

z/OS
2.5

Infoprint Server Introduction



Note

Before using this information and the product it supports, read the information in [“Notices” on page 29.](#)

This edition applies to Version 2 Release 5 of z/OS® (5650-ZOS) and to all subsequent releases and modifications until otherwise indicated in new editions.

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About this publication

This publication is an overview of Infoprint Server, which is an optional, separately priced feature of z/OS. This publication applies to z/OS Version 2 Release 5.

This overview includes the benefits of Infoprint Server, how you can use it, and how it works.

Who should read this publication

This publication is for managers, print administrators, and any other users who need to understand the benefits and capabilities of Infoprint Server.

Where to find more information

The following information describes where to find information that is related to z/OS and Infoprint Server.

Preventive Service Planning information

Before you install Infoprint Server, review the current Preventive Service Planning (PSP) information, also called the *PSP bucket*. The PSP upgrade ID depends on your z/OS operating system; for example, ZOSV2R5. The subset for Infoprint Server is INFOPRINT.

To obtain the current PSP bucket, contact the IBM® Support Center or use z/OS SoftwareXcel (IBMLink). If you obtained z/OS as part of a CBPDO, HOLDDATA and PSP information is included on the CBPDO tape. However, this information might not be current if the CBPDO tape was delivered several weeks before installation.

Infoprint Server migration information

This table lists documents that can help you upgrade from previous releases of z/OS and migrate from IP PrintWay basic mode to IP PrintWay extended mode.

Document	Form number	Description
<u>z/OS Upgrade Workflow</u>	GA32-0889	Describes the tasks that are required to upgrade to z/OS V2R5. Includes the migration tasks for Infoprint Server.
<u>z/OS Release Upgrade Reference Summary</u>	SA23-2300	Describes new and changed messages and interfaces in z/OS V2R5. Includes the messages and interfaces for Infoprint Server.
<u>z/OS Infoprint Server Customization</u>	SA38-0691	Describes the tasks that are required to migrate to IP PrintWay extended mode from IP PrintWay basic mode. Also, describes the tasks that are required to use the new functions that are introduced in z/OS V2R5.

Documents

These tables list related documents that can help you use Infoprint Server and transform products. For documents for all z/OS products, see [z/OS Information Roadmap](#).

<i>Table 1. Documents for Infoprint Server</i>		
Document	Form number	Description
<u>z/OS Infoprint Server Introduction</u>	SA38-0692	Introduces Infoprint Server. This document contains printing scenarios that show how you can use Infoprint Server in your installation.
<u>z/OS Infoprint Server Customization</u>	SA38-0691	Describes customization tasks for Infoprint Server. This document describes Infoprint Server environment variables, configuration files, startup procedures, how to write exit routines and filter programs, and how to use the Infoprint Server API.
<u>z/OS Infoprint Server Operation and Administration</u>	SA38-0693	Describes operator procedures and administrative tasks for Infoprint Server. This document describes how to start and stop Infoprint Server and how operators can use Infoprint Central. It describes how administrators can create entries in the Printer Inventory by using either ISPF panels or the Printer Inventory Definition Utility (PIDU) program and define NetSpool printer LUs to VTAM®.
<u>z/OS Infoprint Server Printer Inventory for PSF</u>	SA38-0694	Describes the Printer Inventory for PSF for PSF customers who do not purchase an Infoprint Server license. It describes the tasks that are required to customize Infoprint Server, start and stop Infoprint Server, create PSF FSS and FSA definitions in the Printer Inventory, and diagnose problems in Infoprint Server.
<u>z/OS Infoprint Server User's Guide</u>	SA38-0695	Describes user tasks for Infoprint Server. This document describes how to submit print jobs from remote systems (including Windows systems), the local z/OS system, and Virtual Telecommunications Access Method (VTAM) applications. It describes z/OS UNIX commands; the AOPPRINT JCL procedure; the AOPBATCH program; DD and OUTPUT JCL parameters that Infoprint Server supports; and how to download and install the Infoprint Port Monitor for Windows.
<u>z/OS Infoprint Server Messages and Diagnosis</u>	GA32-0927	Describes messages from Infoprint Server. This document also describes how to use Infoprint Server tracing facilities to diagnose and report errors.

<i>Table 2. Documents for IBM transform products</i>		
Document	Form number	Description
<u>IBM Infoprint Transforms to AFP for z/OS</u>	G550-0443	Describes IBM Infoprint Transforms to AFP for z/OS (5655-N60)

Table 2. Documents for IBM transform products (continued)		
Document	Form number	Description
<u>IBM Print Transforms from AFP for Infoprint Server for z/OS</u>	G325-2634	Describes these products: <ul style="list-style-type: none"> • IBM Print Transform from AFP to PCL for Infoprint Server for z/OS (5655-TF2) • IBM Print Transform from AFP to PDF for Infoprint Server for z/OS (5655-TF1) • IBM Print Transform from AFP to PostScript for Infoprint Server for z/OS (5655-TF3)
<u>IBM Infoprint XT for z/OS</u>	GI11-9492	Describes IBM Infoprint XT for z/OS (5655-O15)

Table 3. Documents for Ricoh products	
Ricoh Document	Description
<u>Ricoh InfoPrint Manager for AIX, Linux, and Windows: Transform Feature in Ricoh Software Information Center (help.ricohsoftware.com/swinfocenter)</u>	Describes InfoPrint Transform Manager and provides configuration information about the product
<u>Ricoh InfoPrint Manager for AIX, Linux, and Windows: Installing InfoPrint Manager Transform Feature in Ricoh Software Information Center (help.ricohsoftware.com/swinfocenter)</u>	Provides installation information for InfoPrint Transform Manager
<u>InfoPrint Manager AFP2PDF Transform Feature: Installing and Using in Ricoh Software Information Center (help.ricohsoftware.com/swinfocenter)</u>	Describes the InfoPrint Transform Manager AFP to PDF transform

Infoprint Server online help

The Infoprint Server ISPF panels contain integrated online help for each panel and field. To view the help, place your cursor on a panel or in a field on a panel and press the Help function key (F1).

Infoprint Central contains an integrated online help system. To view the general help system and help for individual web pages, select the question mark (?) on the title bar.

The **man** command provides online help for z/OS UNIX commands. The syntax is:

```
man command_name
```

TSO/E provides online help for the AOPCMND command. The syntax is:

```
HELP AOPCMND
```


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 xiii.

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 \(ibm.com.developerworks/rfe\)](http://ibm.com.developerworks/rfe).

Feedback on IBM Documentation function

If your comment or question is about the IBM Documentation functionality, for example search capabilities or how to arrange the browser view, send a detailed email to IBM Documentation Support at ibmdoc@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: *z/OS Infoprint Server Introduction*, SA38-0692
- The section title of the specific information to which your comment relates
- The text of your comment.

When you send comments to IBM, you grant IBM a nonexclusive authority to use or distribute the comments in any way appropriate without incurring any obligation to you.

IBM or any other organizations use the personal information that you supply to contact you only about the issues that you submit.

If you have a technical problem

If you have a technical problem or question, do not use the feedback methods that are provided for sending documentation comments. Instead, take one or more of the following actions:

- Go to the [IBM Support Portal \(support.ibm.com\)](http://support.ibm.com).
- Contact your IBM service representative.
- Call IBM technical support.

Summary of changes

This information includes terminology, maintenance, and editorial changes.

z/OS Version 2 Release 5 (V2R5)

The following content is new, changed, or no longer included in z/OS Version 2 Release 5.

New

- Information about new functions in z/OS V2R5 is added. See [“What's new in z/OS Version 2 Release 5” on page 7](#).

Changed

- Table 3 on page xi is updated.
- In [“How Infoprint Server handles printing” on page 3](#), AFP and EBCDIC line data are added to the list of data formats.
- In [“Create AFP output from Windows applications” on page 6](#), the URL for downloading the AFP Printer Driver is updated.
- In [“Browse AFP documents on the web” on page 6](#), the URL for downloading the AFP Viewer plug-in is updated.

Deleted

- References to Windows 7 are deleted because it is no longer in service.
- References to Microsoft Internet Explorer are deleted because it is no longer in service.

z/OS Version 2 Release 4 (V2R4)

The following content is new, changed, or no longer included in z/OS Version 2 Release 4.

New

- Information about new functions in z/OS V2R4 is added. See [“What's new in z/OS Version 2 Release 4” on page 7](#).

Deleted

- Because the Distributed File System/Server Message Block (DFS/SMB) protocol is no longer supported, references to it are deleted. IBM recommends that you use the Network File System (NFS) protocol instead.

z/OS Version 2 Release 3 (V2R3)

The following content is new, changed, or no longer included in z/OS Version 2 Release 3.

New

- Information about new functions in z/OS V2R3 is added. See [“What's new in z/OS Version 2 Release 3” on page 8.](#)

Changed

- Infoprint Port Monitor is updated to V3.2. See [“Infoprint Server components” on page 3.](#)
- A reference to z/OS UNIX System Services printing commands is added to [“Printing z/OS UNIX System Services data on AFP printers” on page 11.](#)
- In [“Infoprint Central” on page 22,](#) you can no longer link to the printer's web page when you work with printers.
- [“Windows workstation support” on page 23](#) is updated to remove system requirements for installing Infoprint Port Monitor because this information is in the [z/OS Infoprint Server User's Guide.](#)

Deleted

- References that state that IP PrintWay uses VTAM services to transmit data to printers in an SNA network are removed from:
 - [Chapter 1, “What Infoprint Server can do for you,” on page 1](#)
 - [“How to handle the changing printing requirements” on page 2](#)
 - [“How Infoprint Server handles printing” on page 3](#)
 - [“Infoprint Server components” on page 3](#)
 - [“Print Interface” on page 18](#)
- References to Infoprint Coaxial Printer Support for z/OS (Part Number 5655-N62) are removed from:
 - [“Printing from batch applications to network printers” on page 14](#)
 - [Figure 10 on page 17](#)
 - [“IP PrintWay” on page 21](#)

Chapter 1. What Infoprint Server can do for you

Infoprint Server is an optional, separately priced feature of z/OS that uses z/OS UNIX System Services. This feature is the basis for a total print serving solution for the z/OS environment. With Infoprint Server, you can consolidate your print workload from many servers onto a central z/OS print server.

Infoprint Server delivers improved efficiency and lower overall printing cost with the flexibility for high-volume, high-speed printing from anywhere in the network. With Infoprint Server, you can reduce the overall cost of printing while you improve manageability, data retrievability, and usability.

Some highlights of Infoprint Server are:

IP PrintWay

Provides fast access to TCP/IP-connected printers.

NetSpool

Automatically directs VTAM application data to the job entry subsystem (JES) spool without requiring application changes.

Print Interface

Receives print requests from clients that run on remote systems, such as Windows and UNIX systems, and directs data to the JES spool. Accepts data in various formats, including Advanced Function Presentation (AFP), plain text, Printer Control Language (PCL), Portable Document Format (PDF), and PostScript formats. Also provides commands so that you can print from z/OS UNIX System Services.

Infoprint Central

Lets help desk operators and other authorized users or job submitters work with print jobs, printers, NetSpool logical units (LUs), and job selection rules; display printer definitions; and check system status. Infoprint Central is a web-based print management system.

In addition, Infoprint Server works with separately priced transform products from IBM and Ricoh. Infoprint Server can automatically transform data streams from one format to another before the data is printed or sent to an email destination. For example, you can use the PDF to AFP transform to convert documents in PDF format to AFP format.

Administrators can set up the transforms to automatically transform documents before they are printed. Users can also use the z/OS UNIX command line to transform documents, which can then be saved in the converted format and later printed or sent to other users.

The following information describes how printing requirements are changing. It explains why print consolidation with z/OS is the best way to handle printing, describes how Infoprint Server supports printing in the z/OS environment, and explains how Infoprint Server can benefit you.

How printing requirements are changing

With the advent of local area networks (LANs) and new information technologies, printing requirements are changing. For example:

Applications need to print on LAN printers and host printers

Businesses that print statements, such as banking statements, invoices, and bills of materials, need to print both on LAN-attached printers and on higher-volume, host-attached printers. Traditionally, VTAM applications, such as Customer Information Control System (CICS®) and Information Management System (IMS), have printed such business statements on coaxially attached Systems Network Architecture (SNA) printers. Now, these VTAM applications need to print on LAN-attached printers or on high-volume host printers.

Workstation users want to print on host printers

Workstation users want to print documents, such as memos, email, web documents, and manuals on LAN-attached PCL and PostScript printers. They also want to print on higher-speed, host-attached printers.

Users want easy-to-use software

Users want easy-to-use graphical user interfaces (GUIs) to handle the complex tasks of printing and managing printers.

Applications need to print and run on the same system

Many line-of-business applications, such as payroll, accounting, and inventory-control applications, need to print on the same system where the data is located. Whether these applications are z/OS batch applications or z/OS UNIX System Services applications, they need to print on host-attached printers.

Companies require more print servers

Companies with a combination of stand-alone and host-connected LANs that use various network operating systems and protocols need more print server capacity to meet their distributed printing needs. Adding more print servers increases printing costs.

These requirements introduce new issues:

- How to handle the wide range of printers and formatting options available in an environment and let users of traditional terminals and distributed workstations share these printers.
- How to print from host-based applications that are ported to z/OS UNIX System Services without reengineering their printing functions.
- How to reduce costs by reducing the number of print servers.

How to handle the changing printing requirements

Print server consolidation is the best way to handle the changing printing requirements. Why? One central print server in a network is more cost-effective than a distributed solution with printers that are attached to many different LAN servers or local desktop computers. By consolidating onto a central print server, you can use the correct printer for specific print jobs.

With z/OS with Infoprint Server, you can consolidate your print workload from many servers to a central z/OS print server. z/OS handles high volume printing, logs accounting histories, and provides data security and recovery. With z/OS, you can control host and LAN printing. You do not need to continually upgrade your server so it can handle more print requests.

Figure 1 on page 3 illustrates the printing solutions that Infoprint Server provides. No matter what type of data you want to print (payroll, invoices, web documents, sales reports), you can use z/OS batch applications, VTAM applications, applications that are running on remote workstations, and z/OS UNIX System Services applications to send print requests to Infoprint Server. Infoprint Server then sends the documents to be printed to local printers and remote printers in your TCP/IP network. Infoprint Server can also send documents over the internet to printers that use the Internet Printing Protocol (IPP) and to one or more email addresses.

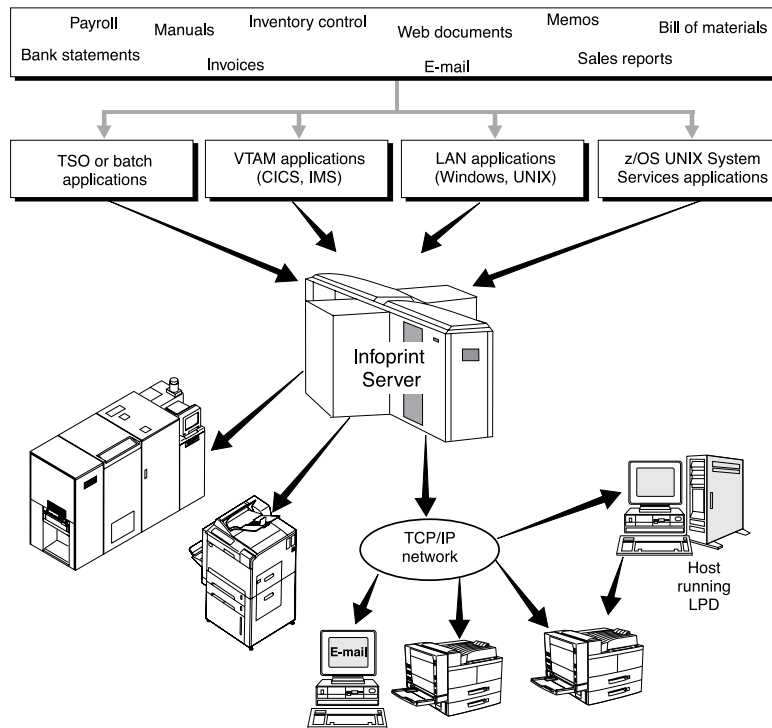


Figure 1. How Infoprint Server handles printing requirements

How Infoprint Server handles printing

Infoprint Server uses the JES spool, one of the most powerful print spoolers available, to manage the printers on z/OS.

In addition to the JES spool's traditional functions of scheduling and recovering print jobs, Infoprint Server enhances the use of the JES spool in these ways:

- Users can submit documents to the JES spool in any data format, such as:
 - AFP line data
 - ASCII text
 - EBCDIC line data
 - Printer Control Language (PCL)
 - Portable Document Format (PDF)
 - PostScript
 - SCS and 3270 data (from VTAM applications)
 - Xerox
- Files on the JES spool can print not only on the traditional array of JES-controlled printers and printers that are driven by Print Services Facility (PSF), but also on ASCII printers in an Internet Protocol network. Using Infoprint Server, files on the JES spool can also be sent over the internet to IPP-enabled printers and to email destinations.

Infoprint Server components

Infoprint Server provides these components:

Printer Inventory

Provides a single set of printer definitions that all the components of Infoprint Server use. The Printer Inventory also contains printer customization information that Print Services Facility (PSF) uses.

Print Interface

Provides these functions:

- A line printer daemon (LPD) that extends JES2 and JES3 print capabilities to users and application programs in a TCP/IP environment.
- Printing support for users and application programs in the z/OS UNIX System Services environment.
- Printing support for users and application programs in the SAP R/3 environment.
- Support for the Internet Printing Protocol (IPP) for printing from Windows.

z/OS UNIX System Services printing commands

Allow z/OS UNIX System Services environment applications to submit print, query, and cancel requests to Print Interface.

NetSpool

Directs VTAM application data to the JES spool without requiring application program changes.

IP PrintWay

Directs JES2 or JES3 print data from z/OS to a printer in an Internet Protocol network, to an email address, or to another system's spool. IP PrintWay uses the line printer requester/line printer daemon (LPR/LPD) protocol, direct socket printing, or the Internet Printing Protocol (IPP) to transmit data to printers in TCP/IP.

Transform Interface

Communicates with transform products that IBM and Ricoh provide. Transforms convert data from one format to another. For example, from PDF to AFP format, or from AFP to PCL format.

Infoprint Central

Lets help desk operators and other authorized users or job submitters work with print jobs, printers, NetSpool logical units (LUs), and job selection rules; display printer definitions; and check system status. Infoprint Central is a web-based print management system.

Infoprint Port Monitor for Windows

Automatically transmits documents to Print Interface for printing so that users can use familiar print-submission methods from Windows applications. Infoprint Port Monitor V3.2 runs on Windows 7, Windows 8.1, Windows 10, Windows Server 2012, and Windows Server 2016. You can use the IPP printing protocol instead of the Infoprint Port Monitor for Windows. However, with the Infoprint Port Monitor for Windows, you can specify such things as the number of job copies and whether to print on one or both sides of the paper. It can also improve performance.

Note: Infoprint Port Monitor V3.2 can run on Windows 32-bit systems or on Windows 64-bit systems that are based on x64 architecture. However, it cannot run on Windows 64-bit systems that are based on Intel Itanium architecture.

NetSpool and IP PrintWay are the strategic replacements for Internet Protocol Network Print Facility (NPF) and provide improved usability, performance, capacity, and function.

You can configure Print Interface, NetSpool, and IP PrintWay independently. You determine how you want to configure these Infoprint Server components. For example, if you need to print batch jobs on remote printers, you can configure IP PrintWay. Then, as you need more function, you can configure more components.

Transform products

These IBM and Ricoh transform products work with Infoprint Server. You can run the transforms as stand-alone commands from z/OS UNIX System Services, or you can run them automatically when you submit a job to print. The transforms are all separately priced products. You need to purchase the transforms only if you need to use them.

IBM Infoprint Transforms to AFP for z/OS, 5655-N60

Transforms documents to Advanced Function Presentation (AFP) format from HP Printer Control Language (PCL), Adobe Portable Document Format (PDF), Adobe PostScript, or SAP R/3 System Generic Output Format (SAPGOF). For information, see [*IBM Infoprint Transforms to AFP for z/OS*](#).

IBM Print Transform from AFP to PCL for Infoprint Server for z/OS, 5655-TF2

Transforms documents from AFP format to PCL. For information, see [*IBM Print Transforms from AFP for Infoprint Server for z/OS*](#).

IBM Print Transform from AFP to PDF for Infoprint Server for z/OS, 5655-TF1

Transforms documents from AFP format to PDF. For information, see [*IBM Print Transforms from AFP for Infoprint Server for z/OS*](#).

IBM Print Transform from AFP to PostScript for Infoprint Server for z/OS, 5655-TF3

Transforms documents from AFP format to PostScript. For information, see [*IBM Print Transforms from AFP for Infoprint Server for z/OS*](#).

IBM Infoprint XT for z/OS, 5655-O15

Transforms Xerox files (line-conditioned data streams (LCDS) or metacode data streams) to AFP format. For information, see [*IBM Infoprint XT for z/OS*](#).

Ricoh InfoPrint Transform Manager for Linux®

Transforms documents from Graphics Interchange Format (GIF), Joint Photographic Experts Group (JPEG) File Information Format (JFIF), PCL, PDF, PostScript, or Tagged Image File Format (TIFF) to AFP format. For more information, see [*InfoPrint Transform Manager for Linux*](#) in [Ricoh Software Information Center](#) (help.ricohsoftware.com/swinfocenter).

It also transforms documents from AFP format to PDF format. For information, see [*InfoPrint Transform Manager for Linux: afp2pdf Transform Installation and User's Guide*](#) in [Ricoh Software Information Center](#) (help.ricohsoftware.com/swinfocenter).

Related products for Windows systems

The following related IBM products are run on Windows systems. You might want to use them if your installation has IBM AFP printers or AFP documents.

AFP Printer Driver for Windows

Creates output files in AFP format. Files in AFP format can be printed on IBM AFP printers.

AFP Viewer Plug-in for Windows

Used to view documents in AFP format. For example, documents that are downloaded from the z/OS system or documents on the web.

Benefits of using Infoprint Server

Users and application programs in a z/OS network, including LAN and z/OS UNIX System Services environments, can take full advantage of Infoprint Server's many benefits.

Access all defined printers

In today's network environments, printers are often attached to a single workstation or are only available to users of a LAN. Infoprint Server lets you define all of your printers in a centralized repository. Any user in the network can send print jobs from z/OS and LAN clients to any printer that is defined to Infoprint Server.

Because all components of Infoprint Server use the same printer definition, you only need to configure each printer in one place.

Handle print jobs effectively

Because print jobs are managed by the JES spool, they are secure and recoverable. z/OS accounting information for print jobs is logged automatically.

Detect and transform data streams

In many cases, Infoprint Server can automatically detect the format of the data stream in print jobs. It can then make sure that the selected printer can print the data stream, thus saving paper and time.

Without requiring a separate transform product, Infoprint Server can transform:

- SCS and 3270 data from VTAM applications to line data for printing on IBM AFP printers, or to PCL data
- Text data to line data for printing on IBM AFP printers
- Line data to text data for printing on ASCII printers

With a separate transform product, Infoprint Server supports printing data streams such as PCL, PDF, and PostScript on IBM AFP printers. It also supports printing data in AFP format on ASCII printers. Infoprint Server protects your investment in printer hardware while it provides you with printing enhancements.

Query job status

Users of network printing solutions today spend unnecessary time going to the printer to see whether their jobs printed. If they do not find them immediately, they might resubmit the jobs several times without knowing why they did not print. With Infoprint Server, users in the LAN and UNIX System Services environments can query the status of their print jobs to find out whether a job is processing or is complete. Local system users can wait for the server to notify them that the job is complete. The users save time, and the business saves paper.

Create AFP output from Windows applications

Because of its capabilities for automatic resource management, error recovery, integrated accounting, and printing from 10 to over 1000 pages per minute without application changes, AFP offers an outstanding solution for high-speed printing. The AFP Printer Driver for Windows creates output in AFP format. Therefore, you can print output from any Windows application on any of IBM's AFP printers.

The AFP Printer Driver for Windows is not part of Infoprint Server. You can download the AFP Printer Driver for Windows from Ricoh Production Print Software (dl.ricohsoftware.com/downloads/aa9a248e-101c-4aa6-b109-1cf7403f3b4f).

Browse AFP documents on the web

Many z/OS applications generate documents that are formatted for AFP/Intelligent Printer Data Stream (IPDS) printers. You might need to view those documents in an archival system or on a web server from your desktop. With the AFP Viewer plug-in for Windows, you can view AFP documents from your web browser. You can also use Infoprint Server to print documents that you are viewing from a web browser to any defined printer.

The AFP Viewer plug-in is not part of Infoprint Server. You can download the AFP Viewer plug-in for Windows from Ricoh Production Print Software (dl.ricohsoftware.com/downloads/aa9a248e-101c-4aa6-b109-1cf7403f3b4f).

Send print output to email addresses

With Infoprint Server, you can send print output to one or more email addresses. With this support, you can easily distribute documents over the internet, and email recipients can view the output and print it only when necessary.

Some features of email support are:

- IP PrintWay sends each document as an email attachment.
- The data in the attachment can be in any format, including PDF, PostScript, AFP, and text format.
- Data can be transformed to another format that is suitable for viewing on a workstation. For example, you can transform:
 - Traditional line data and VTAM application data (for example, CICS and IMS data) to text format.
 - Traditional line data, VTAM application data, and AFP data to PDF or PostScript format. A separate transform product is required.
 - PCL data and PostScript data to AFP format. A separate transform product is required.

- When you use IP PrintWay to print VTAM application data, you can send output to an email address list and print it at the same time.

Work with print jobs and printers

With Infoprint Central, help desk operators and other authorized users or job submitters can work with print jobs, printers, NetSpool logical units (LUs), and job selection rules; display printer definitions; and check system status. Infoprint Central is a web-based print management system that works with IP PrintWay extended mode.

What's new in z/OS Version 2 Release 5

Infoprint Server is enhanced in z/OS Version 2 Release 5 with these new capabilities:

Infoprint Central responsive design

Infoprint Central uses responsive design to automatically adjust the page layout of the user interface to fit the screen size and orientation.

XML Toolkit 1.11 support

Infoprint Server now supports XML Toolkit 1.11. It no longer supports XML Toolkit 1.10.

For information about how to use these new capabilities, see:

- [z/OS Infoprint Server Customization](#)
- Infoprint Central online help

What's new in z/OS Version 2 Release 4

Infoprint Server is enhanced in z/OS Version 2 Release 4 with these new capabilities:

Dynamic configuration at all times

Dynamic configuration is now always enabled. It lets you change Infoprint Server configuration attributes without stopping and restarting Infoprint Server. It lets administrators use the Infoprint Server ISPF panels or the Printer Inventory Definition Utility to change most system configuration attributes instead of editing the `aopd.conf` file. You must still edit a few startup attributes in `aopd.conf`.

Infoprint Central enhancements

Infoprint Central is updated with these enhancements:

Predictable JVM user ID

By setting the new **use-http-userid** attribute (**Use Apache server ID** on the ISPF System Configuration panel) to **yes**, you can start the Java™ virtual machine (JVM) using the user ID of the Apache HTTPD server instead of the user ID of the first user to log into Infoprint Central. Using a predictable user ID lets you use that ID to customize Work Load Manager (WLM) parameters. It improves performance because the WLM can identify JVM jobs and allocate more system resources to them. It also allows all users to view trace files, and prevents the JVM from crashing when it tries to write to a trace file created by a different user ID.

More classes for printer work selection criteria

You can specify up to 36 output classes that a printer can select for processing.

Usability and accessibility enhancement

The new **Limit** field lets you specify the maximum number of objects to display on a search pane.

Accessible and signed PDFs

These job attributes and corresponding fields on the ISPF panels are added to support accessible and signed PDFs:

- **pdf-author**
- **pdf-digital-certificate-name**
- **pdf-keywords**

- **pdf-signature-contact**
- **pdf-signature-location**
- **pdf-signature-name**
- **pdf-signature-reason**
- **pdf-subject**
- **pdf-title**
- **pdf-user-accessibility-control-file**

Security enhancement

New messages are written to the common message log when an unauthorized user tries to access objects protected by the Resource Access Control Facility (RACF®).

For information about how to use these new capabilities, see:

- [z/OS Infoprint Server Customization](#)
- [z/OS Infoprint Server Messages and Diagnosis](#)
- [z/OS Infoprint Server Operation and Administration](#)
- [z/OS Infoprint Server User's Guide](#)

What's new in z/OS Version 2 Release 3

Infoprint Server is enhanced in z/OS Version 2 Release 3 with these new capabilities:

Dynamic trace facility

As an option, the trace facility for Infoprint Server can use cross-system coupling facility (XCF) signaling to adjust trace parameters dynamically while the target daemon is running. The dynamic trace facility uses new trace fields in the ISPF System Configuration panel or new PIDU attributes instead of environment variables to start or stop tracing for Infoprint Server daemons. With dynamic tracing, users do not need to change environment variables and then stop and restart one or more Infoprint Server daemons.

Infoprint Central enhancements

Infoprint Central is updated with these enhancements:

Job ID search function updates

When you select **Infoprint Server print jobs** and use the **Job ID** field on the Work with Print Jobs page to search for print jobs, the search function works in these ways:

- When you specify a numeric job ID, Infoprint Server searches for all standard JES job prefixes (such as JOB) in addition to the Infoprint Server configuration **job-prefix** (such as PS).
- When you specify a job ID and select **Show only exact matches**, Infoprint Server searches for jobs that exactly match the job ID you specified. Previously, Infoprint Server ignored the **Show only exact matches** field when it was specified with the **Job ID** field.

Search for multiple forms

You can now specify up to eight FORMS names on the Work with Print Jobs page when you are searching for JES print jobs. The search finds all print jobs that match any of the specified FORMS.

Usability and web browser support

The user interface is updated to improve usability, and now includes support for Microsoft Edge 25 or later.

Infoprint Port Monitor 3.2

Infoprint Port Monitor 3.2 is a new release that supports ~~Windows 7~~, Windows 8.1, Windows 10, Windows Server 2012, and Windows Server 2016.

IP PrintWay backup printer capability

The print administrator can now use IP PrintWay extended mode to define a backup printer in case a print failure occurs on the primary printer. The backup printer is defined in an ISPF printer definition panel or PIDU. The operator can then select the backup printer for IP PrintWay to use when the primary printer is not functioning.

Java 8 support

z/OS Java Technology Edition, Version 8 is supported for Infoprint Server in z/OS V2R3.

JES2 job grouping

Infoprint Server supports using JES2 JCL statements to define job groups that describe the relationships among multiple separate jobs. For example, the JCL statements can control the order and conditions under which a group of jobs run: job A can run before jobs B and C, and job D can run after jobs B and C.

For information about the new JCL statements, see [z/OS MVS JCL Reference](#)

Mail transport replacement for sendmail

In z/OS V2R3, IP PrintWay uses the sendmail to Communications Server Simple Mail Transport Protocol (SMTP) bridge as the mail transport instead of using the z/OS UNIX sendmail program. The sendmail bridge provides an API that is compatible with the sendmail program API so that programming changes are not required.

While the sendmail bridge performance might be better than the sendmail program, the sendmail bridge does not support these functions:

- Email delivery to local TSO and UNIX System Services mailboxes.
- The **-m** option on the **lp** command.
- Creation of alias files. Only existing alias files are supported.

Also, only a limited number of options are supported by the **mailer-options** system configuration attribute or AOPMAILER_OPTIONS environment variable that the sendmail bridge uses.

Support for 8-character TSO/E user ID

Infoprint Server now supports 8-character TSO/E user IDs.

For information about how to use these new capabilities, see:

- [z/OS Infoprint Server Customization](#)
- [z/OS Infoprint Server Messages and Diagnosis](#)
- [z/OS Infoprint Server Operation and Administration](#)
- [z/OS Infoprint Server User's Guide](#)

Chapter 2. Using Infoprint Server

These scenarios describe how you can use Infoprint Server in your particular environment to meet your printing needs:

- [“Printing CICS or IMS output data on network printers” on page 11](#)
- [“Printing z/OS UNIX System Services data on AFP printers” on page 11](#)
- [“Printing web documents with the Infoprint Port Monitor for Windows” on page 12](#)
- [“Printing documents over the internet with the Internet Printing Protocol” on page 13](#)
- [“Printing from batch applications to network printers” on page 14](#)
- [“Printing AFP data from batch applications on LAN-based PCL printers and sending it to email destinations” on page 14](#)
- [“Creating and printing AFP documents from Windows” on page 15](#)
- [“Printing SAP R/3 documents on AFP printers” on page 16](#)

These scenarios are examples of printing situations, but do not represent all situations that exist. Each scenario includes a figure that shows which components are used. The components are shaded in the figures. Infoprint Server components are displayed in yellow, while the separate transform products are displayed in blue.

Printing CICS or IMS output data on network printers

A large international manufacturing company recently configured a LAN and purchased network printers to replace its coaxially-attached SNA printers. This company wants to print inventory control reports from its CICS and IMS applications to the network printers, instead of to its usual set of SNA printers. The company wants to route the reports to one or more remote locations, such as warehouses, docks, and the plant floor, while it takes advantage of the security, accounting, and recovery capabilities of z/OS.

Here is how this company can use the Infoprint Server components to meet its requirements:

1. The CICS or IMS applications submit print requests by using VTAM in the same way as they submit print requests to SNA printers. No changes to the CICS or IMS applications are necessary.
2. The NetSpool component 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 IP PrintWay uses to transmit the output to a particular network printer.
3. The IP PrintWay component transmits the output data sets from the JES spool to one or more network printers on TCP/IP. The z/OS IP security function can encrypt the data.

Figure 2 on page 11 shows how Infoprint Server directs the data to network printers.

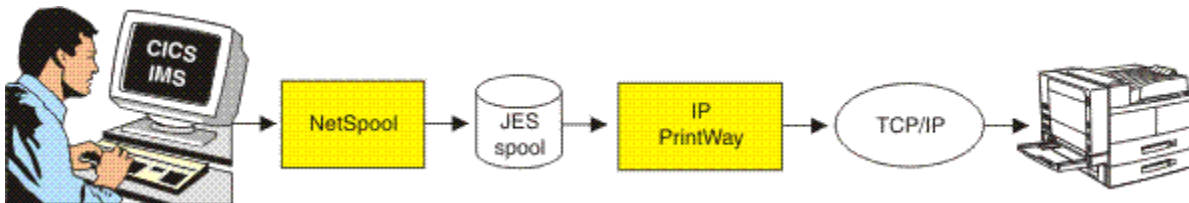


Figure 2. Printing CICS or IMS output data on network printers

Printing z/OS UNIX System Services data on AFP printers

A midsize retailer runs UNIX applications that are ported to z/OS UNIX System Services. Until now, the applications printed business statements to PostScript printers controlled by a print server that runs on

a UNIX system. Now, the retailer wants to use a higher-speed AFP printer that is attached to an IBM Z mainframe for more efficient printing.

Here is how this retailer can use the Infoprint Server components and a transform product to meet its requirements:

1. The UNIX user logs on to z/OS UNIX System Services by using the **rlogin** function.
2. Using the z/OS UNIX System Services printing commands that Infoprint Server provides, the UNIX applications print directly to the Print Interface component. For information about printing commands, see [“z/OS UNIX System Services printing commands”](#) on page 19.
3. The Print Interface component automatically calls the transform product to convert PostScript or PDF documents to AFP format.
4. The Print Interface component creates output data sets on the JES spool.
5. PSF selects the output data sets from the JES spool and prints them on an AFP printer. If the retailer has more than one AFP printer, the first available printer can print the data sets.

[Figure 3 on page 12](#) shows how Infoprint Server directs z/OS UNIX System Services data to AFP printers.

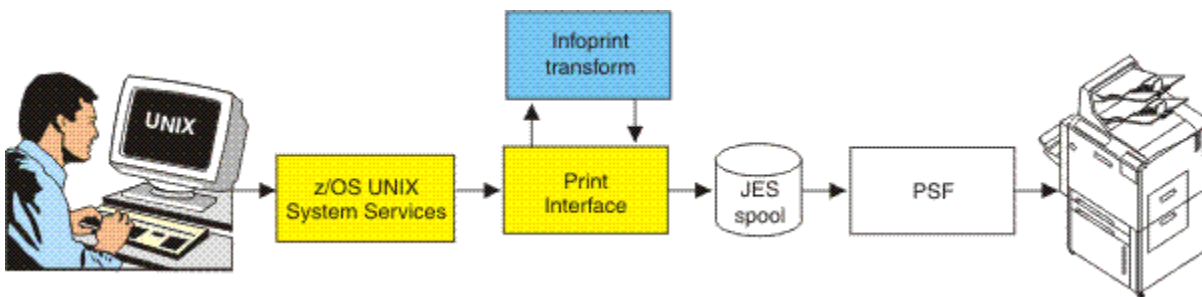


Figure 3. Printing z/OS UNIX System Services data on AFP printers

Tip: Users can also submit print requests from UNIX workstations by using the **lpr** command or the **lptrafp** command.

Printing web documents with the Infoprint Port Monitor for Windows

A market research firm wants to print web-based documents on LAN-based PCL printers and on an AFP printer that is attached to an IBM Z mainframe. To improve performance and to specify Infoprint Server job attributes, some users install the Infoprint Port Monitor for Windows on their Windows systems.

1. From a Windows workstation, a user views a document from the web by using a browser, such as Microsoft Edge.
2. The user submits the document for printing by using the standard print-submission method that the browser provides. The user selects a Windows printer that the Infoprint Port Monitor manages and, as an option, specifies job attributes in the Infoprint Port Monitor for Windows window. The Infoprint Port Monitor sends the document to a z/OS printer defined to Infoprint Server, which might be a PostScript printer or an AFP printer. The printer driver that is associated with the printer creates an output file. For example, a PCL driver creates an output file in PCL format.
3. The Infoprint Port Monitor for Windows transmits the output file across TCP/IP to the Print Interface component.
4. The Print Interface component automatically calls the transform product to convert PCL data into the document format that is required by the printer, if necessary. For example, if the selected printer is an AFP printer, the PCL to AFP transform converts data to AFP format.
5. The Print Interface component creates an output data set on the JES spool by using the JES output parameters that are defined by the administrator and the JES output parameters that correspond to the job attributes that the user specified. The JES output parameters specify routing information that

PSF and IP PrintWay can use to transmit the output to a printer. These parameters can also specify how the job is printed.

6. If the selected printer is a remote PCL printer, the IP PrintWay component transmits the output data set to the PCL printer on TCP/IP. If the selected printer is an AFP printer, PSF prints the data set on the AFP printer. The z/OS IP security function can encrypt the data.

Figure 4 on page 13 shows how Infoprint Server directs data from the web to PostScript or AFP printers.

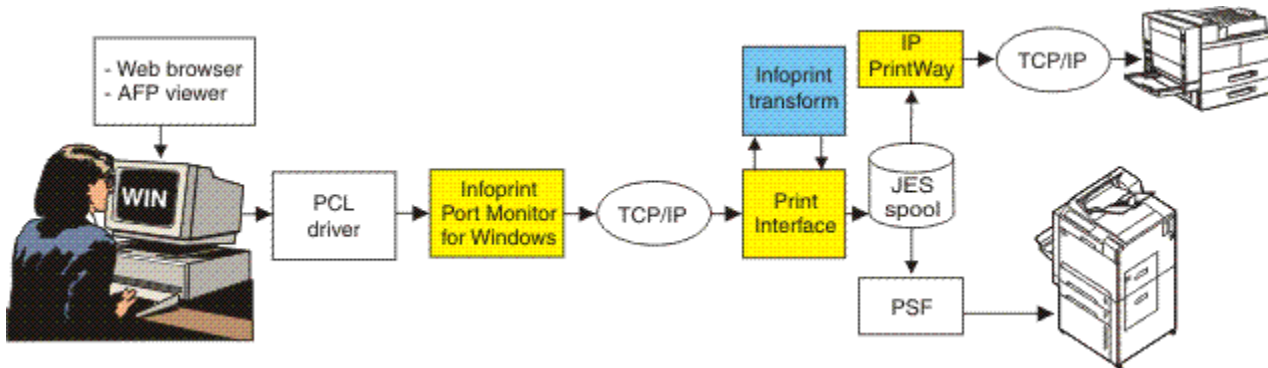


Figure 4. Printing documents from the web with the Infoprint Port Monitor for Windows

Printing documents over the internet with the Internet Printing Protocol

A market research firm wants to print documents that are created by Windows applications over the internet to PostScript printers and high-speed AFP printers that are attached to an IBM Z mainframe. The company runs on a Windows system that provides an integrated IPP client. It also installs printers that support the Internet Printing Protocol (IPP).

1. From a Windows workstation, a user submits a document for printing by using the standard print-submission method that the Windows application provides. The user selects a z/OS printer that is defined to Infoprint Server, which might be a remote PostScript printer or a locally attached AFP printer. The printer driver that is associated with the printer creates an output file in the required format. For example, the AFP Printer Driver for Windows creates an output file in AFP format for printing on AFP printers.
2. The IPP printing protocol included in Windows automatically transmits the output file over the internet to the Print Interface component.
3. The Print Interface component creates an output data set on the JES spool by using JES output parameters that are defined by the administrator. The JES output parameters specify routing information that PSF and IP PrintWay can use to transmit the output to a printer. They can also specify how the job is to be printed.
4. If the selected printer is a remote PostScript printer, the IP PrintWay component transmits the output data set to the PostScript printer on TCP/IP. If the printer supports the IPP protocol, the IP PrintWay component communicates with the printer's IPP server. If the selected printer is an AFP printer, PSF prints the data set on the AFP printer. The z/OS IP security function can encrypt the data.

Figure 5 on page 14 shows how Infoprint Server directs data to PostScript or AFP printers.

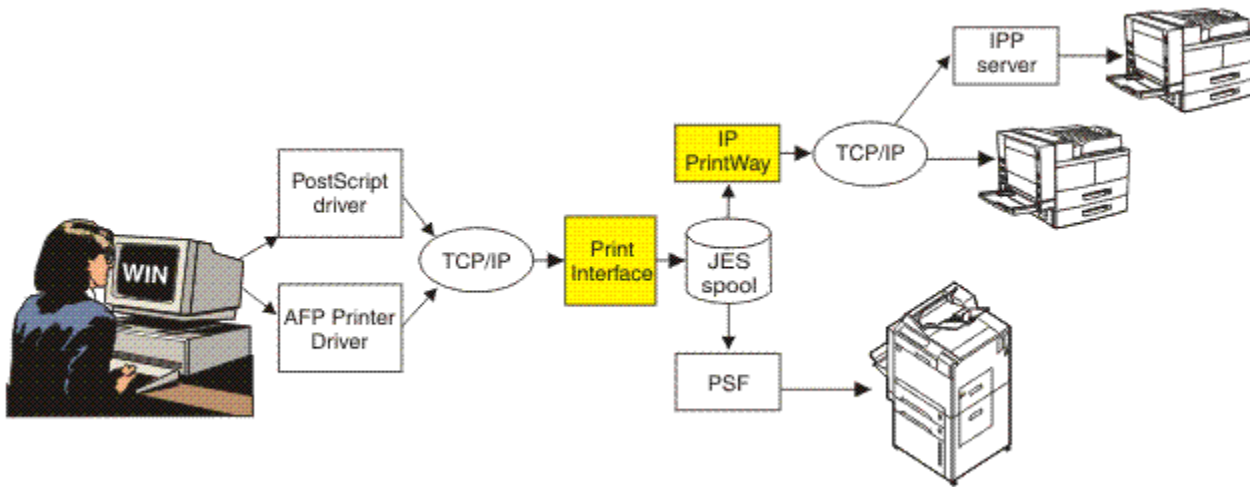


Figure 5. Printing documents with the IPP Printing Protocol

Printing from batch applications to network printers

A financial institution wants to use z/OS 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. The printers are in a TCP/IP network.

Here is how this financial institution can use the Infoprint Server components to meet its requirements:

1. The financial institution uses a z/OS batch application to generate statements, segment the statements by branch office, and store them in separate files for printing.
2. The application uses job control language (JCL) to submit the files directly to the JES spool.
3. The IP PrintWay component transmits the files from JES2 or JES3 to branch office printers in a TCP/IP network. In TCP/IP, the z/OS IP security function can encrypt the data.

Figure 6 on page 14 shows how Infoprint Server directs batch data to network printers.

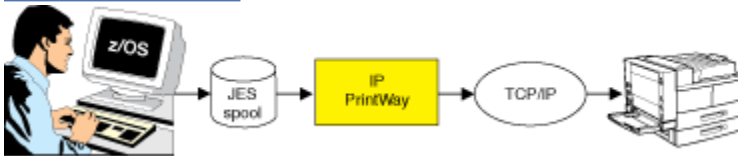


Figure 6. Printing from batch applications to network printers

Printing AFP data from batch applications on LAN-based PCL printers and sending it to email destinations

A bank creates its loan applications in AFP format for printing on high-speed AFP printers. The company also wants to print these documents at their branch offices. However, the printers at their branch offices can print only PCL data. This company also wants to send the loan applications to some branch offices as email attachments in PDF format. These branch offices can view and save the PDF file and print the loan applications later on any type of printer.

Here is how the company can use Infoprint Server and separate transform products to meet its requirements:

1. A batch application that is running on z/OS submits an AFP document to the JES spool. The application's JCL creates two output data sets with the same data, one to be printed on a PCL printer in the branch office and one to be sent to an email address list.

2. The IP PrintWay component determines that the AFP document must be transformed into PCL format for printing and into PDF format for sending to the email destination. IP PrintWay calls the transform products.
3. The AFP to PCL and AFP to PDF transforms use AFP resources, such as a form definition and fonts from the AFP resource libraries, to convert the AFP data to PCL and to PDF format.
4. IP PrintWay transmits the document in PCL format from the JES spool to the PCL printers.
5. IP PrintWay transmits the document in PDF format from the JES spool to the email address list. The email recipients can use Adobe Acrobat Reader to view the document and print it on any printer.

Figure 7 on page 15 shows how Infoprint Server can print AFP data to a PCL printer and send it to an email destination.

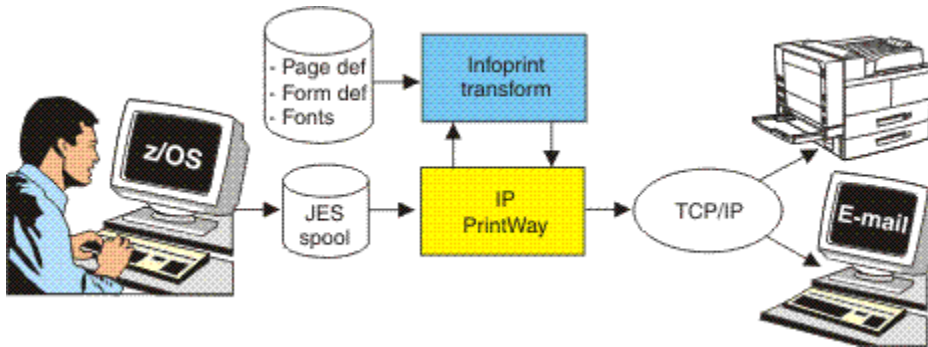


Figure 7. Printing AFP from batch applications to PCL printers and sending AFP data to email destinations

Creating and printing AFP documents from Windows

A large production printing company uses a word processor on Windows workstations to prepare its manuals. It then uses AFP printers on the z/OS system to print the manuals.

Here is how this company can use Infoprint Server to develop and print from a Windows environment:

1. At a Windows workstation, a writer uses a word processor to prepare a manual. The writer then uses the standard print-submission method that the word processor provides to submit the manual to an AFP printer attached to the z/OS system. The AFP Printer Driver that is associated with the printer creates an output file in AFP format.
2. The Infoprint Port Monitor for Windows automatically transmits the output file across TCP/IP to the Print Interface component.
3. The Print Interface component creates an output data set on the JES spool.
4. PSF selects the print job from the JES spool and directs it to the selected AFP printer.

Figure 8 on page 15 shows how Infoprint Server lets a user create and print AFP documents from Windows.

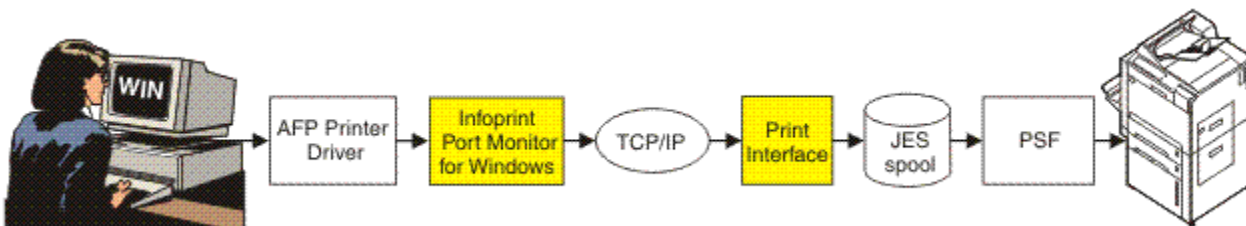


Figure 8. Creating and printing AFP documents from Windows

Printing SAP R/3 documents on AFP printers

A manufacturing company wants to print purchase orders that are generated by SAP R/3 applications on high-speed AFP printers. With no changes to the SAP R/3 applications, this company can convert SAP R/3 documents to AFP format and print them on AFP printers that are attached to z/OS.

Here is how the company can use Infoprint Server, a separate transform product, and the SAP R/3 Application Server for z/OS to meet its requirements:

1. With the SAP R/3 GUI, a user submits a document for printing on an SAP R/3 output device, which the SAP R/3 administrator associates with a printer defined to Infoprint Server. The SAP R/3 application server converts the document to PCL format and sends it to the spool work process of the SAP R/3 Application Server for z/OS. The spool work process must run on the same system as Infoprint Server.
2. The SAP R/3 Application Server's spool work process submits the document (in PCL format) to the Infoprint Server SAP Output Management System (OMS), which is part of the Print Interface component.
3. Print Interface determines that the document must be transformed into AFP format for printing. Print Interface calls the PCL to AFP transform.
4. The PCL to AFP transform converts the data to AFP format.
5. Print Interface creates an output data set on the JES spool.
6. PSF selects the output data set from the JES spool and directs it to the selected AFP printer.
7. When the data set finishes printing or is deleted from the JES spool, the Print Interface SAP Callback daemon sends notification back to the SAP application server that submitted the print request. The notification indicates whether the data set printed successfully.

Figure 9 on page 16 shows how Infoprint Server lets SAP R/3 users print on AFP printers that are controlled by PSF.

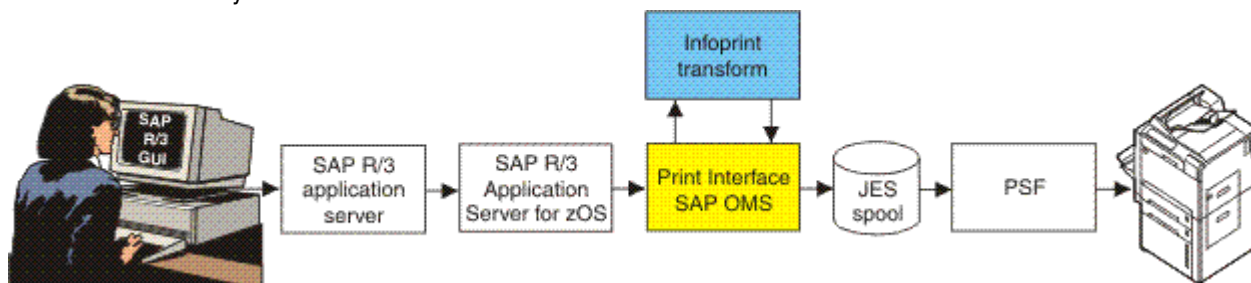


Figure 9. Printing SAP R/3 documents on AFP printers

Chapter 3. Understanding the components of Infoprint Server

Figure 10 on page 17 shows how most of the components of Infoprint Server fit into your system. Infoprint Server components are displayed in yellow and marked with I in the upper-right corner, while the separate transform products are displayed in blue and marked with T.

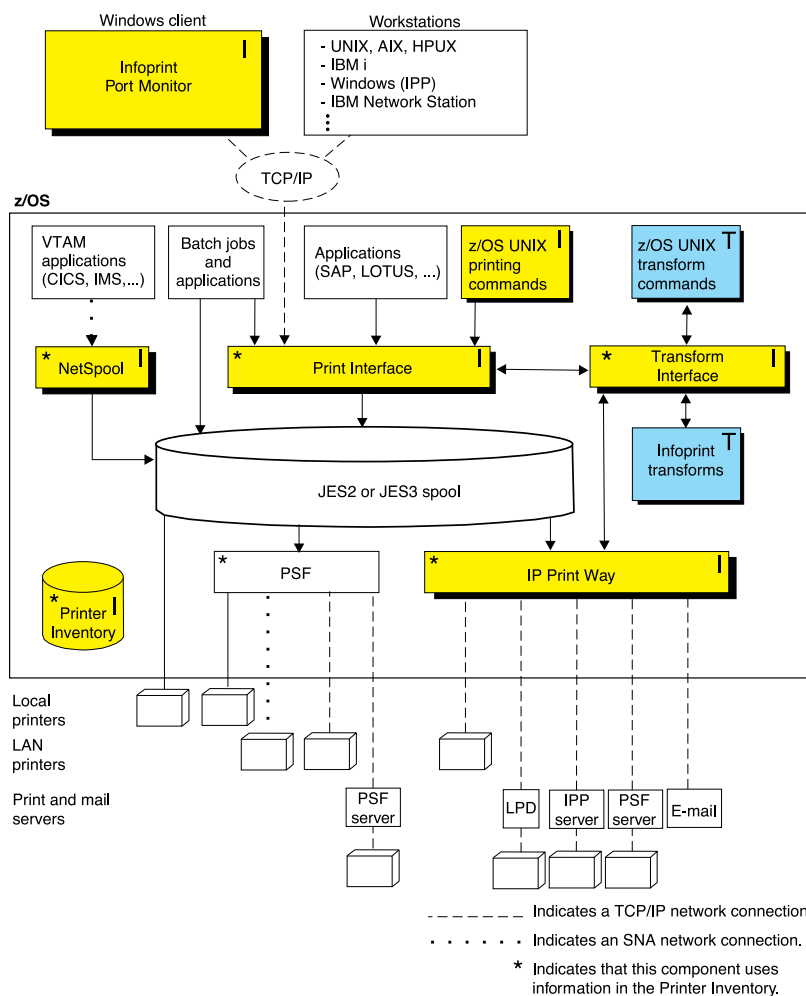


Figure 10. Infoprint Server components

Printer Inventory

The Printer Inventory is a set of UNIX files in the z/OS file system, either Hierarchical File System (HFS) or z/OS File System (zFS), that is maintained by the system administrator. The Printer Inventory contains information about the z/OS printers, including both local and remote printers. In one central location, it contains all the information that is needed to do these tasks:

- Validate print requests.
- Transform data to a format supported by the printer.
- Allocate data sets on the JES spool.
- Direct data sets to printers.

The Printer Inventory is common to the Print Interface, IP PrintWay, and NetSpool components of Infoprint Server. This means that the system administrator can define a printer once for all components

of Infoprint Server. However, the Printer Inventory cannot be shared by Infoprint Server components that are running on other z/OS systems.

The system administrator can also specify configuration information in the Printer Inventory that PSF and the AFP Download Plus feature of PSF can use. The PSF system administrator can change the configuration information more easily in the Printer Inventory without restarting all the PSF printers or AFP Download Plus senders that use the same startup procedure. The PSF operator needs to restart only the one PSF printer or AFP Download Plus sender whose configuration information changed.

Note: PSF customers can specify configuration information in the Printer Inventory without purchasing Infoprint Server. For information about the Printer Inventory for PSF function, see [*z/OS Infoprint Server Printer Inventory for PSF*](#).

Print Interface

The Print Interface component of Infoprint Server provides z/OS UNIX System Services printing commands and a subsystem so you can print from the local z/OS system. Print Interface accepts different data formats; transforms the data streams to EBCDIC line data, AFP, PCL, PostScript, PDF, or other data formats that the printer accepts; and allocates output data sets on the JES spool.

Print Interface also provides an LPD that you can use to submit print requests from remote workstations that have TCP/IP access. In addition, Print Interface can receive print requests from remote workstations that use the Internet Printing Protocol (IPP). Print Interface also provides an SAP R/3 Output Management System that can receive SAP R/3 print requests.

Print Interface does these functions:

- It creates an output data set on the JES spool for each document to be printed. Print Interface maps the printing options that are specified on **lp** commands and some of the printing options that are specified on **lpr** commands to JES output parameters. These parameters are the same parameters that you can specify on JCL statements when you submit batch jobs.
- It responds to query requests with the status of the output data set on the JES spool or a list of the printers that are defined in the Printer Inventory.
- It responds to cancel requests by removing data sets that are on the JES spool. The data sets must not yet be selected for printing. For security reasons, Print Interface does not allow unauthenticated users on remote systems to cancel print requests.

After Print Interface creates output data sets on the JES spool, the data sets can be printed in any of these ways:

- JES or PSF can print the data sets.
- JES can transmit the data sets to another location for printing.
- IP PrintWay can transmit the data sets to a remote printer in your Internet Protocol network.

Some of the benefits of Print Interface are:

- Printing of any data format that the printer supports

Print Interface lets users submit print requests with any data format that the printer supports. These formats include, but are not limited to, PCL, PostScript, MO:DCA-P, line data, XML, and text. Print Interface automatically detects the data format.

- Automatic data transform

If you installed an IBM transform product, Print Interface can automatically transform data to and from the AFP data format on the z/OS system. In addition, if you installed a Ricoh transform product, Print Interface can automatically send data to AIX®, Windows, and Linux systems to be transformed remotely.

- Validation of print requests

Before it accepts print requests, Print Interface validates, with some exceptions, that a document can print as requested on the selected printer. For example, Print Interface rejects a document with a data format that the printer does not support or that cannot be transformed into a supported data format.

- Notification of completion

Print Interface notifies users on the local z/OS system when document processing is complete.

- Identification of printed output

Print Interface maintains the user ID of the job submitter for printing on separator pages. With both PSF and IP PrintWay, installations can write an exit to print separator pages.

- Double-byte character set (DBCS) support

Print Interface converts DBCS data from one code page to another before it writes the data to the JES spool.

- IPP server

Print Interface includes an IPP server to support printing from Windows systems. Windows users can use the IPP server to print on z/OS printers without installing the Infoprint Port Monitor for Windows.

- SAP R/3 Output Management System

Print Interface provides an SAP R/3 Output Management System (OMS) that is SAP-certified as interface software for the SAP R/3 4.0 system. SAP R/3 users can use the SAP OMS, with the SAP R/3 Application Server for z/OS, to print on any printer that is defined in the Printer Inventory, cancel jobs, obtain accurate job status, and receive immediate notification when their documents completed (successfully or unsuccessfully).

- Print Interface subsystem

The Print Interface subsystem can transform and print output from z/OS applications with minimal changes to the applications' job control language (JCL). The subsystem processes the application's output, transforms it to the format required by the printer or email destination, and writes it to the JES spool. From the JES spool, the transformed data can be printed on any printer, including AFP printers that are controlled by PSF and PostScript or PCL printers that are controlled by the IP PrintWay component of Infoprint Server. Also, the transformed data can be sent to email destinations with the email support that IP PrintWay provides.

z/OS UNIX System Services printing commands

Print Interface includes enhanced z/OS UNIX System Services printing commands, which provide more function than the printing commands available without Infoprint Server. These enhanced commands conform to UNIX standards to facilitate the porting of UNIX applications to z/OS UNIX System Services:

lp

The **lp** command sends files for printing to Print Interface running on the local z/OS system. The files can be UNIX files or traditional MVS™ data sets, such as sequential data sets and partitioned data sets. This command conforms to the Single UNIX Specification Version 3 standard.

lpstat

The **lpstat** command queries the status of print jobs. It also queries the names, locations, and descriptions of printers that the administrator defined in the Printer Inventory. This command conforms to the X/Open Portability Guide Issue 4 Version 2 (XPG4.2) standard.

cancel

The **cancel** command cancels print requests, if the data set allocated on the JES spool is not yet selected for printing. This command conforms to the X/Open Portability Guide Issue 4 Version 2 (XPG4.2) standard.

Some of the benefits of these commands are:

- Notification of completion

These commands let users request notification when data set processing on the JES spool completes. Notification can be sent to the terminal or can use the electronic mail facility.

- Specifying AFP printing options

On the **lp** command, users can request printing options for printing on AFP printers. For example, users can specify the names and locations of user-defined form definitions and page definitions.

- Specifying printing options in a file

To make specification of printing options easier, the **lp** command lets users specify the printing options in a file and name the file on the command.

- Specifying printing options in an environment variable

The **lp** command also lets users specify printing options in an environment variable. Options that are specified in a variable take effect automatically. The user can override these options on the command line or in a file.

- Printing on remote printers that are not defined in the Printer Inventory

On the **lp** command, users can specify routing information, such as the Internet Protocol (IP) address or host name and the print queue name, for remote printers in the Internet Protocol network. This lets users print on remote printers that the administrator did not define in the Printer Inventory.

NetSpool

NetSpool intercepts print data from VTAM applications, such as CICS and IMS; transforms the data streams to EBCDIC line data, PCL, PDF, or other formats that the printer accepts; and allocates output data sets on the JES spool. JES or PSF can print the output data sets or JES can transmit them to other locations for printing. IP PrintWay can transmit the output data sets to remote printers in your Internet Protocol network.

NetSpool supports these data streams:

- SNA character string (SCS) data over a logical unit (LU) type 1 session
- 3270 data over an LU type 0 or type 3 session
- Binary data over an LU type 0, type 1, or type 3 session

You can configure NetSpool so that you do not need to change existing VTAM applications. That is, existing VTAM applications can send print requests to NetSpool in the same manner as they currently send print requests to SNA network printers.

Some of the benefits of NetSpool are:

- Data integrity

By placing VTAM application output on the JES2 or JES3 spool, NetSpool lets you take advantage of the security, checkpoint and restart, and reprint capabilities that JES provides.

- Printer sharing

NetSpool lets multiple VTAM applications direct output to the JES spool for simultaneous printing on a single shared printer.

- Print broadcasting

NetSpool lets a single VTAM application simultaneously direct output to the JES spool for printing on multiple printers.

- AFP formatting

Users can specify AFP parameters, such as page definition, form definition, and character sets, to take advantage of AFP formatting when printing on AFP printers.

- DBCS support

NetSpool supports DBCS data in both SCS and 3270 data streams.

- Transparent-data support

NetSpool supports transparent data in SCS data streams and provides exits for adding and changing transparent data.

- Owner and job attribute support

VTAM application programmers can embed the **owner** job attribute and other Infoprint Server job attributes in the application's print data that is sent to NetSpool. Also, the administrator can specify a NetSpool default owner in the printer definition.

- Transforms

NetSpool can transform data streams from one format to another, such as from SCS and 3270 data streams to:

- Line data streams for printing on AFP printers (does not require a separate transform product)
- Line data streams and then to PDF data for viewing in an email attachment (requires the AFP to PDF transform)
- PCL data streams for printing on network printers (does not require a separate transform product)

When converting to PCL, NetSpool can preserve more print-formatting controls in SCS data streams by generating corresponding PCL commands. This results in greater print fidelity. For example, when converting SCS data, Infoprint Server can:

- Preserve line-density and print-density controls
- Preserve paper-source, output-bin, job-separation, and duplex controls
- Preserve portrait and landscape page-orientation controls
- Automatically change the page orientation and reduce the font size, if necessary, page by page

IP PrintWay

IP PrintWay transmits output data sets from the JES spool to remote printers or print servers and to email destinations.

You can run either IP PrintWay basic mode or IP PrintWay extended mode:

- IP PrintWay basic mode, the original mode of operation, uses the z/OS Functional Subsystem Interface (FSI) to obtain output data sets from the JES spool. IBM does not plan more enhancements to IP PrintWay basic mode.
- IP PrintWay extended mode uses the z/OS SYSOUT Application Programming Interface (SAPI) to obtain output data sets from the JES spool. It provides better performance, improved usability, and more function than IP PrintWay basic mode.

IP PrintWay basic mode and IP PrintWay extended mode use the same printer definitions in the Printer Inventory.

In addition:

- IP PrintWay can transmit output data sets to remote printers or host systems in an Internet Protocol network. A print server can be running on the host system. The remote printer or host system can support one of these TCP/IP protocols:
 - LPR/LPD protocol
 - Internet Printing Protocol (IPP)
 - Direct socket printing protocol
- IP PrintWay can transmit output data sets to one or more email addresses. Each output data set is sent as an email attachment. If you install an AFP to PDF transform, IP PrintWay can transform line data and AFP data so that the email recipients can view and print the output with Adobe Acrobat Reader.

Some of the benefits of IP PrintWay are:

- JCL parameters to route data sets

A user who is submitting a batch job from z/OS can specify routing information in JCL. For example, the user can specify the name of the remote print queue or the port number, the IP address or the host name of the printer's host system, or the email addresses of the recipients of the email.

- Data integrity

IP PrintWay can retransmit data sets to remote printers. It can also verify that the transmission of data is successful before it deletes data sets from the JES spool. (Even though transmission is successful, the data set might not yet be printed.)

In addition, IP PrintWay can retain data sets on the JES spool for a specified amount of time after either successful or failed transmissions.

If you use IP PrintWay extended mode and the direct sockets protocol, IP PrintWay can track the number of pages that are printed on printers that support Hewlett Packard (HP) Printer Job Language (PJM). IP PrintWay can restart printing after the last page that printed. This can prevent duplicate pages.

- IPsec data encryption

You can use the IP security function of z/OS Communications Server to encrypt data that Infoprint Server sends to printers and print servers that support Internet Protocol security (IPsec). Encrypting data ensures the confidentiality of the data that you send to the printer.

- Distribution of data to a workstation

Transmitting data sets to a print queue on a workstation lets users use workstation applications not only to print data, but also to view, archive, or fax the data.

- Accounting

For each data set processed, IP PrintWay writes a System Management Facilities (SMF) type 6 record, which includes the number of bytes transmitted and the IP address of the printer.

If you use IP PrintWay extended mode and the direct sockets protocol, IP PrintWay can track the number of pages that are printed on printers that support Hewlett Packard (HP) Printer Job Language (PJM). IP PrintWay can record the number of pages that printed successfully for each document. This provides more accurate accounting information in SMF type 6 records.

- Installation exits

IP PrintWay lets system programmers write exits to customize IP PrintWay processing. For example, in an exit you can change routing information, add separator pages, edit SMF accounting records, and notify users of processing events.

- DBCS support

IP PrintWay supports conversion of DBCS data from extended binary-coded decimal interchange code (EBCDIC) to ASCII before transmission to a remote printer for printing.

- Transforms

IP PrintWay can transform data from one format to another. For example, it can transform data from AFP format to PCL, PostScript, or PDF format with a separate transform product. IP PrintWay extended mode can call transforms directly, while IP PrintWay basic mode transforms data by resubmitting it to Print Interface. Calling transforms directly is more efficient because data is not written to the JES spool a second time.

Transform Interface

Transform Interface communicates with IBM and Ricoh transform products. It works with the transform products listed in “Transform products” on page 4. Transform Interface manages transforms that run on the z/OS system. In addition, it can send data to remote systems, such as Linux, to be transformed.

Infoprint Central

Infoprint Central is a web-based print management system primarily for help desk operators. However, other authorized users or job submitters can also use it. Infoprint Central works with IP PrintWay extended mode. With Infoprint Central, you can:

- Work with print jobs

You can find and work with print jobs that are on the JES spool. Plus, you can see more information about print jobs that Infoprint Server or PSF for z/OS already processed. For example, you can see

whether an Infoprint Server print job completed successfully and where it printed – even if the print job is no longer on the JES spool.

You can use several different search criteria to find print jobs. After you find a print job, you can delete, hold, release, move, or change the priority of the print job. And, you can see all messages for that one print job.

- Work with printers

You can find and work with printers that are defined in the Printer Inventory – including AFP printers that are controlled by PSF (called *PSF printers*), and all printers to which IP PrintWay extended mode sends print jobs (called *IP PrintWay printers*).

You can also work with PSF AFP Download Plus senders as if they were PSF printers. An AFP Download Plus sender sends print jobs to a receiver on another system for printing, emailing, faxing, or archiving.

You can use various search criteria to find printers. After you find a printer, you can see its status, the printer's job queue, and view other properties of the printer. You can do these printer actions:

- IP PrintWay printers: Start, stop, redirect, restore, ping, turn online, turn offline, and reset. Also, you can see all the messages from Infoprint Server for that one printer.
- PSF printers: Start, stop, space, interrupt, pause (JES2 only), ping, turn online, turn offline, and reset. Also, you can change forms and other job selection criteria, and you can see all the messages from PSF for that one printer. If the PSF printer is an AFP Download Plus sender, you can do a limited set of PSF printer actions.

Some printer actions (ping, turn online, turn offline, and reset) are available only for TCP/IP-attached printers.

- Work with NetSpool logical units

You can work with any NetSpool logical units (LUs) that are defined to NetSpool in the Printer Inventory and also defined to VTAM.

You can find LUs by name. After you find a NetSpool LU, you can start and stop it. When you start an LU, that LU is started in both Infoprint Server and VTAM. Likewise, when you stop an LU, that LU is stopped in both Infoprint Server and VTAM. You can also display information about the current VTAM session that is established with a NetSpool LU.

- Display printer definitions

You can display the properties of any printer definition in the Printer Inventory. You can use various search criteria to find printer definitions, including the printer definition name and the printer's location. This action can help you find the name of a printer in your area.

- Work with job selection rules

You can display the job selection rules that are defined in the Printer Inventory. IP PrintWay selects only print jobs whose properties match all of the criteria in a started job selection rule. In addition, you can start and stop IP PrintWay job selection rules to change which print jobs IP PrintWay processes.

- Check system status

You can see the status of all Infoprint Server daemons and tasks. This action can help you determine the cause of a printing problem.

- View Infoprint Central logs

You can view the Infoprint Central message logs to find out who used Infoprint Central to do an action on a print job, printer, or NetSpool LU. For example, you can find out who deleted a print job or who redirected a printer.

Windows workstation support

This Infoprint Server Windows client is included with Infoprint Server or it can be downloaded from the web:

Infoprint Port Monitor for Windows

Software that runs on a Windows workstation. You can use it to print files on z/OS printers just like you print files on local Windows printers. You can submit the files from any Windows application that has a printing function. After the Infoprint Port Monitor is installed and configured on the Windows system, it automatically sends documents to the Print Interface component of Infoprint Server.

The following related products from Ricoh are also run on Windows systems. You might want to use them if your installation has AFP printers or AFP documents.

AFP Printer Driver for Windows

Creates output files in AFP format. Files in AFP format can be printed on AFP printers. The driver can create output files that contain documents, overlays, or page segments. It can also create inline form definitions for printing documents with special options, such as printing on both sides of the paper.

AFP Viewer Plug-in for Windows

Used to view documents in AFP format. For example, documents that are downloaded from the z/OS system or documents on the web. You can also use the viewer to print AFP documents on AFP and on non-AFP printers.

Some of the benefits of the Infoprint Port Monitor, AFP Printer Driver, and AFP Viewer Plug-in are:

Printing with standard Windows printing windows

Windows users can use the Infoprint Port Monitor to print on any z/OS printer that is defined in the Printer Inventory by using standard print-submission methods from Windows applications that support printing.

Print Interface also includes support for the Internet Printing Protocol (IPP) on Windows. Therefore, Windows users can use standard print-submission methods to print without installing the Infoprint Port Monitor for Windows. However, installing the Infoprint Port Monitor for Windows might improve performance. Also, users can use the Infoprint Port Monitor for Windows to specify Infoprint Server job attributes.

Viewing AFP documents

Windows users can use the AFP Viewer Plug-in to view AFP documents, such as documents downloaded from the z/OS system or retrieved from the web.

Printing AFP documents on non-AFP printers

Windows users can use the AFP Viewer Plug-in to view AFP documents, and then print them on non-AFP printers and on AFP printers.

Printing on AFP printers

Windows users can use the AFP Printer Driver to print documents, including web-based documents in other formats, on AFP printers.

Appendix A. Accessibility

Accessible publications for this product are offered through [IBM Documentation \(www.ibm.com/docs/en/zos\)](http://www.ibm.com/docs/en/zos).

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 \(www.ibm.com/systems/campaignmail/z/zos/contact_z\)](http://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 Documentation 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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Policy for unsupported hardware

Various z/OS elements, such as DFSMSdfp, JES2, JES3, and MVS, contain code that supports specific hardware servers or devices. In some cases, this device-related element support remains in the product even after the hardware devices pass their announced End of Service date. z/OS may continue to service element code; however, it will not provide service related to unsupported hardware devices. Software problems related to these devices will not be accepted for service, and current service activity will cease if a problem is determined to be associated with out-of-support devices. In such cases, fixes will not be issued.

Minimum supported hardware

The minimum supported hardware for z/OS releases identified in z/OS announcements can subsequently change when service for particular servers or devices is withdrawn. Likewise, the levels of other software products supported on a particular release of z/OS are subject to the service support lifecycle of those

products. Therefore, z/OS and its product publications (for example, panels, samples, messages, and product documentation) can include references to hardware and software that is no longer supported.

- For information about software support lifecycle, see: [IBM Lifecycle Support for z/OS \(www.ibm.com/software/support/systemsz/lifecycle\)](http://www.ibm.com/software/support/systemsz/lifecycle)
- For information about currently-supported IBM hardware, contact your IBM representative.

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