to a loopback line in a railroad syntax diagram.

+ indicates a syntax element that must be included

The plus (+) symbol indicates a syntax element that must be included at least once. A dotted decimal number followed by the + symbol indicates that the syntax element must be included one or more times. That is, it must be included at least once and can be repeated. For example, if you hear the line 6.1+ data area, you must include at least one data area. If you hear the lines 2+, 2 HOST, and 2 STATE, you know that you must include HOST, STATE, or both. Similar to the * symbol, the + symbol can repeat a particular item if it is the only item with that dotted decimal number. The + symbol, like the * symbol, is equivalent to a loopback line in a railroad syntax diagram.

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Glossary

This glossary defines technical terms and abbreviations used in PSF for z/OS documentation.

These cross-references are used in this glossary:

See
> Refers to preferred synonyms or to defined terms for acronyms and abbreviations.

See also
> Refers to related terms that have similar, but not synonymous, meanings, or to contrasted terms that have opposite or substantively different meanings.

A

above the bar storage
> Storage above the 2 GB bar. The system programmer can specify that all inline resources are stored in this area during job processing. This is useful when there might not be enough virtual storage in the region area (above the 16 MB line and below the 2 GB bar).

ACIF
> See AFP Conversion and Indexing Facility.

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

Advanced Function Presentation data stream (AFPDS)
> A presentation data stream that is processed in the AFP environment. MO:DCA is the AFP interchange data stream. IPDS is the AFP printer data stream.

Advanced Interactive Executive (AIX)
> A UNIX operating system developed by IBM that is designed and optimized to run on POWER® microprocessor-based hardware, such as servers, workstations, and blades.

AFP
> See Advanced Function Presentation.

AFP Conversion and Indexing Facility (ACIF)
> An optional feature of PSF for z/OS that converts a print file into a MO:DCA document, creates an index file for later retrieval and viewing, and retrieves resources used by an AFP document into a separate file.

AFP Download Plus
> An optional feature of PSF for z/OS that distributes AFP data from a z/OS operating system to an AIX, Linux, Windows, or other z/OS operating system for printing, emailing, or faxing, or to an OnDemand server for archiving.

AFPDS
> See Advanced Function Presentation data stream.

AFP Font Collection
> An IBM licensed product that includes a set of utilities, and a single font source for all AFP operating systems.

AFP printer driver
> A printer driver that runs on a Windows workstation and creates output in AFP format for printing on AFP printers.

AFP resource installer
> An application that runs on a Windows workstation and installs and manages fonts, data objects, and color management resources (CMRs) in resource libraries. It also creates CMRs and associates CMRs with data objects.

AFP Toolbox

A 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 Upload

An optional feature of PSF for z/OS that receives AFP print data from AIX and places it on the JES spool for printing on any printer that is supported by PSF for z/OS.

AFP Viewer plug-in

A program that runs on a Windows workstation and displays files in AFP format from a Web browser.

AFP Workbench Viewer

A product that displays AFP and ASCII files at a Windows workstation in the same format they are printed.

AIX

See Advanced Interactive Executive.

all-points addressability (APA)

The capability to address, reference, and position text, overlays, and images at any defined position or picture element on the printable area of the paper. This capability depends on the ability of the hardware to address and to display each picture element.

all-points addressable (APA)

Pertaining to addressing, referencing, and positioning text, overlays, and images at any defined position or picture element on the printable area of the paper.

American Standard Code for Information Interchange (ASCII)

A standard code used for information exchange among data processing systems, data communication systems, and associated equipment. ASCII uses a coded character set consisting of 7-bit coded characters. See also Extended Binary Coded Decimal Interchange Code.

APA

See all-points addressability or all-points addressable.

application program

A program used to communicate with stations in a network, enabling users to perform application-oriented activities.

ASCII

See American Standard Code for Information Interchange.

auxiliary data set

In AFP printing, a data set that contains job header, data set header, job trailer, or message data. See also print data set.

C

channel-attached

Pertaining to the attachment of devices directly by input/output channels to a host processor. See also SNA-attached and TCP/IP-attached.

CICS

See Customer Information Control System.

client

A software program or computer that requests access to data, services, programs, and resources from a server. See also server and host.

CMR

See color management resource.

coexistence

The ability of two or more entities to function in the same system or network.

colon hexadecimal notation
The syntactical representation for a 128-bit integer that consists of eight groups of four hexadecimal numbers, separated by colons. IP addresses can be represented in colon hexadecimal notation. See also dotted decimal notation and host name.

color management resource (CMR)
An object that provides color management in presentation environments.

communication-attached
Pertaining to a device that is SNA-attached and that uses a communication controller. See also local-attached.

compatibility font
An AFP raster font designed to emulate the uniformly spaced and fixed-pitch fonts used with line printers.

Content Manager OnDemand
An IBM program that you can use to automatically capture, index, archive, search, retrieve, present, and reproduce stored computer-generated documents and other business-related data.

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 tear them apart. Before printing, the forms are folded in a stack, with the folds along the perforations. See also cut-sheet paper.

Customer Information Control System (CICS)
An IBM licensed program that provides online transaction-processing services and management for business applications.

cut-sheet paper
Paper that is cut into uniform-size sheets before it is loaded into the printer. See also continuous forms.

D

DASD
See direct access storage device.

data object resource
An object container resource or IOCA image resource that is either printer resident or downloaded. Data object resources can be:

- Used to prepare for the presentation of a data object, such as with a resident color profile resource object
- Included in a page or overlay through the Include Object (IOB) structured field; for example, PDF single-page and multiple-page objects, Encapsulated PostScript (EPS) objects, and IOCA images
- Called from within a data object; for example, PDF resource objects

data set
The major unit of data storage and retrieval, consisting of a collection of data in one of several prescribed arrangements and described by control information to which the system has access. See also file.

data stream
The commands, control codes, data, or structured fields that are transmitted between an application program and a device, such as printer or nonprogrammable display station.

DCF
See Document Composition Facility.

direct access storage device (DASD)
A device that allows storage to be directly accessed, such as a disk drive.

distributed print function (DPF)
A component of a Windows print server that can be installed and used to print jobs from PSF.

document

1. A machine-readable collection of one or more objects that represent a composition, a work, or a collection of data.

2. Data that has already been composed into pages and that contains a Begin Document and an End Document structured field.

Document Composition Facility (DCF)
An IBM licensed program used to format input to a printer.

dotted decimal notation
The syntactical representation for a 32-bit integer that consists of four 8-bit numbers written in base 10 and separated by periods (dots). IP addresses can be represented in dotted decimal notation. See also colon hexadecimal notation and host name.

download
To transfer data from a computer to a connected device, such as a workstation or a printer. Typically, users download from a large computer to a diskette or fixed disk on a smaller computer or from a system unit to an adapter.

Download for z/OS
An optional feature of PSF for z/OS that uses TCP/IP to automatically send data sets from the JES spool, without formatting them, directly to a PSF for z/OS, OnDemand, AIX, Linux, or Windows server.

DPF
See distributed print function.

E

EBCDIC
See Extended Binary Coded Decimal Interchange Code.

electronic form
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.

Enterprise Systems Connection (ESCON)
A peripheral interface for an Enterprise Systems Architecture/390 and IBM Z computer. The I/O interface uses ESA/390 logical protocols over a serial interface that configures attached units to a communication fabric.

ESCON
See Enterprise Systems Connection.

Ethernet
A packet-based networking technology for local area networks (LANs) that supports multiple access and handles contention by using Carrier Sense Multiple Access with Collision Detection (CSMA/CD) as the access method. Ethernet is standardized in the IEEE 802.3 specification.

Extended Binary Coded Decimal Interchange Code (EBCDIC)
A coded character set of 256 eight-bit characters developed for the representation of textual data. EBCDIC is not compatible with ASCII character coding. See also American Standard Code for Information Interchange.

F

file

1. A collection of related data that is stored and retrieved by an assigned name. A file can include information that starts a program (program-file object), contains text or graphics (data-file object), or processes a series of commands (batch file).

2. See also data set.

font

1. A family or assortment of characters of a given size and style, for example, 9-point Bodoni modern. A font has a unique name and might have a registry number.
2. A particular type style (for example, Bodoni or Times Roman) that contains definitions of character sets, marker sets, and pattern sets.

format

The shape, size, printing requirements, and general makeup of a printed document or presentation display.

form definition

An AFP resource object used by PSF that defines the characteristics of the form or printed media, including: overlays to be used, duplex printing, text suppression, the position of composed-text data on the form, and the number and modifications of a page.

G

GDDM

See Graphical Data Display Manager.

Graphical Data Display Manager (GDDM)

An IBM computer-graphics system that provides presentation services for host computers, including creating images and page segments for use in AFP applications and processing text and graphics for output on a display, printer, or scanner.

H

hardcopy

A printed copy of machine output in a visually readable form, such as printed reports, documents, and summaries. See also softcopy.

host

1. A computer that is connected to a network and provides an access point to that network. The host can be a client, a server, or both a client and server simultaneously. See also client and server.
2. In TCP/IP, any system that has at least one Internet Protocol address associated with it.

host address

See Internet Protocol address.

host name

The network name given to a computer. Sometimes, host name is used to mean the fully qualified domain name; other times, it is used to mean the most specific subname of a fully qualified domain name. For example, if `mycomputer.city.company.com` is the fully qualified domain name, either of these host names can be used: `mycomputer.city.company.com` or `mycomputer`. See also colon hexadecimal notation and dotted decimal notation.

host system

See host.

I

i5/OS

The IBM licensed program that was used as the operating system for System i® servers. The predecessor to i5/OS was OS/400®. See IBM i.

IBM i

The IBM licensed program that is used as the principal operating system for Power Systems products. The predecessor to IBM i was i5/OS, which was preceded by OS/400.

Infoprint Fonts for z/OS

The outline version of the IBM Expanded Core Fonts.

Infoprint Port Monitor
A program that runs on a Windows workstation and sends a file for printing to Infoprint Server on z/OS.

Infoprint Server
An element of z/OS that supports printing on local printers and remote printers in an Internet Protocol or SNA network. With Infoprint Server, users can submit print requests from remote workstations in an Internet Protocol network, from z/OS UNIX System Services applications, from batch applications, from VTAM applications (such as CICS or IMS), and from SAP R/3.

installation exit
The means specifically described in an IBM software product's documentation by which an IBM software product can be modified by a customer's system programmers to change or extend the functions of the IBM software product. Such modifications consist of exit routines written to replace one or more existing modules of an IBM software product, or to add one or more modules or subroutines to an IBM software product.

Intelligent Printer Data Stream (IPDS)
An all-points-addressable data stream that lets users position text, images, graphics, and bar codes at any defined point on a printed page. IPDS is the strategic AFP printer data stream generated by PSF.

Internet Protocol (IP)
A protocol that routes data through a network or interconnected networks. This protocol acts as an intermediary between the higher protocol layers and the physical network. See also Transmission Control Protocol and Transmission Control Protocol/Internet Protocol.

Internet Protocol (IP) address
A unique address for a device or logical unit on a network that uses the IP standard. See also colon hexadecimal notation, dotted decimal notation, and host name.

IP
See Internet Protocol.

IP address
See Internet Protocol address.

IPDS
See Intelligent Printer Data Stream.

J

JCL
See job control language.

JES
See Job Entry Subsystem.

JES2
An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for processing, 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. See also Job Entry Subsystem and JES3.

JES3
An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for processing, 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 by using a common job queue. See also Job Entry Subsystem and JES2.

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.

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

job control language (JCL)
>A command language that identifies a job to an operating system and describes the job's requirements.

Job Entry Subsystem (JES)
>An IBM licensed program that receives jobs into the system and processes all output data that is produced by jobs. See also JES2 and JES3.

L

LAN
>See local area network.

line data
>Data prepared for printing on a line printer without any data placement or presentation information. Line data can contain carriage-control characters and table-reference characters (TRC) for spacing and font selections. See also record format line data and traditional line data.

line printer
>A device that prints a line of characters as a unit. See also page printer.

local area network (LAN)
>A network that connects several devices into a limited area (such as a single building or campus) and that can be connected to a larger network.

local-attached
>Pertaining to an SNA-attached device that does not have a communications controller in its configuration. See also communication-attached.

M

migration
>The movement of data when software is upgraded or the data is transferred to a different hardware server or model.

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

Mixed Object Document Content Architecture for Presentation (MO:DCA-P)
>The subset of MO:DCA that defines presentation documents. PSF supports MO:DCA Presentation Interchange Set data streams.

MO:DCA
>See Mixed Object Document Content Architecture.

MO:DCA AFP/Archive (MO:DCA AFP/A)
>An AFP document architecture interchange set that is used for long-term preservation and retrieval. This subset ensures page independence and eliminates images without clearly specified resolution, device default fonts, and external resources.

MO:DCA AFP/A
>See MO:DCA AFP/Archive.

MO:DCA AFP/A, IS/3
>An AFP document architecture interchange set that complies with the rules and restrictions of both the AFP/Archive and IS/3 interchange sets.

MO:DCA 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. ACIF or AFP Download Plus can transform line data or XML data to MO:DCA data.

MO:DCA GA
    See MO:DCA Graphic Arts Function Set.

MO:DCA Graphic Arts Function Set (MO:DCA GA)
    An extension of MO:DCA IS/3 that provides support for PDF presentation object containers.

MO:DCA IS/1
    See MO:DCA Presentation Interchange Set 1.

MO:DCA IS/3
    See MO:DCA Presentation Interchange Set 3.

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

MO:DCA Presentation Interchange Set 1 (MO:DCA IS/1)
    A subset of MO:DCA that defines an interchange format for presentation documents.

MO:DCA Presentation Interchange Set 3 (MO:DCA IS/3)
    A subset of MO:DCA that defines an interchange format for presentation documents. The MO:DCA IS/3 data stream includes structured fields that are not found in MO:DCA IS/1.

Multiple Virtual Storage (MVS)
    An IBM operating system that accesses multiple address spaces in virtual storage.

MVS
    See Multiple Virtual Storage.

N

network
    In data communications, a configuration in which two or more locations are physically connected for the purpose of exchanging data.

Network Print Facility (NPF)
    A feature that routes VTAM, JES2, or JES3 printer output to printers in an Internet Protocol network.

NPF
    See Network Print Facility.

O

object container
    A MO:DCA structure that carries object data, which might or might not be defined by a presentation architecture.

OGL
    See Overlay Generation Language.

OpenType font
    An extension of the TrueType font format that adds support for PostScript outlines and more support for international character sets and advanced typographic control.

overlay

    1. A resource object that contains predefined presentation data, such as text, image, graphics, and bar code data, that can be merged with variable data on a page or form while printing.

    2. The final representation of a collection of predefined presentation data on a physical medium.

Overlay Generation Language (OGL)
    An IBM licensed program used for designing objects (such as lines, boxes, shadings, and irregular shapes) for electronic overlays.

P

page

    1. A collection of data that can be printed on one side of a sheet of paper or a form.

2. A data stream object delimited by a Begin Page structured field and an End Page structured field. A page can contain presentation data such as text, image, graphics, and bar code data.

page definition
An AFP resource object used by PSF that defines the rules for transforming line data and XML data into MO:DCA data and text controls, such as width of margins and text orientation.

page printer

1. In AFP support, any of a class of printers that accepts composed pages, constructed of composed text and images, among other things. See also line printer.

2. A device that prints one page at a time.

Page Printer Formatting Aid (PPFA)
An IBM licensed program with which to create and store form definitions and page definitions, which are resource objects used for print-job management. These stored objects are used to format printed output.

page segment
An AFP resource object containing text, image, graphics, or bar code data that can be positioned on any addressable point on a page or an electronic overlay.

pel
See picture element.

physical medium
A physical entity on which information is presented; for example, a sheet of paper, a roll of paper, microfilm, an envelope, label, or display screen.

picture element (pel, pixel)

1. An element of a raster pattern about which a toned area on the photoconductor might appear. When used with a number, *pel* indicates resolution. Examples include 240-pel and 300-pel.

2. The smallest printable or displayable unit that can be displayed. A common measurement of device resolution is picture elements per inch. Typical monitors display between 72 and 96 pixels per inch. Characters and graphics are created by turning pixels on or off.

PostScript
A page description language developed by Adobe Systems, Incorporated that describes how text and graphics are presented on printers and display devices.

PPFA
See Page Printer Formatting Aid.

preprinted form
A sheet of paper containing a preprinted design of constant data on which variable data can be printed.

presentation device
A device, such as a printer, that produces character shapes, graphic pictures, images, or bar code symbols on a physical medium.

print data set
A data set created by an application program that contains the actual information to be printed and, optionally, some of the data that controls the format of the printing. The types of print data sets are composed text, line format, XML data, and mixed format. See also auxiliary data set and print file.

Printer Control Language (PCL)
The Hewlett Packard page description language that is used in laser and ink-jet printers.

Printer Inventory
In Infoprint Server, a set of files that contain information about printers. The Printer Inventory includes such objects as printer definitions, functional subsystem (FSS) definitions, and job selection rules for IP PrintWay.

print file
A file that is created for the purpose of printing data. A print file includes information to be printed and, optionally, some of the data that controls the format of the printing. See also print data set.

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

print job
One or more documents submitted in the same job to be printed on the same printer.

Print Services Facility (PSF)
An IBM licensed program that manages and controls the input data stream and output data stream required by supported page printers.

program temporary fix (PTF)
For System i, System p, and IBM Z products, a package containing individual or multiple fixes that is made available to all licensed customers. A PTF resolves defects and might provide enhancements.

protocol
A set of rules controlling the communication and transfer of data between two or more devices or systems in a communications network.

PSF
See Print Services Facility.

PTF
See program temporary fix.

R

RACF
See Resource Access Control Facility.

raster pattern
A series of picture elements (pels) arranged in scan lines to form an image. The toned or untoned status of each pel creates an image. A digitized raster pattern is an array of bits. The on or off status of each bit determines the toned or untoned status of each pel.

RAT
See resource access table.

record format line data
A form of line data where each record is preceded by a 10-byte identifier. See also line data.

region area
Storage above the 16 MB line and below the 2 GB bar. By default, inline resources are stored in the region area during job processing. See also above the bar storage.

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

Resource Access Control Facility (RACF)
An IBM licensed program that provides for access control by identifying users to the system, verifying users of the system, authorizing access to protected resources, logging unauthorized attempts to enter the system, and logging accesses to protected resources.

resource access table (RAT)
An array of data that is used to map a resource name specified in the MO:DCA data stream to information used to find and process the resource on a given system.

S

Scalable Vector Graphics (SVG)
A vector graphics format that produces graphics that cannot be produced using AFP GOCA.

SDLC

See Synchronous Data Link Control.

SDSF

See System Display and Search Facility.

server

A software program or a computer that provides services to other software programs or other computers. The program or computer making the request of the server is typically called the client. See also client and host.

SNA

See Systems Network Architecture.

SNA-attached

Pertaining to a device that is linked to the host system through VTAM or ACF/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, an IBM 3825 Page Printer attached to a communication controller that uses the LU 6.2 communication protocol to transfer data to a communication controller is considered an SNA-attached printer. See also channel-attached and TCP/IP-attached.

softcopy

One or more files that can be electronically distributed, manipulated, and printed by a user. See also hardcopy.

SVG

See Scalable Vector Graphics.

Synchronous Data Link Control (SDLC)

A protocol for managing synchronous information transfer over a data link connection.

System Display and Search Facility (SDSF)

An IBM licensed program that provides a menu-driven, full-screen interface that is used to obtain detailed information about jobs and resources in a system.

Systems Network Architecture (SNA)

The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through the networks and controlling the configuration and operation of networks. The layered structure of SNA allows the ultimate origins and destinations of information (the users) to be independent of and unaffected by the specific SNA network services and facilities that are used for information exchange.

T

TCP

See Transmission Control Protocol.

TCP/IP

See Transmission Control Protocol/Internet Protocol.

TCP/IP-attached

Pertaining to a device that is linked to an operating system through an Internet Protocol network and receives data from the system by using an application-layer protocol for IPDS printers. Some TCP/IP-attached printers require the i-data 7913 IPDS Printer LAN Attachment. See also channel-attached and SNA-attached.

traditional line data

A form of line data that is prepared for printing on a line printer. See also line data.

Transmission Control Protocol (TCP)

A communications protocol used in the Internet and in any network that follows the Internet Engineering Task Force (IETF) standards for internetwork protocol. TCP provides a reliable host-to-host protocol in packet-switched communications networks and in interconnected systems of such networks. See also Internet Protocol.

Transmission Control Protocol/Internet Protocol (TCP/IP)
An industry-standard, nonproprietary set of communications protocols that provide reliable end-to-end connections between applications over interconnected networks of different types.

TrueType font
A font format based on scalable outline technology in which the graphic character shapes are based on quadratic curves. The font is described with a set of tables contained in a TrueType font file.

U

Unicode
A character encoding standard that supports the interchange, processing, and display of text that is written in the common languages around the world, plus some classical and historical texts. For example, the text name for $ is *dollar sign* and its numeric value is X'0024'. The Unicode standard has a 16-bit character set defined by ISO 10646.

UNIX
A highly portable operating system that features multiprogramming in a multiuser environment. The UNIX operating system was originally developed for use on minicomputers, but has been adapted for mainframes and microcomputers. The AIX operating system is IBM's implementation of the UNIX operating system.

UNIX System Services
See z/OS UNIX System Services.

V

Virtual Telecommunications Access Method (VTAM)
An IBM licensed program that controls communication and the flow of data in an SNA network. It provides single-domain, multiple-domain, and interconnected network capability.

VTAM
See Virtual Telecommunications Access Method.

W

Workbench Viewer
See AFP Workbench Viewer.

X

XML data
Data identified with the Extensible Markup Language (XML), which is a standard metalanguage for defining markup languages that is based on Standard Generalized Markup Language (SGML). For printing on page printers, a page definition is required to provide the data placement and presentation information. The XML data processed by PSF can be encoded in EBCDIC, ASCII, UTF-8 or UTF-16.

Z

zFS
See z/OS File System.

z/OS
An IBM mainframe operating system that uses 64-bit real storage.

z/OS File System (zFS)
A type of file system that resides in a Virtual Storage Access Method (VSAM) linear data set (LDS). zFS contains files and directories that can be used by z/OS UNIX System Services to provide data access over IP networks.

z/OS Font Collection
A base element of z/OS V2R2 or later that contains a comprehensive set of fonts, including AFP outline fonts, AFP raster fonts, and WorldType fonts (TrueType and OpenType fonts). The recommended source of AFP fonts for printing with PSF.

z/OS UNIX System Services

An element of z/OS that creates a UNIX environment which conforms to the XPG4 UNIX 1995 specifications and provides two open systems interfaces on the z/OS operating system: an application program interface (API) and an interactive shell interface.

Bibliography

This bibliography lists the titles of publications containing additional information about PSF, AFP, the z/OS operating system, and related products.

The titles and order numbers might change from time to time. To verify the current title or order number, consult your IBM marketing representative.

You can obtain many of the publications listed in this bibliography from the AFP Consortium Publications (afpcinc.org/publications) and the z/OS Internet Library (www.ibm.com/servers/resourcelink/svc00100.nsf/pages/zosInternetLibrary).

Advanced Function Presentation (AFP)

AFP publications are available from AFP Consortium Publications (afpcinc.org/publications).

Publication	Order Number
Advanced Function Presentation: Programming Guide and Line Data Reference	S544-3884
AFP Consortium: AFP Color Management Architecture (ACMA)	AFPCC
AFP Toolbox User's Guide	S544-5292
Bar Code Object Content Architecture Reference	AFPC-0005
Color Management Object Content Architecture Reference	AFPC-0006
Font Object Content Architecture Reference	AFPC-0007
Graphics Object Content Architecture for AFP Reference	AFPC-0008
Guide to Advanced Function Presentation	G544-3876
IBM AFP Fonts: Font Summary for AFP Font Collection	S544-5633
IBM Infoprint Fonts: Font Summary	G544-5846
Image Object Content Architecture Reference	AFPC-0003
Intelligent Printer Data Stream Reference	AFPC-0001
Mixed Object Document Content Architecture Reference	AFPC-0004
Overlay Generation Language/370 User's Guide and Reference	S544-3702
Presentation Text Object Content Architecture Reference	AFPC-0009
Using OpenType Fonts in an AFP System	G544-5876
z/OS Font Collection	GA32-1048

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