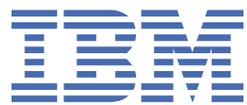z/OS
Version 2 Release 4

Infoprint Server User's Guide

IBM

Note

Before using this information and the product it supports, read the information in "Notices" on page 197.

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About this publication

This publication describes how to print jobs with Infoprint Server, a separately priced feature of z/OS®. This publication applies to z/OS Version 2 Release 4.

This publication describes how to:

- Submit jobs to Infoprint Server from these operating systems:
  - z/OS UNIX System Services
  - z/OS with Job Control Language (JCL)
  - z/OS with Virtual Telecommunications Access Method (VTAM®) applications (the term *VTAM* refers to the z/OS Communications Server SNA Services element of z/OS)
  - These remote systems with Transmission Control Protocol/Internet Protocol (TCP/IP) installed:
    - Windows
    - Advanced Interactive Executive (AIX®)
    - z/OS
    - Virtual Machine (VM) or z/VM®
    - IBM® i
    - Novell NetWare
- Query printer names, printer locations, or print job status
- Cancel print jobs
- Transform print jobs from one data format to another

Who should read this publication

This publication is for anyone who prints documents with Infoprint Server.

How to read syntax diagrams

The general notations that this document uses in syntax diagrams are explained here. For ease of reading, this document breaks some examples into several lines. However, when you enter a command, enter it all on one line. Do not press **Enter** until you type the entire command.

Table 1. Syntax notation				
			For example:	
This notation:	**Means:**	**You enter:**	**This document shows:**	**You enter:**
Apostrophes	String	As shown	`SEND '123'`	`SEND '123'`
Bold	Keyword	As shown	`CLASS`	`CLASS`
Braces	List of items	The braces and one or more items from the list	`{GT10 GT12}`	`{GT10 GT12}`
Brackets	Optional item	One item or no items	`aopstop [now]`	`aopstop`
Comma	Separator	As shown	`DISPLAY C,K`	`DISPLAY C,K`

			For example:	
Table 1. Syntax notation (continued)				
This notation:	**Means:**	**You enter:**	**This document shows:**	**You enter:**
Ellipsis	Repeatable item	One or more items	*filename ...*	`file1 file2`
Lowercase	Item the system defines	As shown, in lowercase	`lp`	`lp`
Lowercase italics	Variable item	A value for the item	`MOUNT `*`devnum`*	`MOUNT A30`
Parentheses	List of items	The parentheses and one or more items from the list	`(GT10,GT12)`	`(GT10,GT12)`
Special characters	Various symbols	As shown	`%filter-options`	`%filter-options`
Underline	Default	The item, or you can omit it	`K T `<u>`REF`</u>	`K T`
Uppercase	Item the system defines	As shown, in uppercase	`PRMODE`	`PRMODE`
Vertical bar	UNIX pipe (the output of the first is input to the second)	As shown	`ls	lp`	`ls	lp`
Vertical bar in braces	Required choice	One item	`{NOW|FOREVER}`	`FOREVER`
Vertical bar in brackets	Optional choice	One item or no items	`[PORTNO| PRTQUEUE]`	`PORTNO`

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, ZOSV2R4. 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
z/OS Upgrade Workflow	GA32-0889	Describes the tasks that are required to upgrade to z/OS V2R4. Includes the migration tasks for Infoprint Server.
z/OS Release Upgrade Reference Summary	SA23-2300	Describes new and changed messages and interfaces in z/OS V2R4. Includes the messages and interfaces for Infoprint Server.
z/OS Infoprint Server Customization	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 V2R4.

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*.

Table 2. Documents for Infoprint Server		
Document	**Form number**	**Description**
z/OS Infoprint Server Introduction	SA38-0692	Introduces Infoprint Server. This document contains printing scenarios that show how you can use Infoprint Server in your installation.
z/OS Infoprint Server Customization	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.
z/OS Infoprint Server Operation and Administration	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.
z/OS Infoprint Server Printer Inventory for PSF	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.

Table 2. Documents for Infoprint Server (continued)		
Document	**Form number**	**Description**
z/OS Infoprint Server User's Guide	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.
z/OS Infoprint Server Messages and Diagnosis	GA32-0927	Describes messages from Infoprint Server. This document also describes how to use Infoprint Server tracing facilities to diagnose and report errors.

Table 3. Documents for IBM transform products		
Document	**Form number**	**Description**
IBM Infoprint Transforms to AFP for z/OS	G550-0443	Describes IBM Infoprint Transforms to AFP for z/OS (5655-N60)
IBM Print Transforms from AFP for Infoprint Server for z/OS	G325-2634	Describes these products: • 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)
IBM Infoprint XT for z/OS	GI11-9492	Describes IBM Infoprint XT for z/OS (5655-O15)

Table 4. Documents for Ricoh products	
Ricoh Document	**Description**
InfoPrint Transform Manager for AIX, Linux, and Windows: Planning and Installing in **Ricoh Production Print Information Center (info.rpp.ricoh-usa.com/help/index.jsp)**	Describes InfoPrint Transform Manager and provides installation and configuration information about the product
InfoPrint Transform Manager for Linux: afp2pdf Transform Installation and User's Guide in **Ricoh Production Print Information Center (info.rpp.ricoh-usa.com/help/index.jsp)**	Describes the InfoPrint Transform Manager for Linux 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 xix.

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: z/OS Infoprint Server User's Guide, SA38-0695-40

   • 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).

• Contact your IBM service representative.

• Call IBM technical support.

Summary of changes

This information includes terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations for the current edition are indicated by a vertical line to the left of the change.

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

- These new attributes are added to support accessible PDFs (APAR OA52466):
  - "pdf-author" on page 67
  - "pdf-keywords" on page 69
  - "pdf-subject" on page 71
  - "pdf-title" on page 71
  - "pdf-user-accessibility-control-file" on page 72

  See "Job attribute listing" on page 48, Appendix A, "Job attributes and JCL parameters," on page 169, and Appendix B, "JCL parameters and corresponding job attributes," on page 173.

- These new attributes are added to support signed PDFs (APARs OA55427 and OA55478):
  - "pdf-digital-certificate-name" on page 68
  - "pdf-signature-contact" on page 70
  - "pdf-signature-location" on page 70
  - "pdf-signature-name" on page 71
  - "pdf-signature-reason" on page 71

  See "Job attribute listing" on page 48, Appendix A, "Job attributes and JCL parameters," on page 169, and Appendix B, "JCL parameters and corresponding job attributes," on page 173.

- New values are added for the "pdf-encryption-level" on page 68 attribute. See "Job attribute listing" on page 48.

Changed

- The web site from which you can download the `lprafp` command is changed. See Chapter 10, "Printing with the lprafp command," on page 163.

Deleted

- References to automatic creation of the system configuration definition are deleted.
- Because dynamic configuration is now always enabled, references to situations where Infoprint Server behaves differently depending on whether dynamic configuration is enabled are 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

- A new job attribute is added so that an IP PrintWay printer definition name can be identified for a backup printer. See "backup-printer-definition-name" on page 49 and Table 21 on page 169. Also, see the Retry function in "IP PrintWay" on page 13.

Changed

- Infoprint Port Monitor is updated to V3.2. See "Windows client" on page 4, "Determining the print submission protocol" on page 147, "Installing Infoprint Port Monitor for Windows" on page 148, and "Uninstalling Infoprint Port Monitor for Windows" on page 155.
- The description of the Infoprint Server job ID is updated in "cancel--Cancel a print job" on page 24, "lp--Print a file" on page 26, and "AOPPRINT results" on page 129.
- The **-c** option description is updated in "lp--Print a file" on page 26.
- Local TSO and UNIX System Services mailboxes can no longer receive emails through the sendmail bridge. "Sending a file to an email destination" on page 29, "Sending output to an email destination" on page 86, and "Sending a file to an email destination" on page 127 are updated for the new sendmail bridge, including removal of information that describes how to receive email replies.
- "Using the email address list in an alias file" on page 88 is updated because in z/OS V2R3 you cannot create new alias files to be used with the sendmail bridge.
- The z/OS UNIX sendmail program that IP PrintWay uses is changed to use the sendmail to Communications Server SMTP (CSSMTP) bridge as the mail transport. Therefore, all references to "z/OS UNIX sendmail function" are changed to "sendmail bridge". See MAILBCC, MAILCC, MAILTO, and REPLYTO in "JCL parameters for printing with IP PrintWay" on page 94.

Deleted

- References to IP PrintWay using VTAM services to transmit data to printers in an SNA network are removed from:
  - Chapter 1, "Introducing Infoprint Server," on page 1
  - "IP PrintWay" on page 13
  - "Infoprint Central" on page 18
  - Chapter 2, "Using Infoprint Server z/OS UNIX commands," on page 21
  - **lp** command: "Options" on page 27 and "Print multiple copies of each file" on page 31
  - "copies" on page 51
  - "COPIES=nnn" on page 96
  - "FCB=fcb_name" on page 99
  - "Print multiple copies of a data set" on page 130
  - "Using a Windows application" on page 154
- References to Infoprint Coaxial Printer Support for z/OS (Part Number 5655-N62) are removed from the figure in "IP PrintWay" on page 13.
- The **-m** option is removed from "lp--Print a file" on page 26.

z/OS Version 2 Release 2 (V2R2)

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

New

- The IBM HTTP Server powered by Domino® that Infoprint Central previously used is replaced with the IBM HTTP Server - Powered by Apache. See "Infoprint Central" on page 18.
- Chapter 1, "Introducing Infoprint Server," on page 1, which was omitted from the previous edition, is now in the publication.
- Two new job attributes are added so that IP PrintWay extended mode can include data from an existing text job attribute or a message inline at the beginning of each email. See "mail-inline-message" on page 62, "mail-inline-text-attribute" on page 63, and Table 21 on page 169.

Changed

- Information about Infoprint Central help is updated. See "Infoprint Server online help" on page xvii.
- The description of Infoprint Central in Chapter 1, "Introducing Infoprint Server," on page 1 is updated.
- The location of Infoprint Port Monitor V3.1 files that are included with Infoprint Server are added to "Windows client" on page 4. Also, web pages for downloading the AFP Printer Driver and the AFP Viewer plug-in are updated.
- The results in "Send a file to an email destination specified in job attributes" on page 33 are updated.
- An AOPRINT example, "Print with error processing" on page 130, is updated.
- A note is added to "Using the LPR command" on page 155 that specifies the limit for sending print jobs.

Deleted

- References to "Windows Server 2003" and "Windows XP" as supported operating systems for Infoprint Port Monitor are removed.
- The "SNMP subagent" section is removed from Chapter 1, "Introducing Infoprint Server," on page 1 because the **aopsnmpd** daemon is no longer supported in Infoprint Server V2R2. The SNMP subagent allowed the IBM Network Printer Manager (NPM) to manage PSF-driven printers. Now that most PSF-driven printers are TCP/IP-connected and have a built-in SNMP agent, the Infoprint server SNMP subagent is no longer used. As an alternative to using a network management system to monitor PSF-controlled printers, you can use Infoprint Central.

  Also, references to "Simple Network Management Protocol (SNMP) subagent", "SNMP", and "SNMP subagent" are removed from:

  - The Infoprint Server components that are listed after Figure 1 on page 1.
  - Figure 2 on page 3 and the list of components in bullet 2.
- An example for the PRTATTRS JCL parameter is removed. See "PRTATTRS='attribute=value ...' " on page 104.
- A rule for storing SUBSYS attributes in an attributes file is deleted. See "JCL parameters for the Print Interface subsystem" on page 111.

Chapter 1. Introducing Infoprint Server

Infoprint Server supports LAN and host printing on your z/OS system. It works together with data stream transforms that other transform products provide. Figure 1 on page 1 shows how most of the components of Infoprint Server fit into your system. The components of Infoprint Server and the transform products are shaded. 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. Following the figure is a description of each component.
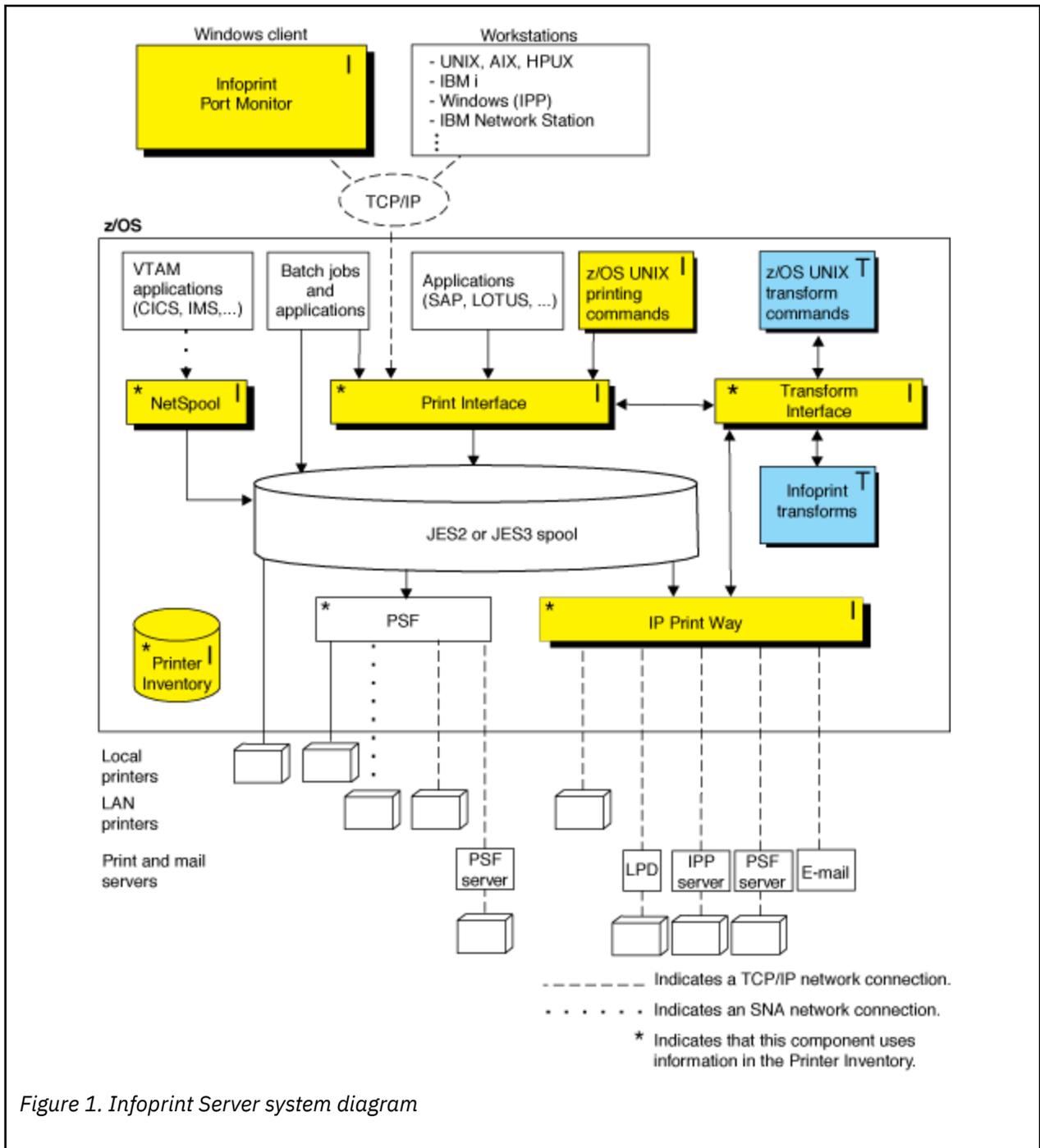
Figure 1. Infoprint Server system diagram

Printer Inventory and Printer Inventory Manager
The Printer Inventory Manager controls the Printer Inventory. The Printer Inventory consists of files in a z/OS UNIX file system (HFS or zFS) that contain information about printers and print jobs. The Printer Inventory also contains information about system configuration.

Infoprint Server Windows Client
The Infoprint Server Windows client consists of the Infoprint Port Monitor, which sends print requests and job attributes to Print Interface.

Print Interface
Print Interface processes print requests from remote clients and from the local z/OS system and allocates output data sets on the JES spool. Print Interface accepts various data formats and can transform input data streams to EBCDIC line data, ASCII text data, AFP, PCL, PostScript, PDF, or other data formats that the printer accepts. A separate transform product is required for some transforms.

NetSpool
NetSpool processes print requests from VTAM applications, such as CICS® and IMS, and allocates output data sets on the JES spool. NetSpool accepts SCS, 3270, and binary data streams and can transform input data streams to EBCDIC line data, PCL, PDF, AFP, or other data formats that the printer accepts. A separate transform product is required for some transforms. However, a separate transform product is not required to convert input data streams to the line or PCL formats.

IP PrintWay
IP PrintWay transmits data sets from the JES spool to printers or print servers in a TCP/IP network and to email destinations. IP PrintWay accepts various data formats and can transform input data streams to ASCII text data, PCL, PostScript, PDF, or other data formats that the printer accepts. A separate transform product is required for some transforms.

Transform Interface
Transform Interface communicates with other transform products to transform data to another data format. It manages the transforms that run on z/OS, and it sends data to transforms that run on other systems, including Linux, AIX, and Windows systems.

Infoprint Central (not shown in figure)
Infoprint Central is a web-based application that help desk operators use to work with print jobs (output data sets) on the JES spool, printers that are controlled by IP PrintWay extended mode or PSF, and NetSpool logical units. Operators also use Infoprint Central to check system status, view printer definitions, and view, start, and stop job selection rules.

Transforms (separate products)
Transform products can transform data streams from one data format to another. These products are separate from Infoprint Server.

PSF for z/OS (separate product)
PSF for z/OS can use system configuration information that is stored in the Printer Inventory. In addition, PSF can write messages for print jobs and printers to the Infoprint Server common message log.

Printer Inventory Manager

The Printer Inventory Manager component of Infoprint Server controls the Printer Inventory. The Printer Inventory consists of Hierarchical File System (HFS) or z/OS File System (zFS) files that contain information about the printing environment. The administrator must create and manage information in the Printer Inventory.

Note: The Printer Inventory cannot be shared by Infoprint Server running on other systems.

The objects in the Printer Inventory are:

Printer definitions
Contain information about printers and email destinations.

Printer pool definitions
Contain information about groups of printer definitions that you want to broadcast data to (applies only to NetSpool).

FSS definitions
Contain configuration information for IP PrintWay basic mode functional subsystems (FSSs) and PSF FSSs.

FSA definitions
Contain configuration information for IP PrintWay basic mode functional subsystem applications (FSAs) and PSF FSAs.

Job selection rules
Contain rules that IP PrintWay extended mode uses to determine which print jobs to select from the JES spool for printing.

System configuration definition
Contains configuration information for Infoprint Server. Administrators can create or modify this definition.

Trace-parameters objects
Contain trace parameters for tracing a daemon.

Figure 2 on page 3 shows how the administrator can create objects in the Printer Inventory and which components of Infoprint Server use the Printer Inventory.

Figure 2. Printer Inventory Manager system diagram
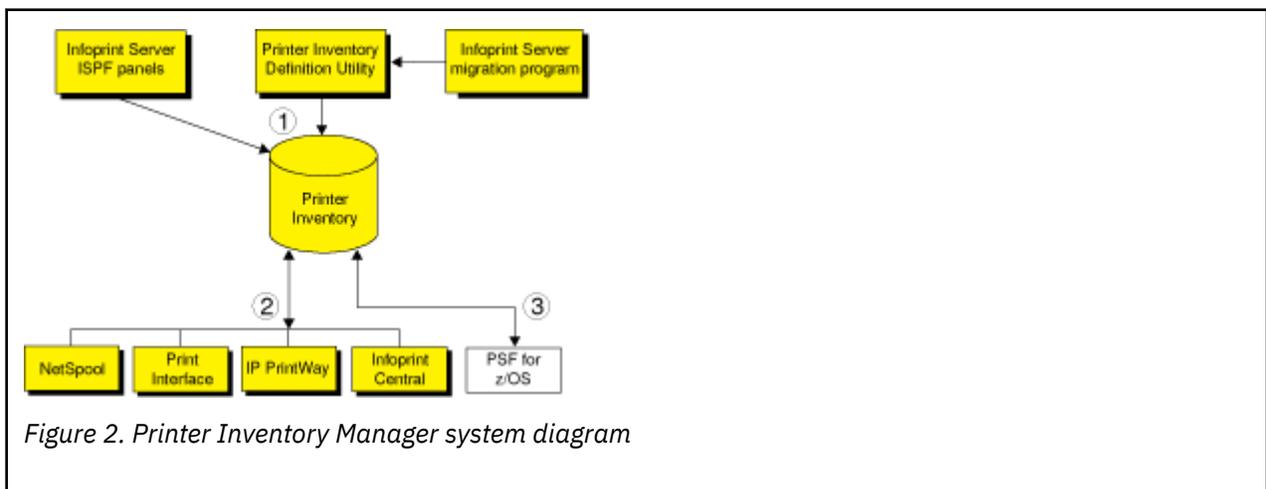
1. The administrator can use Infoprint Server ISPF panels and the Printer Inventory Definition Utility (PIDU) to create and maintain the Printer Inventory. PIDU is useful for creating many printer definitions at the same time and for backing up the Printer Inventory.

2. These Infoprint Server components use information in the Printer Inventory:

   - NetSpool uses information in printer definitions and in printer pool definitions.

   - Print Interface uses information in printer definitions.

   - IP PrintWay uses information in printer definitions. Also, IP PrintWay basic mode uses configuration information in FSS and FSA definitions, and IP PrintWay extended mode uses job selection rules.

   - Infoprint Central displays Printer Inventory information.

3. PSF and the AFP Download Plus feature of PSF can, as an option, use configuration information that is specified in FSS and FSA definitions in the Printer Inventory. For information, see *z/OS Infoprint Server Printer Inventory for PSF*. The system programmer can alternatively specify this configuration information in PSF and AFP Download Plus startup procedures and exits. When the printer configuration information is specified in the Printer Inventory:

   - The information can be changed without restarting all FSAs in the FSS. Only the FSAs with changed configuration information need to be restarted.

- Authorized operators can use Infoprint Central to work with PSF printers. (Operators can work with AFP Download Plus senders in the same way they work with PSF printers.) For example, operators can start and stop (that is, drain) printers, change JES work-selection criteria, and turn TCP/IP-connected printers online and offline.
- PSF can write messages for print jobs and printers to the Infoprint Server common message log. Authorized users can view these messages in Infoprint Central. Infoprint Server administrators can use the **aoplogu** command to select messages in a particular time range and copy them to a file or view them on the terminal.

More functions that the Printer Inventory Manager provides are:

Common message log
The common message log displays messages in one place from Infoprint Server, from some transform products, and from PSF for z/OS. The log contains messages from all components of Infoprint Server except for IP PrintWay basic mode. For information about whether a transform can write messages to the common message log, see the documentation for the transform.

IP PrintWay extended mode writes its messages only to the common message log. Other components, such as NetSpool and Print Interface, write their messages to the common message log and also to other locations, such as the NetSpool message-log data set and the system console log.

You can view and process messages in the common message log in these ways:

- Authorized users can use Infoprint Central to view messages for selected print jobs, IP PrintWay printers, PSF printers, and NetSpool LUs.
- Infoprint Server administrators can use the **aoplogu** command to select messages in a particular time range and copy them to a file or view them on the terminal.

Hardcopy log
Infoprint Server administrators can select messages to send to the z/OS system log (SYSLOG) or operations log (OPERLOG) for message automation.

Historical inventory
The historical inventory contains information about print jobs that Infoprint Server processed but that are no longer on the JES spool because they finished processing or were deleted. Authorized users can use Infoprint Central to view information about these print jobs.

Migration program
The Infoprint Server migration program copies configuration information from PSF and AFP Download Plus startup procedures to the Printer Inventory. It automatically creates PSF FSS and FSA definitions in the Printer Inventory.

Security
You can use a z/OS security manager, such as RACF®, to restrict access to the Printer Inventory, the common message log, operator commands that start and stop Infoprint Server daemons, and Infoprint Central actions.

Printer Inventory for PSF
PSF customers who do not purchase an Infoprint Server license can specify PSF and AFP Download Plus configuration information in the Printer Inventory. For information, see *z/OS Infoprint Server Printer Inventory for PSF*.

Windows client

The Infoprint Server Windows client consists of this program:

Infoprint Port Monitor for Windows
Software that runs on a Windows workstation. You can use this program 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.

Infoprint Port Monitor 3.2 runs on these systems:

32 bit
Windows 7, Windows 8.1, and Windows 10

64 bit
Windows 7, Windows 8.1, Windows 10, Windows Server 2012, and Windows Server 2016

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

Infoprint Port Monitor 3.2 is included with Infoprint Server at:

```
/usr/lpp/Printsrv/win/En_US/aopwin32.exe
/usr/lpp/Printsrv/win/En_US/aopwin64.exe
```

You can also download the Infoprint Port Monitor (www.ibm.com/support/docview.wss?uid=psd1P1000597).

Note: Infoprint Server also supports printing from a Windows system with the Internet Printing Protocol (IPP). To use the IPP protocol, Windows users do not need to install the Infoprint Port Monitor.

You might want to use these products if your installation has AFP printers or prints 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
You can use this product 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 printers and on non-AFP printers.

Note: You can download the AFP Printer Driver for Windows and the AFP Viewer plug-in for Windows from these websites:

- Ricoh AFP Printer Driver website (support.rpp.ricoh-usa.com/internet/dcfdata.nsf/vwWeb/P4000384)
- Ricoh AFP Viewer plug-in website (support.rpp.ricoh-usa.com/internet/dcfdata.nsf/vwweb/p4000233)

Print Interface

The Print Interface component of Infoprint Server processes print requests received from both remote clients and local users. Figure 3 on page 6 shows the steps that occur from the time Print Interface receives a print request until it allocates an output data set on the JES spool. An explanation of each step follows.

Figure 3. Print Interface system diagram
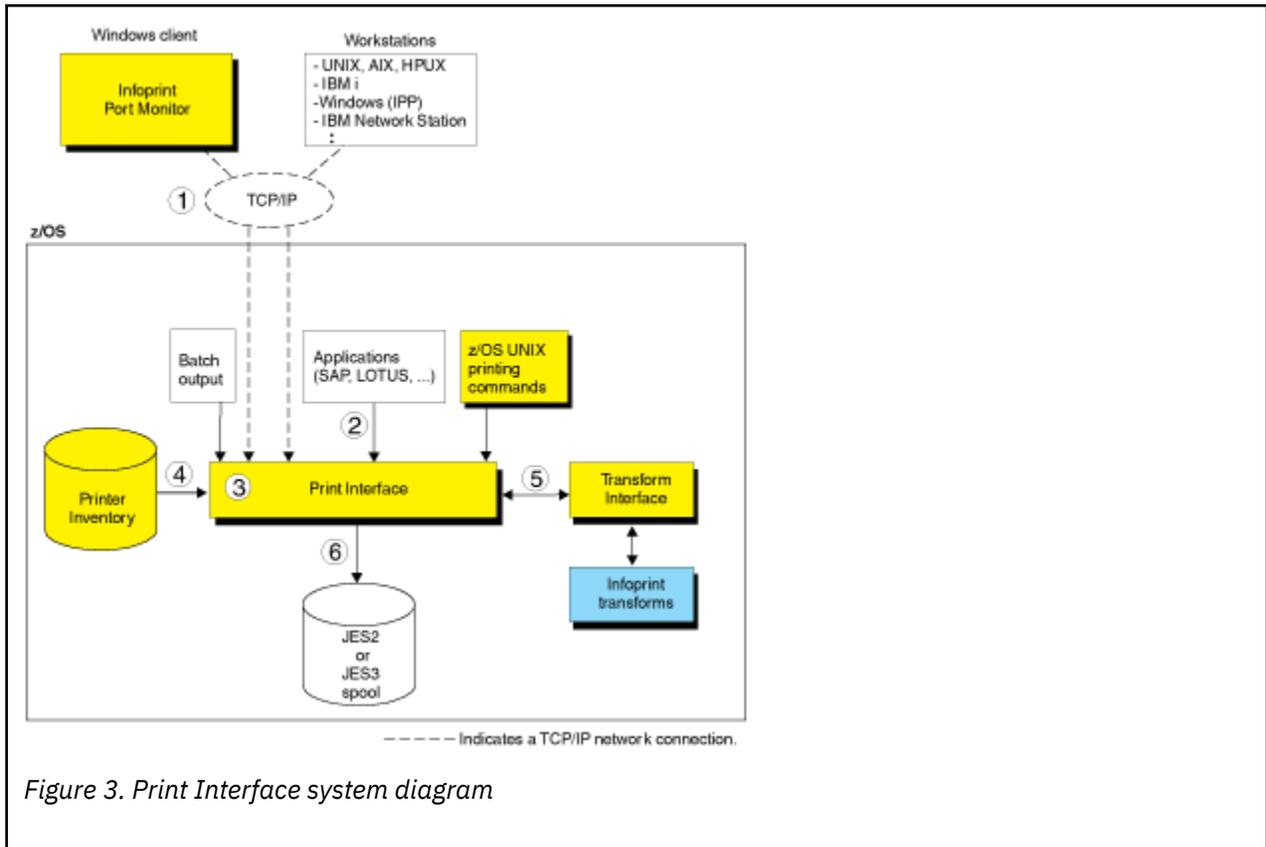
1. Users can submit print requests and query job status from remote clients in the Internet Protocol network with one of these TCP/IP protocols:

   LPR protocol
   > The LPR protocol is defined by RFC 1179. Clients that use this protocol include:
   >
   > - The Infoprint Port Monitor for Windows. Infoprint Server provides this client (see "Windows client" on page 4).
   > - The **lprafp** command for Windows and UNIX systems. You can use this command to specify Infoprint Server job attributes. You can download the **lprafp** command from z/OS downloads (www.ibm.com/systems/z/os/zos/downloads). In the "As-is z/OS downloads" section, select **Infoprint Server for z/OS**.
   > - TCP/IP commands such as **lpr**, **enq**, and **lpq**.
   > - An SAP R/3 application server that runs on a remote system.

   Internet Printing Protocol (IPP)
   > IPP is a standard protocol for printing over the Internet. An IPP client must run in the remote system.

2. Users can submit print requests from the local z/OS system with one of these methods:

   Print Interface subsystem
   > By using the Print Interface subsystem, you can transform and print output data that is created by a batch application with minimal changes to your JCL.

   AOPPRINT
   > By using the AOPPRINT JCL procedure, you can print existing MVS™ data sets and UNIX files.

   z/OS UNIX printing commands (lp, lpstat, and cancel) that Infoprint Server provides
   > By using these commands, you can print MVS data sets and UNIX files, query the status of a print job, and cancel a print job. You can run these commands from the z/OS UNIX command line or from a UNIX application.

⚠️ **Trouble:** If you receive this error message from the **lpstat** or **cancel** command:

`FSUMF014 There is no function provided for this utility`

you are running the z/OS UNIX base command in /bin instead of the Infoprint Server replacement command in /usr/lpp/Printsrv. /bin/lpstat and /bin/cancel are stub commands. z/OS UNIX recognizes them but does not support their function. To make sure that you run /usr/lpp/Printsrv/lpstat and /usr/lpp/Printsrv/cancel, do either of these:

- Use the **mv** command to rename the command in /bin.
- Change your PATH environment variable so that /usr/lpp/Printsrv comes before / bin.

Infoprint Server SAP Output Management System (OMS)
By using the Infoprint Server SAP OMS and the SAP R/3 Application Server for z/OS, SAP R/3 users can submit a print job and receive immediate notification about job events.

3. Print Interface runs as a UNIX application that uses the services of z/OS UNIX System Services.

   Print Interface accepts data in any format, including but not limited to these formats: line data, MO:DCA-P (also known as AFP), PostScript, PDF, PCL, SAP (OTF and ABAP), XML, and text.

4. Each print request specifies the name of a printer definition in the Printer Inventory. The printer definition can describe a printer or an email destination. Print Interface uses information in the printer definition to determine items, such as how to process the data or whether to transform the data.

5. Print Interface can, in most cases, automatically detect the data format of the input data and validate that the printer accepts that data format. Print Interface can convert data between EBCDIC and ASCII. Also, it can use other transform products to transform data into other formats for printing or emailing.

6. For each print request, Print Interface dynamically allocates an output data set on the JES2 or JES3 spool. In a JES2 environment, you can request that Print Interface allocate output data sets on the spool of the primary JES2 subsystem or a secondary JES2 subsystem. Print Interface uses JES allocation parameters that are specified in the printer definition, including:

   - JES work-selection parameters, such as class, forms name, and destination. These parameters cause JES to direct the output data sets to the correct program, such as PSF or IP PrintWay.
   - Advanced Function Presentation (AFP) parameters, such as the name of a form definition and page definition. PSF uses these parameters when printing data on AFP printers.

Some additional functions that Print Interface provides include:

Transforms
Print Interface can transform data to line data or text format without using a separate transform product. It can:

- Transform text data into line data for printing on AFP printers.
- Transform line data (for example, in a sequential data set or a partitioned data set) into text data for printing on a network printer or emailing.

Print Interface can also transform data to AFP format for printing on AFP printers, and it can transform data to PCL, PostScript, or PDF format for printing or emailing. To do these transforms, Print Interface can use the transform products that are described in "Transforms" on page 17.

Validation of print requests
Print Interface can validate, with some exceptions, that the document can print as requested on the selected printer. For example, Print Interface can reject documents with data formats that the printer does not support or that are too large to print on the selected printer.

Notification of completion
Print Interface can notify users on the local z/OS system when document processing is complete and the data set is removed from the JES spool. It can also notify users who request mail notification with a command, such as **lpr**, that uses the LPR to LPD protocol.

Operator control

The operator can use tools, such as SDSF and Infoprint Central, to find output data sets that Print Interface writes to the JES spool. Infoprint Central can display additional status, such as whether the output data sets (called *print jobs*) are completed successfully, are retained because of failed transmission to LAN printers, or are deleted before printing.

Identification of output

Print Interface retains the user ID of the job submitter for printing on separator pages and for display on the JES spool so that the user ID can be printed on separator pages and the operator can see the name of the job submitter when the data set is on the JES spool.

Double-byte character set (DBCS) support

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

Filters

You can write filter programs to modify data before Print Interface writes the data to the JES spool. For example, a filter can add separator pages or transform data from one format to another.

SAP Output Management System (OMS)

Print Interface provides an SAP OMS with a Callback daemon to support printing with the SAP R/3 Application Server for z/OS. SAP users can use the OMS and Callback daemon to print, cancel jobs, obtain job status, and receive immediate notification about job events.

The SAP-certified functions that Print Interface provides are:

- OMS Polling Interface
- OMS/XOM Callback Interface
- OMS Operations Supplement

For more information about SAP certification, see the SAP website (www.sap.com).

describes SAP OMS support. The Print Interface LPD can print documents that are received from an SAP R/3 application server that is running on another system, such as an AIX or Windows system. describes this support.

Print Interface with an SAP R/3 application server on the z/OS system

shows how the Print Interface SAP Output Management System (OMS), Callback daemon, and the SAP R/3 Application Server for z/OS fit into your system. When the SAP R/3 Application Server runs on the same z/OS system, the Print Interface OMS receives print and status requests, and the Callback daemon provides immediate notification of job events. The SAP R/3 Application Server for z/OS and its spool work process must run on the same system as Infoprint Server. The Print Interface Callback daemon can return notification of job events to SAP R/3 application servers that run on other SAP R/3 systems, if the SAP spool work process runs on the z/OS system.

Figure 4. Printing SAP R/3 documents with an SAP R/3 application server that runs on a z/OS system
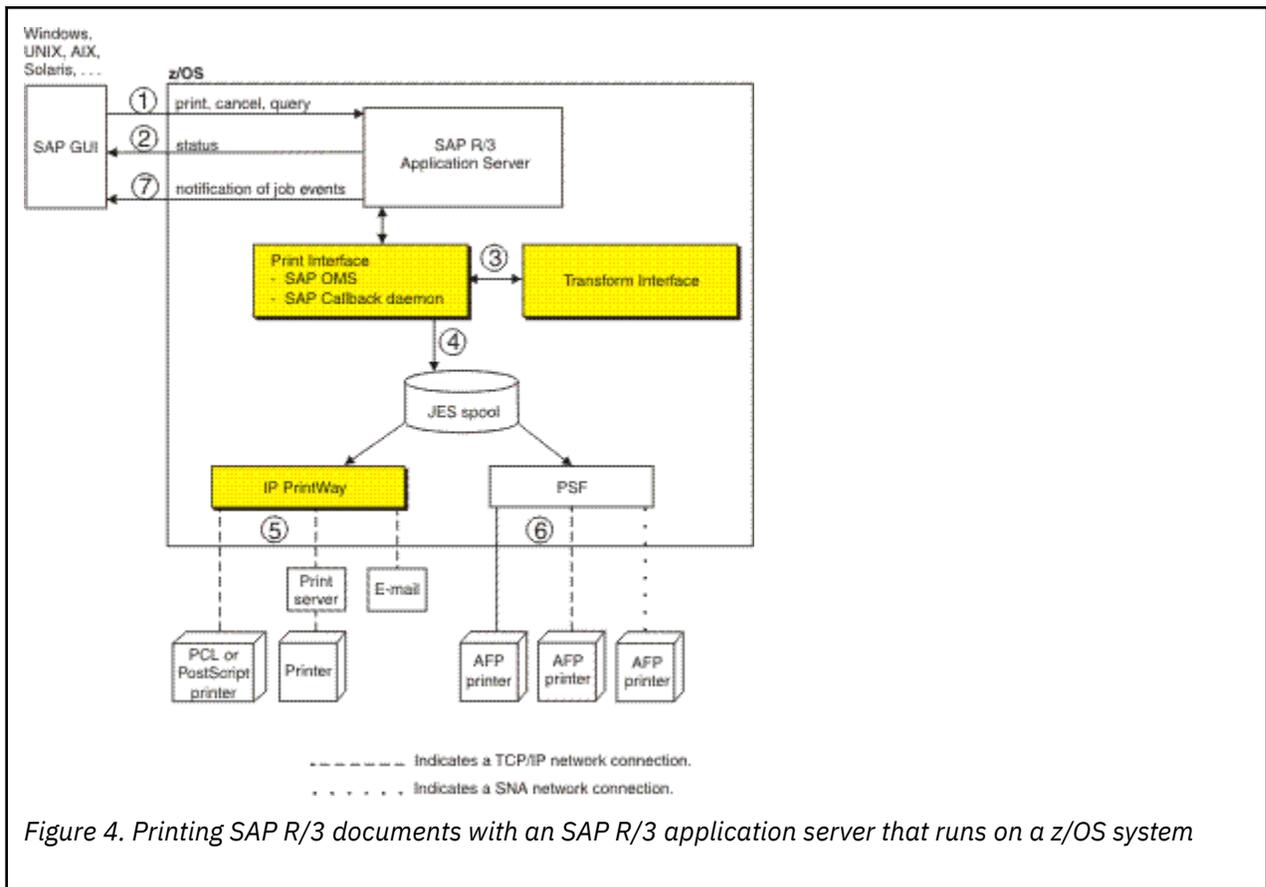
1. From an SAP R/3 GUI, users make print, cancel, job query, and device query requests to the SAP R/3 Application Server. These print requests specify the name of an SAP R/3 output device that is defined to the SAP R/3 system. The SAP administrator associates each output device with a printer definition in the Infoprint Server Printer Inventory.

2. For a status request, the Print Interface SAP OMS returns the status of a print job or a list of print jobs that the printer is processing.

3. For a print request, Print Interface automatically detects the data format. It calls Transform Interface to transform the data to another format if the administrator specified a filter in the printer definition. For example, if the data format is PCL or PostScript, Transform Interface can call the PCL to AFP transform or the PostScript to AFP transform to transform the data to AFP format for printing on an AFP printer.

4. Print Interface creates an output data set on the JES spool. From the JES spool, IP PrintWay, PSF, or JES can print the document.

5. IP PrintWay selects data sets from the JES spool and transmits them to remote printers, print servers, or email destinations.

6. PSF selects data sets from the JES spool and prints them on AFP printers. The printers can be local, TCP/IP-attached, or SNA-attached.

7. As print jobs complete (successfully or unsuccessfully), the Print Interface SAP callback daemon sends notification back to the SAP R/3 system.

Print Interface with an SAP R/3 application server on a remote system

Figure 5 on page 10 shows how the Print Interface LPD and an SAP R/3 application server that runs on a remote system (such as AIX or Windows) fit into your system. When no SAP R/3 application server is running on the z/OS system, the Infoprint Server LPD (as opposed to the Infoprint Server OMS) receives print and status requests, and notification of job events does not occur.

Figure 5. Printing SAP R/3 documents with an SAP R/3 application server that runs on a non-z/OS system
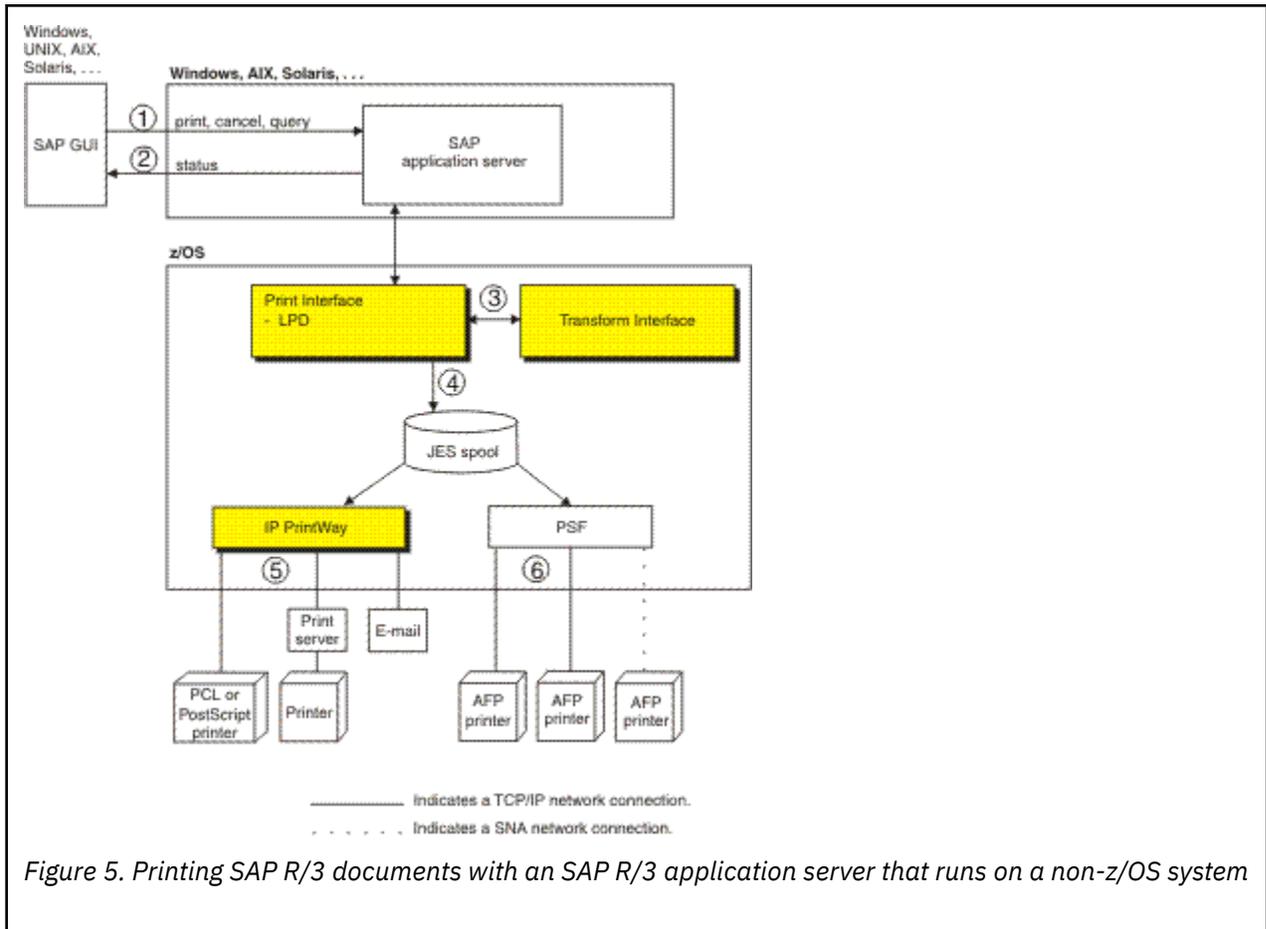
1. From an SAP R/3 GUI, users make print, cancel, job query, and device query requests to an SAP R/3 application server that runs on a remote system such as Windows, AIX, or Solaris. These print requests specify the name of an SAP R/3 output device that is defined to the SAP R/3 system. The SAP administrator associates each output device with a printer definition in the Infoprint Server Printer Inventory.

2. For a status request, the Print Interface LPD returns the status of a print job or a list of print jobs that the printer is processing.

3. For a print request, Print Interface automatically detects the data format. It calls Transform Interface to transform the data to another format if the administrator specified a filter in the printer definition. For example, if the data format is PCL or PostScript, Transform Interface can call the PCL to AFP transform or the PostScript to AFP transform to transform the data to AFP format for printing on an AFP printer. The transform that you need depends on the type of output the SAP R/3 output device creates.

4. Print Interface creates an output data set on the JES spool. From the JES spool, IP PrintWay, PSF, or JES can print the document, or IP PrintWay can send it to an email destination.

5. IP PrintWay selects data sets from the JES spool and transmits them to remote printers or print servers or sends them to email destinations.

6. PSF selects data sets from the JES spool and prints them on AFP printers. The printers can be local, TCP/IP-attached, or SNA-attached.

NetSpool

The NetSpool component of Infoprint Server 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 creates output data sets on the JES2 or JES3 spool. 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.

Figure 6 on page 11 shows the steps that occur from the time VTAM applications send print requests to NetSpool printer logical units (LUs) until NetSpool allocates output data sets on the JES spool. An explanation of each step follows.

Figure 6. NetSpool system diagram
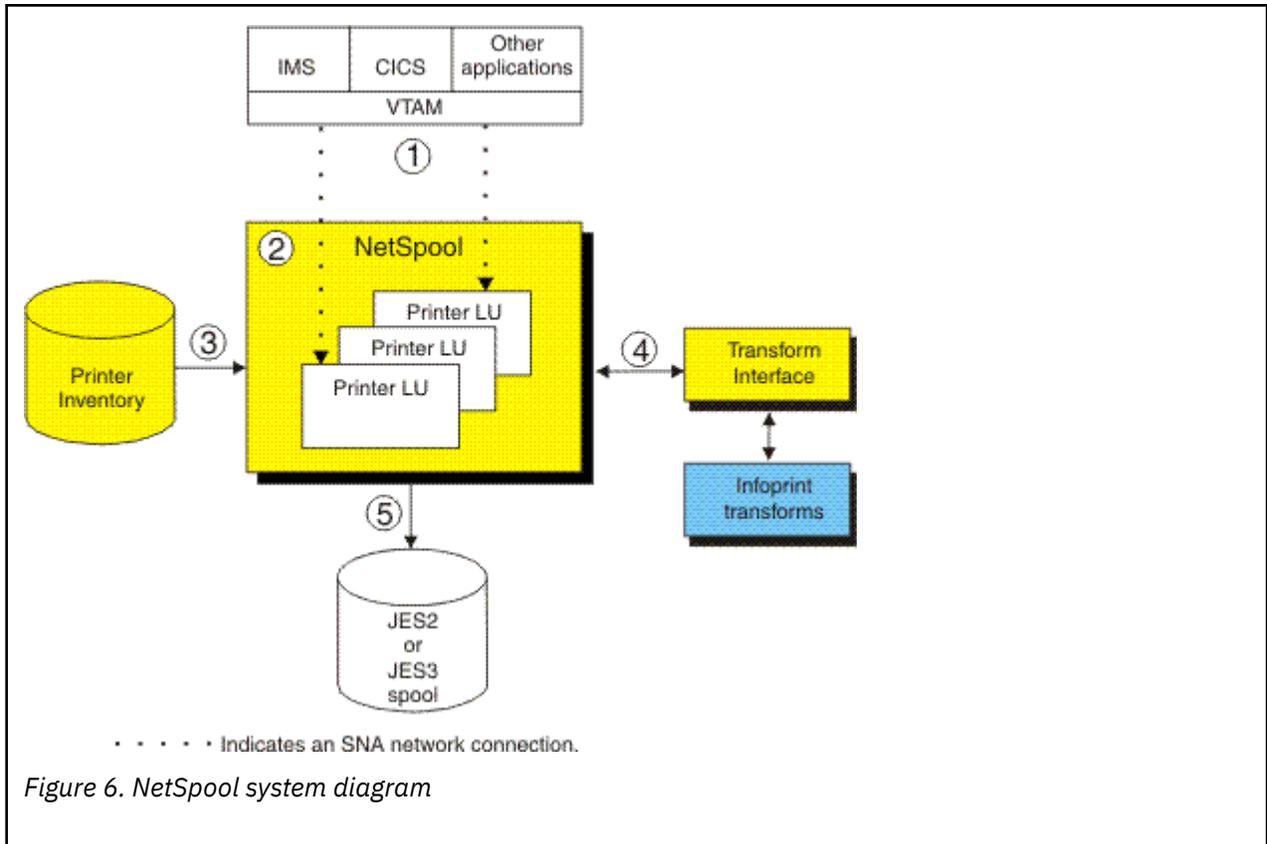
1. VTAM applications, such as CICS or IMS, establish communication sessions with NetSpool printer logical units (LUs) instead of with SNA-network printers. Each NetSpool printer LU must be defined to VTAM as an application logical-unit (LU).

   NetSpool can process these types of VTAM data streams:

   - SNA character string (SCS) data over an LU type 1 session
   - 3270 data over an LU type 3 or LU type 0 session
   - A binary data stream over an LU type 0, type 1, or type 3 session

2. NetSpool runs as a VTAM application on the same or different z/OS system. NetSpool can process VTAM print requests sent to different NetSpool printer LUs.

3. The administrator defines each NetSpool printer LU in a printer definition or printer pool definition in the Printer Inventory. NetSpool uses information in the printer definition to format data into lines and pages, transform data to a format that the printer accepts, and group the data into output data sets.

4. NetSpool can transform SCS and 3270 data streams to EBCDIC line data or ASCII PCL data streams. Also, it can use other transform products to convert line data to other formats for printing or emailing.

5. NetSpool dynamically allocates output data sets on the JES2 or JES3 spool with JES allocation parameters that are specified in the printer definition, including:

   - JES work-selection parameters, such as class, forms name, and destination. These parameters cause JES to direct the output data sets to the correct program, such as IP PrintWay or PSF.
   - Advanced Function Presentation (AFP) parameters, such as the name of a form definition and page definition. PSF can use these parameters when printing data on AFP printers.

- Distribution information, such as name and address, which can be printed on output header pages.

More functions that NetSpool provides are:

Transforms
NetSpool can transform data to line data or PCL format without using a separate transform product. It can:

- Transform SCS and 3270 data streams into line data streams. Line data can be printed on AFP printers.
- Transform SCS and 3270 data streams into PCL data streams. PCL data can be printed on network printers.

For information about how NetSpool transforms SCS and 3270 data streams to line or PCL format, see *z/OS Infoprint Server User's Guide*.

NetSpool can transform data to PDF or PostScript format by using one of the transform products that are described in "Transforms" on page 17. (NetSpool first transforms SCS and 3270 data to line data, and then uses the transform).

Validation of print requests
NetSpool can validate, with some exceptions, that the document can print as requested on the selected printer. For example, NetSpool can reject documents that are too large to print on the selected printer.

Operator control
The operator can control NetSpool LUs from Infoprint Central, from the system console, or from extended MCS consoles. For example, the operator can display the status of NetSpool LUs, stop them, and start them.

The operator can use tools such as SDSF and Infoprint Central to find output data sets that NetSpool writes to the JES spool. Infoprint Central can display additional status such as whether the output data sets (called *print jobs*) completed successfully, were retained because of failed transmission to LAN printers, or were deleted before printing.

Broadcasting output
You can print output to several printers at the same time. Also, you can print output and send it to email destinations at the same time. To do this, the administrator creates a printer pool definition in the Printer Inventory. When VTAM application data is submitted to a printer pool definition, NetSpool creates multiple output data sets on the JES spool.

Exits and filters
System programmers can write and install exits to customize NetSpool processing. NetSpool exits can add data to the beginning of output data sets, map graphic escape characters to other printable characters, and modify or delete transparent data in SCS data streams. System programmers can also write filter programs to provide their own data stream transforms.

Binary data support
The administrator can request in the printer definition that NetSpool treat the data stream as binary data. NetSpool writes binary data to the output data set as variable length records without formatting the data and without rejecting unsupported commands, orders, or data. This function is useful if you want to pass through all data without change and without including transparent (TRN) controls.

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. Application programmers might want to embed the **owner** job attribute to help identify the owner of printed output or the user to charge in an accounting system for printing jobs. Application programmers might want to embed other job attributes, such as **forms**, **page-definition**, or **form-definition**. Also, the administrator can specify a NetSpool default owner in the printer definition.

IP PrintWay

The IP PrintWay component of Infoprint Server 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.

IP PrintWay can use one of these protocols to transmit output data sets to printers:

LPR
The LPR protocol is a TCP/IP protocol that is defined by RFC 1179. An LPD that adheres to RFC 1179 must be running in the remote printer or system.

Direct-sockets
The direct sockets printing protocol is a TCP/IP protocol in which data is transmitted directly to a designated port. The remote printer or print server must support direct sockets printing.

Internet Printing Protocol (IPP)
IPP is a standard TCP/IP protocol for printing over the internet. An IPP Server must be running in the remote printer or system.

Email
IP PrintWay can send print output to one or more email addresses. IP PrintWay can optionally transform the output to another format with a separate transform product. It can send the output as an email attachment or include text and line data inline in the body of the email. You can specify the recipients of the email in a header in the document, in JCL parameters on the OUTPUT JCL statement, in Infoprint Server job attributes, or in the printer definition. You can also specify a standard greeting in the printer definition.

Tip: IP PrintWay basic mode cannot transmit data sets larger than 2 gigabytes to a remote LPD. Also, depending on the IP PrintWay options the administrator selects in the printer definition, IP PrintWay basic mode might not be able to transmit data sets larger than 2 gigabytes to a remote printer that uses the IPP or direct-sockets printing protocol, or to email destinations. This restriction does not apply to IP PrintWay extended mode.

Figure 7 on page 14 shows the steps that occur from the time IP PrintWay selects output data sets from the JES spool until it transmits them to the printer or email destination and then deletes them from the JES spool. An explanation of each step follows.
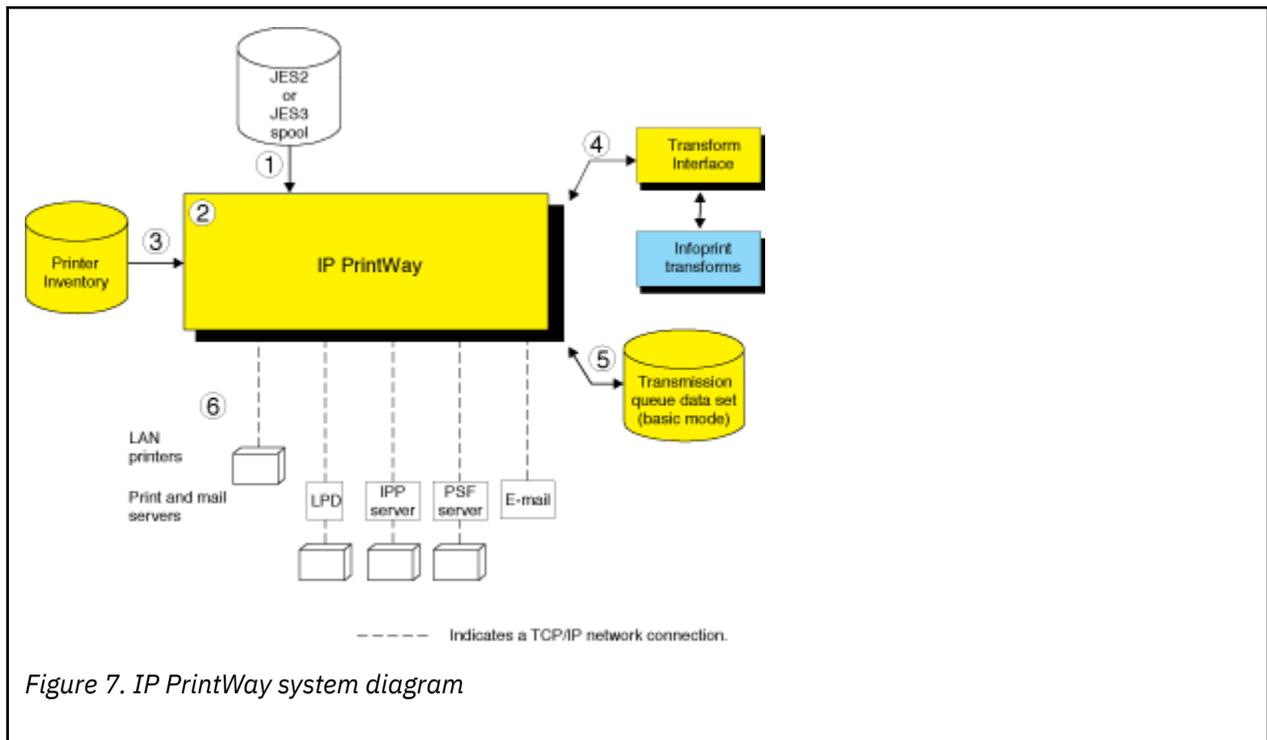
Figure 7. IP PrintWay system diagram

1. IP PrintWay selects output data sets from the JES2 or JES3 spool. IP PrintWay can select output data sets that were allocated on the JES spool by NetSpool or Print Interface, or data sets submitted from z/OS batch jobs with JCL. The data sets can contain line data, ASCII text data, or formatted data, such as PCL, PostScript, SAP, or MO:DCA-P (AFP) data.

2. IP PrintWay extended mode uses the SAPI interface to select output data sets from the JES2 or JES3 spool. IP PrintWay basic mode runs as a JES functional subsystem (FSS). An IP PrintWay basic mode functional subsystem application (FSA) uses the FSI interface to select output data sets from the JES spool.

   In a JES2 environment, you can configure IP PrintWay to select output data sets from the spool of either the JES2 primary subsystem or a JES2 secondary subsystem.

3. IP PrintWay uses information in printer definitions in the Printer Inventory to process data sets, select the transmission protocol, and obtain printer addresses. IP PrintWay can, instead, use the printer's IP address that is specified on the OUTPUT JCL statement or in an Infoprint Server job attribute.

   IP PrintWay recognizes data sets allocated on the JES spool by Print Interface and NetSpool and does not convert data from EBCDIC to ASCII or format the data if Print Interface or NetSpool is already converted data to ASCII. For other data sets, IP PrintWay can convert data between EBCDIC and ASCII, can add a header to each page, and can format data with the carriage-control characters in line data, an FCB, or pagination attributes that are specified in the printer definition.

4. In most cases, IP PrintWay extended mode can automatically detect the input data format and transform data into the format that is required by the printer or email destination. IP PrintWay basic mode can transform data by resubmitting the data stream to Print Interface. To do transforms, IP PrintWay uses transforms that other transform products provide.

5. When you run IP PrintWay extended mode, operators can use Infoprint Central to work with output data sets that IP PrintWay is processing or retained on the JES spool. In addition, you can use Infoprint Central to work with data sets that IP PrintWay has not yet selected for processing.

   When you run IP PrintWay basic mode, the IP PrintWay transmission queue data set contains information about output data sets that IP PrintWay is processing or retained on the JES spool. Operators must use Infoprint Server ISPF panels to manage these data sets.

6. IP PrintWay transmits data sets to the printer, print server, or email destination with the protocol that is selected in the printer definition: LPR, direct sockets, IPP, or email. IP PrintWay can also transmit

LPD options and IPP job attributes to the printer's LPDs and IPP Servers. For example, IP PrintWay can transmit information that the LPD prints on a separator page.

More functions that IP PrintWay provides include:

Retry

IP PrintWay can retransmit an unsuccessful transmission for a specified number of times at a specified interval. Retry limits and retry times can be specified in the printer definition and on an OUTPUT JCL statement. In addition to the requested retransmissions, IP PrintWay tries an unsuccessful transmission automatically for a short time after transmission. The administrator can use IP PrintWay extended mode to define a backup printer in case the retransmissions fail because the IP PrintWay printer is broken or offline. The backup printer is defined in an ISPF printer definitions panel or PIDU. The operator can then select the backup printer for IP PrintWay to use when the primary printer is not functioning.

If an error occurs in the middle of a print job, IP PrintWay restarts printing from the beginning of the print job. However, IP PrintWay extended mode can restart printing after the last page that printed successfully if the printer supports Hewlett Packard (HP) Printer Job Language (PJL) and the direct sockets printing protocol. The administrator must request in the printer definition that IP PrintWay extended mode restart printing after the last successful page.

Retention of jobs on the JES spool

After successfully transmitting each data set, or after it completes the requested number of transmission attempts, IP PrintWay can retain the data set on the JES spool forever or for a specific time. Retention periods can be specified in the printer definition or on an OUTPUT JCL statement.

Transforms

IP PrintWay can transform line data to text format for printing on a network printer or emailing without using a separate transform product.

IP PrintWay can transform data to PCL, PDF, or PostScript format for printing or emailing by using one of the transform products that are described in "Transforms" on page 17.

Validation of print requests

IP PrintWay extended mode can validate, with some exceptions, that the document can print as requested on the selected printer. For example, IP PrintWay extended mode can reject documents with data formats that the printer does not support or that are too large to print on the selected printer.

Operator control

When you run IP PrintWay extended mode, the operator can use tools, such as SDSF and Infoprint Central, to work with output data sets (called *print jobs*) that are intended for IP PrintWay or that IP PrintWay retained. In addition, you can use Infoprint Central to delete, hold, and move print jobs that IP PrintWay extended mode is processing. Infoprint Central can display additional status, such as whether the print jobs are completed successfully, were retained because of failed transmission to LAN printers, or were deleted before printing.

When you run IP PrintWay basic mode, the operator must use Infoprint Server ISPF panels to work with output data sets that IP PrintWay is processing or retained on the JES spool.

Job selection rules

When you run IP PrintWay extended mode, the administrator defines job selection rules in the Printer Inventory to specify which print jobs to select. The operator can use Infoprint Central to start and stop these job selection rules, or the administrator can automate the starting and stopping of job selection rules.

Printer selection using an OUTPUT JCL statement

On an OUTPUT JCL statement, a user can select the printer definition by specifying either the name of the printer definition in the FSSDATA parameter or the DEST, CLASS, or FORMS parameter (or a combination of these parameters) associated with the printer definition.

Users can also specify the IP address for the printer directly on the OUTPUT JCL statement, thereby eliminating the need for the administrator to create a printer definition for each printer in the Printer Inventory.

SMF accounting

For each data set processed, IP PrintWay writes a System Management Facilities (SMF) type 6 record. The SMF type 6 record identifies the job submitter and the address of the printer. It also contains the number of bytes that were transmitted to the printer. IP PrintWay extended mode records additional information in the type 6 record. For example, IP PrintWay extended mode includes accounting information from the JOB JCL statement and the number of pages that printed successfully if the printer supports Hewlett Packard (HP) Printer Job Language (PJL) and the direct sockets printing protocol. The administrator must request in the printer definition that IP PrintWay extended mode record the number of pages.

Exits and filters

You can use IP PrintWay to write exits to customize IP PrintWay processing. For example, exits can change the IP address of the remote printer, add separator pages, specify printer commands in document headers and trailers, and modify SMF accounting records. You can also write filter programs to provide your own data stream transforms.

Transmission order

IP PrintWay preserves the order of the data sets on the JES spool when it transmits data sets. IP PrintWay retains this order even if the transmission of the data sets must be tried again. If a JES output group contains more than one output data set, IP PrintWay acquires all of the data sets in the output group before it transmits any of them and can transmit these data sets to the printer as a single file. Although the data sets are a single file, each data set starts printing on a new page.

Printer commands

The administrator can specify printer commands for IP PrintWay to send to the printer before or after the data to be printed. Printer commands can be used to change fonts or switch between simplex and duplex printing. The administrator can specify printer commands in the printer definition or in the Begin Data Set exit. You can use the Begin Data Set exit to specify different printer commands for each data set.

IPsec data encryption

The IP security function of z/OS Communications Server can encrypt data that IP PrintWay 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.

Transform Interface

The Transform Interface component of Infoprint Server communicates with transforms that transform products provide. Transforms convert data from one format to another, for example, from PCL to AFP format and from AFP to PDF format.

Transform Interface can communicate with transforms that run on the z/OS system and on non-z/OS systems. For a list of the transform products that Transform Interface supports, see "Transforms" on page 17.

Figure 8 on page 16 shows how Transform Interface fits into your system. An explanation of each step follows.
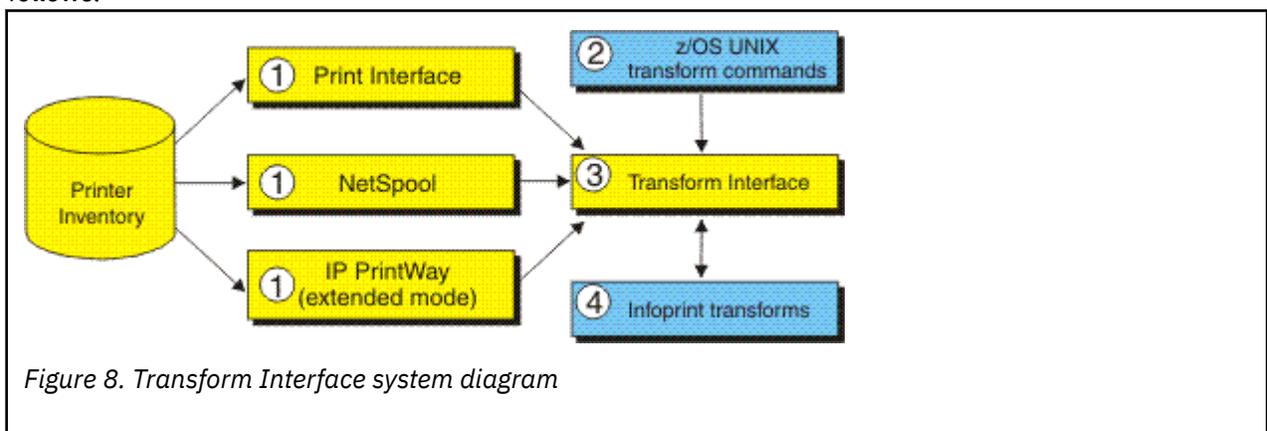
Figure 8. Transform Interface system diagram

1. When they process a print request, Print Interface, NetSpool, and IP PrintWay extended mode call Transform Interface to transform data from one format to another if the administrator specifies a transform filter in the printer definition. The administrator can specify a different transform filter for each data format. Infoprint Server and other transform products provide these transform filters:

   - Some transform products provide transform filters. For example, Infoprint Transforms to AFP for z/OS provides the `pdf2afp.dll` filter, which transforms data from PDF to AFP.
   - `aoprxf.so`: This filter sends data to Ricoh InfoPrint Transform Manager for Linux to be transformed.
   - `aoprform.dll`: This filter sends data to Ricoh InfoPrint Manager for AIX or Windows to be transformed.

   Tip: IP PrintWay basic mode transforms data by resubmitting it to the Print Interface component. This function is called the *resubmit for filtering* function.

2. z/OS job submitters can specify one of these z/OS UNIX commands to transform data without printing it:

   - A transform command: IBM transform products provide z/OS UNIX transform commands (such as **pdf2afp**).
   - **remotexf** command: This command sends data to Ricoh InfoPrint Transform Manager for Linux for transform.

3. Transform Interface communicates with the transform:

   - If the transform runs on z/OS, the Infoprint Server Transform Manager (part of Transform Interface) starts and stops the transform daemons with configuration information that is specified by the administrator.
   - If the transform runs on a non-z/OS system, the Infoprint Server Transform Interface sends the data to the transform.

4. The transform converts the data from one format to another.

Transforms

IBM provides several separately priced transform products that convert data from one format to another. These products run on the z/OS system. Ricoh provides other transform products that run on other systems.

Table 5 on page 17 lists the transform products that you can use with Infoprint Server, the transforms that each product provides, and where you can find more information about the transforms and how to customize them.

Table 5. Transforms that work with Infoprint Server		
Transform product	**Transform**	**For information, see:**
IBM Infoprint Transforms to AFP for z/OS (5655-N60)	PCL to AFP PDF to AFP PostScript to AFP SAP to AFP	*IBM Infoprint Transforms to AFP for z/OS*
IBM Print Transform from AFP to PCL for Infoprint Server for z/OS (5655-TF2)	AFP to PCL	*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)	AFP to PDF	*IBM Print Transforms from AFP for Infoprint Server for z/OS*

Table 5. Transforms that work with Infoprint Server (continued)

Transform product	Transform	For information, see:
IBM Print Transform from AFP to PostScript for Infoprint Server for z/OS (5655-TF3)	AFP to PostScript	*IBM Print Transforms from AFP for Infoprint Server for z/OS*
IBM Infoprint XT for z/OS (5655-O15)	Xerox to AFP	*IBM Infoprint XT for z/OS*
Ricoh InfoPrint Transform Manager for Linux	AFP to PDF GIF to AFP JPEG to AFP PCL to AFP PDF to AFP PostScript to AFP TIFF to AFP	*InfoPrint Transform Manager for AIX, Linux, and Windows: Planning and Installing* and *InfoPrint Transform Manager for Linux: afp2pdf Transform Installation and User's Guide* in Ricoh Production Print Information Center (info.rpp.ricoh-usa.com/help/index.jsp)
Ricoh InfoPrint Manager for AIX	PCL to AFP PDF to AFP PostScript to AFP	*InfoPrint Manager for AIX: Procedures* in Ricoh Production Print Information Center (info.rpp.ricoh-usa.com/help/index.jsp)
Ricoh InfoPrint Manager for Windows	PCL to AFP PDF to AFP PostScript to AFP	*InfoPrint Manager for Windows: Procedures* in Ricoh Production Print Information Center (info.rpp.ricoh-usa.com/help/index.jsp)

Infoprint Central

Infoprint Central is a web-based print management system primarily for help desk operators. However, authorized job submitters can also use it. Infoprint Central requires the IBM HTTP Server - Powered by Apache and a web browser. No applications other than a web browser need to be installed on users' workstations.

With Infoprint Central you can:

Work with print jobs
You can work with print jobs on the JES spool, including Time Sharing Option (TSO) output jobs. Plus, you can see more information about print jobs that Infoprint Server or PSF processed. For example, you can see whether a 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 in the common message log for the print job.

Tip: A print job consists of one or more output data sets submitted together in the same batch job. In JES2, a print job is called an *output group*.

Work with printers
You can work with printers that are defined in the Printer Inventory - including AFP printers that PSF for z/OS controls (called *PSF printers*), and TCP/IP-attached printers to which IP PrintWay extended mode sends print jobs (called *IP PrintWay printers*). You can find and work with IP PrintWay printers only when you run IP PrintWay extended mode.

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, or faxing.

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 other properties of the printer. You can do these printer actions:

- 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, see all messages from PSF for that one printer, and link to the printer's web page. If the PSF printer is an AFP Download Plus sender, you can do a limited set of PSF 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, and you can link to the printer's web page.

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. Also, you can display information about the current VTAM session that is established with a NetSpool LU.

You cannot work with NetSpool LUs if more than one NetSpool task uses the same Printer Inventory. Instead, you must use NetSpool commands and VTAM commands.

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 can help you find the name of a printer in your area.

Manage IP PrintWay 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 to help determine the cause of a printing problem.

More functions that Infoprint Central provides are:

Security
You can authorize access to Infoprint Central by configuring IBM HTTP Server - Powered by Apache so that it uses an authorized user ID that is authenticated by a z/OS security manager, such as RACF. In addition, you can use RACF to restrict access to print jobs, IP PrintWay printers, PSF printers, NetSpool logical units, IP PrintWay job selection rules, and Infoprint Server daemons.

Auditing
You can find out who used Infoprint Central to do actions on print jobs, IP PrintWay printers, PSF printers, and NetSpool LUs. For example, a message in the log for an Infoprint Server print job identifies who deleted the print job.

Tip: When you log on to Infoprint Central, you can log on to only one z/OS system. You can see all the print jobs, printer queues, and Infoprint Server messages for that one z/OS system only. To see print jobs, printer queues, and messages for more than one system, you can open separate instances of your web browser and log on to several z/OS systems at a time.

Chapter 2. Using Infoprint Server z/OS UNIX commands

Infoprint Server provides these z/OS UNIX commands for printing and transforming documents:

- "cancel--Cancel a print job" on page 24
- "lp--Print a file" on page 26
- "lpstat--Show printer names and locations and status of print jobs" on page 35
- "remotexf--Transform data remotely" on page 39

By using the commands, you can:

- Cancel print jobs.
- Print UNIX files and MVS data sets on any printer that your administrator defines in a printer definition in the Infoprint Server Printer Inventory. The printers can be local printers that are attached directly to z/OS, or remote printers in an Internet Protocol network.
- Send UNIX files and MVS data sets to any email destination that your administrator defines in a printer definition in the Infoprint Server Printer Inventory.
- Show printer names and locations and status of print jobs.
- Transform data from one format to another remotely using InfoPrint Transform Manager for Linux transforms.

The commands provide enhanced functions over the commands of the same name that are described in *z/OS UNIX System Services Command Reference*. For example, you can:

- Specify options such as duplexing or a special overlay.
- Display the status of your print request.
- Cancel a print request.

You do not need to change the printing commands in your UNIX applications when you port them to z/OS because the commands conform to the UNIX standards:

- The **lp** command conforms to the Single UNIX Specification Version 3 standard.
- The **cancel** and **lpstat** commands conform to the X/Open Portability Guide Issue 4 Version 2 (XPG4.2) standard.

Online help for Infoprint Server commands

To get online help about Infoprint Server commands, use the **man** command. You can view man pages only in English. If the correct man pages are not displayed, specify this path on the -M option of the **man** command, or add it to your MANPATH environment variable ahead of other values:

```
/usr/lpp/Printsrv/man/En_US
```

Messages sent from Infoprint Server commands

The Infoprint Server commands send messages to your console. These commands can send messages in English or Japanese. If the messages do not appear in the language you want, add one of these values to your NLSPATH environment variable ahead of the other values in the environment variable:

English
    /usr/lpp/Printsrv/En_US/%N

Japanese

```
/usr/lpp/Printsrv/Ja_JP/%N
```

In addition, the LANG environment variable controls the language that is used for messages from InfoPrint Transform Manager for Linux.

Transforming files to and from AFP format

Usually, you do not have to worry about transforming your data to another format. If a transform product is installed, Infoprint Server automatically calls the appropriate transform when you submit a print request to a printer definition (for a printer or an email destination) that your administrator configures for transformation.

However, you might want to transform a file without printing it in these situations:

- You intend to print a file many times. In this case, it is more efficient to transform the file once and print the output than to transform the file every time you print it.
- You want to present your document on the web.

Transforms to AFP format

While you use Infoprint Server to submit data in many different formats, Advanced Function Presentation (AFP) printers print the AFP data stream.

Tip: Documents in AFP format are also called *Mixed Object Document Content Architecture for Presentation (MO:DCA-P)* documents.

These IBM transform products can convert files to AFP format from non-AFP data streams, such as PCL, PDF, and PostScript:

- IBM Infoprint Transforms to AFP for z/OS (5655-N60)
- IBM Infoprint XT for z/OS (5655-O15)

Transforms from AFP format

IBM transform products can convert files from AFP format into PCL, PDF, and PostScript. You use them to print files in AFP format on PCL and PostScript printers, and transform an AFP file to PDF format for viewing on a workstation.

These IBM transform products can convert files from AFP format:

- 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)

How do you...

This information explains what Infoprint Server command you need to use for a printing task and sends you to the correct place to get more information.

Print a file?

To print one or more files, use the **lp** command. For example, to print three copies of `myfile1` and `myfile2` on `Printer2`, which is defined in the Infoprint Server Printer Inventory, enter:

```
lp -d Printer2 -n 3 myfile1 myfile2
```

For more information, see "lp--Print a file" on page 26.

Send a file to an email destination?

To send one or more files to an email destination instead of to a printer, use the **lp** command. Infoprint Server can first transform data in the files into a format that is suitable for viewing; for example, into PDF format.

For example, to send files `myfile1` and `myfile2` to email destination `dept123`, which is defined in the Infoprint Server Printer Inventory, enter:

```
lp -d dept123 myfile1 myfile2
```

The recipients that are listed in the printer definition receive two separate emails.

For more information, see "lp--Print a file" on page 26.

Print or email files with special requirements?

You can use Infoprint Server job attributes to describe special requirements. Attributes specify things like these:

- Whether to print on one or both sides of the paper
- Resources like fonts, page definitions, form definitions, and overlays
- Text to print on the separator sheet or the subject of the email

Use the **-o** option of the **lp** command to specify attribute values when you print a file or send a print file to an email destination. For example, you want to print file `special.job` on both sides of the paper that is loaded in input tray `top` of `Printer2`. You want to print one overlay, `O1ODD`, on all the front sides of the paper and another, `O1EVEN`, on all the back sides. Both overlays are in a library called `MYOVR.LIBRARY`. Enter:

```
lp -d Printer2 -o "input-tray=top duplex=yes
    overlay-front=O1ODD overlay-back=O1EVEN
    resource-library=MYOVR.LIBRARY" special.job
```

Instead of entering all the attributes on the command line, you can store them in an attributes file. If the attributes file is called `myatts`, enter:

```
lp -d Printer2 -o attributes=myatts special.job
```

For a list of job attributes and a description of the use and values of each one, see "Job attribute listing" on page 48. For information about attributes files, see "Attributes files" on page 47. For information about the **-o** option of the **lp** command, see "lp--Print a file" on page 26.

Find out where the printers are?

Use the **lpstat** command to display printer definition names and locations. For example, to see the names and locations of all printers and email destinations that are known to Infoprint Server, enter:

```
lpstat -a
```

For more information, see "lpstat--Show printer names and locations and status of print jobs" on page 35.

Find out whether a file is printing?

You can also use the **lpstat** command to display the status of an Infoprint Server job. For example, you submitted several files to print and want to know whether any of them are printing. To display information about all your jobs that are submitted to any printer, enter:

```
lpstat
```

You can also use **lpstat** to display printer location and job status at the same time. For example, you printed a file to `Printer3` and want to pick it up if it printed instead of waiting to have it delivered to your output bin. To find out where `Printer3` is and whether any job that you submitted to it printed, enter:

```
lpstat -o Printer3
```

For more information, see "lpstat--Show printer names and locations and status of print jobs" on page 35.

Cancel an Infoprint Server job?

Use the **cancel** command to cancel a job that is submitted to Infoprint Server. For example, you realize that you need to make changes in the file that you just sent to print on `Printer3`.

If you do not remember the Infoprint Server job ID that the **lp** command returned, use the **lpstat** command to display all the jobs that you submitted to `Printer3`:

```
lpstat -o Printer3
```

Suppose that your job has an ID of 17. To cancel it, enter:

```
cancel 17
```

For more information, see "cancel--Cancel a print job" on page 24.

Transform data remotely?

Use the **remotexf** command to transform data from one format to another remotely with Ricoh InfoPrint Transform Manager for Linux. The command convert files to another format without printing the files.

InfoPrint Transform Manager for Linux transforms convert files to Advanced Function Presentation (AFP) format from:

- Adobe Portable Document Format (PDF)
- Adobe PostScript
- Graphics interchange format (GIF)
- HP Printer Control Language (PCL)
- Joint Photographic Experts Group (JPEG) file information format (JFIF)
- Tagged image file format (TIFF)

InfoPrint Transform Manager for Linux transforms also convert files from AFP format (MO:DCA-P only) to PDF format.

For more information, see "remotexf--Transform data remotely" on page 39.

cancel--Cancel a print job

Format

cancel *jobid* ...

Description

The **cancel** command cancels one or more print jobs that you submitted, with these restrictions:

- You can only cancel your own jobs.
- You cannot cancel a job after it started processing.
- In a JES3 environment, you might not be able to cancel a job that is held on the Job Entry Subsystem (JES) spool.

Tip: Use this command only on the system where you submitted the print job so you know that you are working with the correct job.

> ⚠️ **Trouble:** If you receive this error message:
>
> `FSUMF014 There is no function provided for this utility`
>
> you are running `/bin/cancel` instead of `/usr/lpp/Printsrv/cancel`. `/bin/cancel` is a stub command. z/OS UNIX recognizes it but does not support its function. To make sure that you run `/usr/lpp/Printsrv/cancel`, do either of these:
>
> - Use the **mv** command to rename `/bin/cancel`.
> - Change your PATH environment variable so that `/usr/lpp/Printsrv` comes before `/bin`.

Operand

jobid ...

The Infoprint Server job ID of the print job you want to cancel. If you do not know the Infoprint Server job ID, you can determine it by using the **lpstat** command to query all the jobs that you submitted.

The **lp** command and AOPPRINT JCL procedure return the Infoprint Server job ID to you when a job is accepted for printing. Infoprint Server also can return the Infoprint Server job ID to you when you submit a job from a remote system.

The Infoprint Server job ID is not the same as the z/OS job ID, which the z/OS system assigns to each job on the JES spool.

Examples -- cancel

Cancel jobs

To cancel jobs 3, 5, and 6, enter:

```
cancel 3 5 6
```

Identify a job and cancel it

You submitted a job to print and want to cancel it, but you do not remember the Infoprint Server job ID. Enter:

```
lpstat
```

The **lpstat** command returns information about all your jobs, including the Infoprint Server job ID and the names of the files in each job. You identify the job that you want to cancel as job 27. To cancel it, enter:

```
cancel 27
```

Environment variables

The **cancel** command uses these environment variables:

AOPCONF

Names the Infoprint Server configuration file. This variable takes precedence over the user-specific configuration file (`$HOME/.aopconf`) and the system default configuration file (`/etc/Printsrv/aopd.conf`). For more information about the configuration file, see *z/OS Infoprint Server Customization*.

LIBPATH

Names the directory paths that the **cancel** command searches for dynamic link libraries (DLLs).

NLSPATH

Names the directory paths that the **cancel** command searches for message catalogs.

PATH
> Names the directory paths that the shell searches for programs.

For information about setting and using environment variables, see *z/OS UNIX System Services User's Guide*.

Files

$HOME/.aopconf
> Contains the user-specific Infoprint Server configuration file. This file takes precedence over `/etc/Printsrv/aopd.conf`.

/etc/Printsrv/aopd.conf
> Contains the system default Infoprint Server configuration file.

Exit values

0
> Infoprint Server accepted the request.

>0
> An error occurred that prevented Infoprint Server from accepting the request. Some possible errors are:
>
> - The command syntax is not valid.
> - Infoprint Server is not available.
> - There was an error in reading the Infoprint Server configuration file.

Portability

There are no extensions to any Portable Operating System Interface for Computer Environments (POSIX) standard or to the XPG4.2 standard for the **cancel** command.

lp--Print a file

Format

lp [-csw] [-d *destination*] [-n *copies*] [-o *option*] ... [-t *title*] [*filename* ...]

Description

The **lp** command prints one or more files, or sends the files to an email destination. The address of the printer is specified in the printer definition in the Infoprint Server Printer Inventory, which your administrator manages. The email addresses are specified in the printer definition or in job attributes.

The files can be:

- MVS data sets, such as partitioned data sets or sequential data sets
- UNIX files, such as files in a Hierarchical File System (HFS), a z/OS File System (zFS), a Network File System (NFS), or a temporary file system (TFS)
- Lists of printable files

If you do not specify any files on the command line, or if you specify a dash (-) for the file name, **lp** prints from standard input.

If a transform product is installed, Infoprint Server can automatically transform a file from one data format to another. To transform a file, the administrator must request the transform in the printer definition.

The **lp** command returns an Infoprint Server job ID, which you can use to query or cancel the job.

Options

-c
Makes a copy of the file and prints that copy. You can specify **-c** but it is unnecessary because **-c** is the default and the `lp` command always makes a copy of the file and prints it. You can change the original file after you submit the `lp` command. The printed file does not contain the changes.

-d *destination*
Selects the printer or the email destination. For *destination*, specify the name of a printer definition in the Infoprint Server Printer Inventory. Contact your administrator for the names of printer definitions or use the `lpstat` command to list printer definition names.

You can omit this option if a default printer exists. You can define a default printer by setting the LPDEST or PRINTER environment variable. The administrator can also define a default printer. If you do not specify a printer and no default exists, the `lp` command displays an error message.

-n *copies*
Prints the specified number of copies of each file. You can specify a value 1 - 32640. This option overrides the **copies** job attribute. The default value is the copies value in the printer definition, or, if none is specified, one copy.

Tip: Some IPP-enabled printers do not support printing more than one copy. In this case, only one copy prints. This option is ignored when data is sent to an email destination. In this case, only one copy is sent.

-o *option*
Specifies an option, that is, one or more attribute value assignments in the format `attribute=value`, separated by spaces.

- If a value contains spaces, enclose the value in single or double quotation marks:

  ```
  attribute='value with spaces'
  attribute="value with spaces"
  ```

- If an option contains spaces or characters that can be interpreted by the shell (such as $ & ( ) > < | ' " #), enclose the option in single or double quotation marks:

  ```
  -o 'attribute1=value1 attribute2=value2'
  -o "attribute='value with spaces'"
  -o "attribute=value(1)"
  ```

  For information about how the shell interprets special characters, see *z/OS UNIX System Services User's Guide*.

- If both value and option require quotation marks, do either of these:

  – Use two pairs of double quotation marks and place a backslash before each quotation mark that surrounds the value:

    ```
    -o "attribute=\"value with spaces\""
    ```

  – Use different quotation marks around the option and value. For example:

    ```
    -o 'attribute="value with spaces"'
    -o "attribute='value with spaces'"
    ```

For a list of the attributes you can specify to describe the job and all the files in it, see "Job attribute listing" on page 48.

Instead of entering a string of attributes on the command line, you can store attributes and values in a file. You use a special attribute that is called **attributes** to specify the file. For examples, see "Specify the attributes files" on page 31 and "Creating an attributes file" on page 47.

You can also set the AOPOPTIONS environment variable to a string of attributes and values. The `lp` command treats these attributes as if you specified them before any other values of the **-o** option on

the command line. For an example of using the AOPOPTIONS environment variable, see "Specify the AOPOPTIONS environment variable" on page 32.

To specify more than one attribute in the **-o** option, either repeat the **-o** option or enclose the entire value in quotation marks. For example:

```
-o attribute1=value1 -o attribute2=value2
-o "attribute1=value1 attribute2=value2"
```

If you specify an attribute more than once, the **lp** command uses the last value.

-s
> Suppresses the message that the **lp** command returns when Infoprint Server accepted the request. This message contains the Infoprint Server job ID. You must know the job ID to query or cancel the job.

-t *"title"*
> Describes the file, which can be printed as the title on a separator page, a page that might be printed before or after the file. If the file is sent to an email destination, this description is the subject of the email. You can specify up to 60 characters. If the text contains spaces or characters that the shell might interpret, enclose the text in single or double quotation marks. This option overrides the **title-text** job attribute. For information about the default value, see "title-text" on page 79.

> **Tip:** Whether a title is printed on a separator page depends on how the administrator configured the separator page.

-w
> Sends a message to the terminal when the file is printed or deleted. If the submitter is not logged on, sends a notification when the file is removed from the system spool for any reason. Some reasons are:

> • The file finished printing.
> • The file is transmitted to a LAN printer or to the sendmail bridge. You might receive notification before the file finished printing or was sent to the email destination. You might receive notification even though a transmission error occurred.

> If your administrator requested that Infoprint Server retain files on the system spool after transmission, you receive notification after the retention time expires.

> • The operator deleted the file.

> **Tip:** Notification might be delayed to improve system performance.

Operand

filename
> The path name of each file that you want to print or send to an email destination. To specify data from standard input (keyboard data or the output from another command), omit the file name or specify a dash (-) as the file name. To print an MVS data set, specify // before the file name.

> **Rule:** If you specify more than one file with the same **lp** command, all files must have the same data format. For example, all files must be PostScript files or text files.

Results

After Infoprint Server accepts the print job, the **lp** command returns an Infoprint Server job ID, which you can use to query and cancel the job. For example, you might receive a message such as:

```
AOP007I Job 14584 successfully spooled to myprinter.
```

The Infoprint Server job ID is different from the z/OS job ID, which is a unique job ID that z/OS assigns to the data set. JES operator commands use the z/OS job ID.

Sending a file to an email destination

With the **lp** command, you can send the file to an email destination instead of to a printer. You can specify the email addresses of the primary and secondary recipients in one of these ways:

- You can use an alias file that is defined to the sendmail bridge. The alias file lists one or more email addresses. For information, see "Using the email address list in an alias file" on page 88. Your administrator can specify the name of the alias file in the printer definition, or you can specify it in a job attribute.

- You can specify the email addresses for the recipients by using these job attributes:

    Use this attribute:
    >   **To specify the email addresses of the:**

    mail-bcc-addresses
    >   Blind copy (bcc) recipients of an email. A *bcc* means that other recipients of the email do not see the bcc recipient listed.

    mail-cc-addresses
    >   Copy (cc) recipients of an email. A *cc* means that other recipients of the email can see the cc recipient listed.

    mail-to-addresses
    >   Primary recipients of an email.

- Your administrator can specify the email addresses in the printer definition in the Printer Inventory.

- In an email header in the document (line data only). For information, see Chapter 11, "Creating an email header," on page 165.

The email has these characteristics:

- If the file contains text or line data, it can be included in an email attachment or inline in the body of the email. If the file contains data in another format (for example, PDF), the data is included in an attachment. To include text or line data inline, specify the **mail-inline-text** job attribute, or the administrator can select the **Inline text and line data** field in the printer definition.

- The name of the attachment is one of these:

    1. The **mail-file-name** job attribute

    2. The **sysout-dataset-name** job attribute

    3. The last 8 characters of the file name

        If the first character is not a letter, #, $, or @, it is converted to a #. If one of the remaining characters is not a letter, number, #, $, or @, it is converted to a #. Lowercase letters are converted to uppercase letters.

    The name of the attachment contains a suffix that indicates the type of data in the file. For example, `txt` indicates text data and `pdf` indicates PDF data.

    Tip: If you specify a file name (in the **mail-file-name** job attribute) with a suffix that indicates the type of data in the file, ask your administrator to request that Infoprint Server not add another suffix. For example, if the file name is `myfile.doc`, ask your administrator to request that Infoprint Server not add suffixes for file names that contain the `.doc` suffix. For information, see customizing IP PrintWay in *z/OS Infoprint Server Customization*.

- The subject of the email is the value that is specified in the **subject** field in the email header, in the **-t** option, or in the **title-text** job attribute. If none is specified, the subject is the title that is specified in the Allocation section of the printer definition. If none is specified, the subject is the ID of the user who entered the **lp** command.

- The sender is the user ID of the user who entered the **lp** command. You can add a descriptive name or other identifier of the sender in the **from** field in the email header, or in the **mail-from-name** job attribute. If none is specified, the **From name** field in the printer definition is used.

- You can receive replies from the email unless you are a TSO or z/OS UNIX System Services user. To receive replies from the email, specify the reply email address in the **reply-to** field of an email header or

in the **mail-reply-address** job attribute. If none is specified, the **Reply address** in the printer definition is used.

Examples -- lp

Print a file on the default printer

To submit the file File1 to your default printer, enter:

```
lp File1
```

Print a file on a specified printer

To submit the file File1 to the printer fred, enter:

```
lp -d fred File1
```

Print a file on an undefined LAN printer

You want to print the file File1 on a LAN printer at a remote site. Your administrator did not define this printer. You must specify:

- The name that your administrator defined to represent all remote printers (for example, remote)
- The printer's Internet Protocol (IP) address
- The remote print queue

Enter:

```
lp -d remote -o "print-queue-name=text
    printer-ip-address=leo.boulder.ibm.com" File1
```

Print an MVS data set

To submit the MVS data set *hlq*.FILE1.LISTPS to your default printer, where *hlq* is your user ID, enter:

```
lp //FILE1.LISTPS
```

To submit the MVS data set FILE2.LISTPS to your default printer, enter:

```
lp "//'FILE2.LISTPS'"
```

Print a multi-document job

To submit the files File1 and File2 to the default printer, enter:

```
lp File1 File2
```

Each file is spooled to the printer separately.

Print a file-reference document

A *file-reference document* is a list of similar printable files that are separated by spaces, tabs, or new lines. For example, the file bills.list contains a list of files, each containing one customer's monthly statement. It looks like this:

```
40009801.dec97
40009802.dec97
40009803.dec97
40009804.dec97
⋮
```

To print all the files that are listed in bills.list on your default printer, enter:

```
lp -o document-type=file-reference bills.list
```

The files are concatenated and printed as a single file.

Transform and print a job

If a transform product is installed, you can submit a job in a format that is different from the ones the printer accepts.

To print the PCL file `sample.pcl` on the AFP printer `printer1`, enter:

```
lp -d printer1 sample.pcl
```

If you want to specify options for a file that is being transformed to AFP, you must use the **filter-options** attribute with the **lp** command. For example, to print pages 3 - 10 of the PCL file `sample.pcl` on the AFP printer `printer1` as an overlay, enter:

```
lp -d printer1 -o "filter-options='-p 3-10 -t overlay'" sample.pcl
```

If you want to specify job attributes for a file that is being transformed from AFP, you do not use the **filter-options** attribute with the **lp** command. You use **filter-options** to specify only **-c** and **-i** options. For example, to print the AFP file `sample.afp` on the PCL printer PCLPRT and printing in duplex, enter:

```
lp -d PCLPRT -o 'duplex=yes' sample.afp
```

To print the AFP file `sample.afp` on the PCL printer PCLPRT by using the transform class US and print in duplex, enter:

```
lp -d PCLPRT -o "filter-options='-c us' duplex=yes" sample.afp
```

Print multiple copies of each file

To print two copies of each file on the default printer, enter one of these:

```
lp -n 2 Title Contents Body1 Body2 Append
```

```
lp -o copies=2 Title Contents Body1 Body2 Append
```

For each file in the job, this command prints two copies of `Title`, followed by two of `Contents`, and so forth.

Tip: Some IPP-enabled printers do not support printing more than one copy. In this case, only one copy prints. If the file is sent to an email destination instead of to a printer, only one copy is sent.

Print a file on both sides of the paper

To print file `File1` on the default printer and to print it on both sides of the paper, enter:

```
lp -o duplex=yes File1
```

Specify the attributes files

To print file `File5` on the default printer and to specify the two attributes files `default.att` and `special.att`, enter:

```
lp -o "attributes=default.att attributes=special.att" File5
```

Suppose that the file `default.att` contains these lines:

```
input-tray=bottom
duplex=yes
output-bin=collator
```

The file `special.att` contains these lines:

```
input-tray=top
copies=5
title-text='Special Report'
```

The preceding command is equivalent to this command:

```
lp -o "input-tray=top duplex=yes output-bin=collator
    copies=5 title-text='Special Report'" File5
```

The value of **input-tray** in `special.att` overrides the value in `default.att` because you specified `special.att` last.

Tip: These examples assume that the attributes files are in the current directory, or that you set the AOPPATH environment variable to include the directories where the attributes files are located. If not, you need to specify the attributes files by their absolute path names.

Override an attribute value in an attributes file

To print file `File1` on the default printer and override the value of **yes** for the **duplex** attribute that is specified in the `default.att` attributes file, enter:

```
lp -o "attributes=default.att duplex=tumble" File1
```

Specify the AOPOPTIONS environment variable

To set the AOPOPTIONS environment variable to your address, add a line like this one to your `.profile` file:

```
export AOPOPTIONS="address-text={'13 Division St.' 'Foxboro, MA 02035'}"
```

Until you reset the AOPOPTIONS environment variable, every **lp** command you enter includes this value. For example, this command:

```
lp myfile.ps
```

is equivalent to:

```
lp -o "address-text={'13 Division St.' 'Foxboro, MA 02035'}" myfile.ps
```

Because the **lp** command reads the value of the AOPOPTIONS environment variable before the options you specify on the command line, you can override the values of this variable. For example, if you want a single job to be delivered to a different address, enter:

```
lp -o "address-text={'999 Eclipse Alley' 'Pawtucket, RI 02860'}" myfile.ps
```

Request notification by message

To print file `File1` on the default printer and to receive a message when the file is printed, enter:

```
lp -w File1
```

Tip: If the printer is a LAN printer, the **lp** command writes a message when the file is transmitted to the printer. When you receive the message, the file might not have finished printing.

Submit and hold a job

To submit file `File1` to the default printer and to hold it so that it does not print until the operator releases it, enter:

```
lp -o hold=true File1
```

Specify a code page for ASCII files

To print the files `File1` and `File2` and to specify the code page `ISO8859-1`, enter:

```
lp -d Printer1 -o document-codepage=ISO8859-1 File1 File2
```

Print from standard input

You can use the **lp** command to print the output from other commands. For example, to print on your default printer a list of all the files in the current directory, enter:

```
ls -la | lp
```

Paginate line data and print with a header on each page

If your administrator specified the LPD compatibility filter (**lpd_compat.so**) for the printer in the Printer Inventory, you can specify filter options that are equivalent to the FILTER, WIDTH, and LINECOUNT options of the z/OS Communications Server (TCP/IP) LPR command. The LPD compatibility filter can be used with text and line data when you print on an AFP printer or a JES line printer. For a description of the options that the LPD compatibility filter supports, see "filter-options" on page 55.

To print data set MYDATA, which contains line data, on the AFP printer `afpprinter`, with a header on each page, a maximum width of 80 characters, and a maximum length of 60 lines, enter:

```
lp -d afpprinter -o "filter-options='-f p -w 80 -l 60'" "//'MYDATA'"
```

Send multiple files to an email destination specified in the printer definition

To send files `File1` and `File2` to the email address list in printer definition `deptmail`, specify a subject for the email, and specify a form definition that is used when the AFP data is converted to PDF format, enter:

```
lp -d deptmail -t "Monthly Report" -o "form-definition=F1MYDEF" File1 File2
```

This example assumes that the AFP to PDF transform is requested for AFP data in the printer definition named `deptmail`.

Results: The recipients that are listed in printer definition `deptmail` receive two emails:

1. The sender of the emails is the user ID of the user who entered the **lp** command. The domain name is the system where the sendmail bridge is running.
2. File `File1` is attached to one email, while file `File2` is attached to another email. The names of the attachments are: `FILE1.pdf` and `FILE2.pdf`. The files are in PDF format and can be viewed and printed with Adobe Acrobat Reader.
3. The subject of both emails is `Monthly Report`.

Send a file to an email destination specified in job attributes

To send file `File1` to the email addresses specified in job attributes instead of to the email addresses specified in the printer definition, and also specify a subject, sender name, attachment name, and reply address for the email, enter this command on one line:

```
lp -d emaildest -t "Monthly Report" -o "mail-to-addresses={'user1@xyz.com'}
    mail-cc-addresses={'user2@xyz.com'} mail-bcc-addresses={'user3@xyz.com'}
    mail-file-name='February 2004 sales report' mail-from-name='John Q. Sender'
    mail-reply-address='secretary@xyz.com'" File1
```

Results: An email is sent with these specifications:

1. The subject is `Monthly Report`.
2. The recipient of the email is `user1@xyz.com`.
3. The copy (cc) recipient is `user2@xyz.com`.

4. The blind copy (bcc) recipient is `user3@xyz.com`.

5. If the file is in an attachment, the attachment is called `February 2004 sales report.txt`.

6. The sender of the email is `John Q. Sender<JOHN@SYSTEM1>`. The user ID of the user who entered the **lp** command is JOHN. The domain name of the system where the sendmail bridge is running is SYSTEM1.

7. The email address that recipients can reply to is `secretary@xyz.com`.

Environment variables

The **lp** command uses these environment variables:

AOPCONF
Names the Infoprint Server configuration file. This variable takes precedence over the user-specific configuration file (`$HOME/.aopconf`) and the system default configuration file (`/etc/Printsrv/aopd.conf`). For more information about the configuration file, see *z/OS Infoprint Server Customization*.

AOPOPTIONS
Specifies a string of attributes and values that the **lp** command includes before the values of the **-o** option.

AOPPATH
Names the directory path that the **lp** command searches for attributes files. The default is your current directory. If the directory where an attributes file is located is not included in the value of AOPPATH, you can specify the file by its absolute path name.

AOP_MVS_RETURN_CODES
Specifies whether to return MVS (0, 4, 8) return codes or UNIX (0, 1) exit values. If not specified, the **lp** command returns UNIX exit values.

LANG
The language that is used for messages.

LC_ALL
The locale that is used to format date and time information in common log messages.

LC_CTYPE
The locale that is used to determine the code page for validating attributes.

LIBPATH
Names the directory paths that the **lp** command searches for dynamic link libraries (DLLs).

LPDEST
Names the default printer. This variable takes precedence over PRINTER.

NLSPATH
Names the directory paths that the **lp** command searches for message catalogs.

PATH
Names the directory paths that the shell searches for programs.

PRINTER
Names the default printer if LPDEST is not defined.

For information about setting and using environment variables, see *z/OS UNIX System Services User's Guide*.

Files

$HOME/.aopconf
Contains the user-specific Infoprint Server configuration file. This file takes precedence over `/etc/Printsrv/aopd.conf`.

/etc/Printsrv/aopd.conf
Contains the system default Infoprint Server configuration file.

Exit values

0

Infoprint Server accepted the request.

>0

An error occurred. Some possible errors are:

- The command syntax is not valid.
- The selected printer cannot print the type of data in one of the files.
- The selected printer does not support one of the specified job attributes.
- Infoprint Server is not available.
- An error occurred in reading the Infoprint Server configuration file.

Note: The AOP_MVS_RETURN_CODES environment variable determines the exit values.

Portability

The **-o**, **-s**, **-t**, and **-w** options are extensions to the POSIX.2 standard. No extensions exist to the Single UNIX Specification Version 3 standard for the **lp** command.

lpstat--Show printer names and locations and status of print jobs

Format

lpstat [**-dt**] [**-a** [*printername* ...]] ... [**-o** [*printername* ...]] ...

 [**-p** [*printername* ...]] ... [**-u** [*userid* ...]] ... [*jobid* ...]

Description

The **lpstat** command writes printer definition names, location information that is specified in the printer definitions, and the status of jobs to standard output.

Tip: Use this command only on the system where you submitted the print job so you know that you are working with the correct job.

⚠️ **Trouble:** If you receive this error message:

```
FSUMF014 There is no function provided for this utility
```

you are running /bin/lpstat instead of /usr/lpp/Printsrv/lpstat. /bin/lpstat is a stub command. z/OS UNIX recognizes it but does not support its function. To make sure that you run /usr/lpp/Printsrv/lpstat, do either of these:

- Use the **mv** command to rename /bin/lpstat.
- Change your PATH environment variable so that /usr/lpp/Printsrv comes before /bin.

For printer definitions in the Infoprint Server Printer Inventory, the **lpstat** command returns this information:

- The name of the printer definition
- The number of jobs that are submitted to the printer definition
- The location information in the printer definition
- The description information in the printer definition

For jobs that Infoprint Server processed (including jobs that are submitted in any of these ways: from a VTAM application through NetSpool; from a remote system or with the **lp** command through Print Interface; from batch JCL printed by IP PrintWay extended mode; using the Print Interface subsystem), the **lpstat** command returns this information:

- The Infoprint Server job ID. The Infoprint Server job ID is a unique job ID assigned to each print job. You can use it to cancel the job with the **cancel** command.

  The Infoprint Server job ID can help the system operator find your job on the JES spool. In most cases, the job ID field of data sets that Infoprint Server allocates on the JES spool contains the Infoprint Server job ID.

  However, the Infoprint Server job ID is different from the z/OS job ID, which is a unique job ID that z/OS assigns to the data set. JES operator commands return the z/OS job ID.
- The user ID of the person who submitted the job.
- The state of each file in the job:

  canceled
  > The file is canceled and is not processed.

  completed
  > The file is processed successfully. It remains on the JES spool for one of these reasons:
  >
  > – Other files in the job are still being processed. The file is removed from the spool after all files in the job are processed.
  > – Your administrator specified that files are to be retained after transmission to a LAN printer or to a print server. The file is removed from the spool when the retention period expires.

  failed
  > Processing failed. The file remains on the JES spool for one of these reasons:
  >
  > – Transmission to a LAN printer, to a print server, or to the sendmail bridge failed. Your administrator specified that files are to be retained after transmission. The file is removed from the spool when the retention period expires.
  > – An error occurred during processing. The file is held.

  held
  > The file is held on the JES spool and cannot print for one of these reasons:
  >
  > – The user specified **hold=true** when the job was submitted.
  >
  >   **Tip:** JES3 does not recognize a job that is held for this reason and returns **pending**.
  > – The operator held the job.

  not_spooled
  > The file is not written to the JES spool because an error occurred.

  pending
  > The file is waiting to print.
  >
  > **Tip:** Because JES3 cannot distinguish job states, in a JES3 environment Infoprint Server can return **pending** for files that are selected for processing or held on the JES spool.

  processing
  > The file is placed on the JES spool and selected for processing. It might be:
  >
  > – Transmitting to a local area network (LAN) printer or to a print server
  > – Printing

  purged
  > The file is deleted before printing.

  rejected
  > The file is rejected and is not processed. It remains on the JES spool until you cancel it or correct the error.

  retry_waiting
  > An error occurred sending this file to the printer. After the retry interval expires, Infoprint Server processes it again. The printer might be turned off.

spooling
>   The file is written to the JES spool.

- The number of bytes in each file in the job.

- The name of each file or file-reference document in the job.

    For jobs submitted to the Print Interface subsystem, the file name is in this format:

    job-name.job-id.dataset-name

    job-name
    >   The name of the z/OS job. The job name can help the system operator locate the data set on the JES spool.

    job-id
    >   The ID that z/OS assigned to the job. The job ID can help the system operator locate the data set on the JES spool.

    dataset-name
    >   The name of the data set that is specified in the DSNAME parameter on the DD JCL statement for the data set. This name is the last qualifier of the fully qualified data set name on the JES spool. If the DSNAME parameter is not specified, this field is blank.

When **lpstat** returns information about multiple jobs, the order is not significant. The first job that is listed might not be the next job to print.

Options

-a [*printername ...*]
>   Displays the names and locations of the specified printers. If you do not specify a printer name, this option displays the names and locations of all printers that are defined in the Printer Inventory.
>
>   If you specify more than one printer name in the **-a** option, enclose the entire value in quotation marks. Or, you can repeat the **-a** option.

-d
>   Displays the name and location of the default printer that the administrator defined. If no default printer exists, **lpstat** returns an error message.
>
>   **Tip:** This option does not display the name or location of a default printer that you defined with the LPDEST or PRINTER environment variable. To display the values of these variables, use the z/OS UNIX **echo** command.

-o [*printername ...*]
>   Displays information about the specified printers and all jobs that you submitted to the specified printers. If you do not specify a printer name, this option displays information about printers that are defined in the Printer Inventory and all jobs that you submitted to them through Infoprint Server.
>
>   If you specify more than one printer name in the **-o** option, enclose the entire value in quotation marks. Or, you can repeat the **-o** option.

-p [*printername ...*]
>   Displays the names and locations of the specified printers. If you do not specify a printer name, this option displays the names and locations of all printers that are defined in the Printer Inventory.
>
>   If you specify more than one printer name in the **-p** option, enclose the entire value in quotation marks. Or, you can repeat the **-p** option.

-t
>   Displays information about all printers that are defined in the Printer Inventory and all jobs that are submitted to them through Infoprint Server.

-u [*userid ...*]
>   Displays information about all jobs that the specified users submitted to any printer. If you specify **-u** without a user name, this option displays information about all jobs that all users submitted to any

printer. If you do not specify **-u**, `lpstat` displays information about all jobs that you submitted to any printer.

The user ID is case-sensitive. Use the exact uppercase and lowercase characters.

If you specify more than one user name in the **-u** option, enclose the entire value in quotation marks. Or, you can repeat the **-u** option.

Operand

jobid ...
> Identifies the job that you want to display information about. Specify the Infoprint Server job ID, not the z/OS job ID.
>
> The **lp** command and AOPPRINT JCL procedure return the Infoprint Server job ID when a job is accepted for printing. Infoprint Server also can return the Infoprint Server job ID to you when you submit a job from a remote system.

Examples -- lpstat

Display the names and locations of all printers

To display the names of all printer definitions in the Infoprint Server Printer Inventory and the location information in the printer definition, enter:

```
lpstat -a
```

Display the name and location of the default printer

To display the name and location of the default printer, enter:

```
lpstat -d
```

Display information about selected jobs

To display the status of the jobs whose Infoprint Server job IDs are 14 and 16, enter:

```
lpstat 14 16
```

Display information about all jobs that you submitted

To display the status of all the jobs that you submitted to any printer definition, enter:

```
lpstat
```

Display information about all jobs submitted by a user

To display the status of all jobs that user MARTHA submitted to any printer definition, enter:

```
lpstat -u MARTHA
```

Display information about a printer and all jobs that you submitted to it

To display the location of printer `Printer1` and the status of all jobs that you submitted to it, enter:

```
lpstat -o Printer1
```

Display information about several printers and all jobs that you submitted to it

To display the location of printers `Printer1` and `Printer2` and the status of all jobs that you submitted to them, enter:

```
lpstat -o "Printer1 Printer2"
```

Display information about all printers and all jobs

To display the status of all printers and all jobs that are submitted by all users in the system, enter:

```
lpstat -t
```

Environment variables

The **lpstat** command uses these environment variables:

AOPCONF
Names the Infoprint Server configuration file. This variable takes precedence over the user-specific configuration file ($HOME/.aopconf) and the system default configuration file (/etc/Printsrv/aopd.conf). For more information about the configuration file, see *z/OS Infoprint Server Customization*.

LIBPATH
Names the directory paths that the **lpstat** command searches for dynamic link libraries (DLLs).

NLSPATH
Names the directory paths that the **lpstat** command searches for message catalogs.

PATH
Names the directory paths that the shell searches for programs.

For information about setting and using environment variables, see *z/OS UNIX System Services User's Guide*.

Files

$HOME/.aopconf
Contains the user-specific Infoprint Server configuration file. This file takes precedence over /etc/Printsrv/aopd.conf.

/etc/Printsrv/aopd.conf
Contains the system default Infoprint Server configuration file.

Exit values

0
Infoprint Server accepted the request.

>0
An error occurred that prevented Infoprint Server from accepting the request. Some possible errors are:

- The command syntax is not valid.
- Infoprint Server is not available.
- An error occurred in reading the Infoprint Server configuration file.

Portability

No extensions exist to any Portable Operating System Interface for Computer Environments (POSIX) standard or to the XPG4.2 standard for the **lpstat** command.

remotexf--Transform data remotely

Format

```
remotexf [-j "jobattributes"] ... [-o outputfile] [inputfile]
```

Description

The **remotexf** command transforms data from one format to another remotely using Ricoh InfoPrint Transform Manager for Linux transforms. The command converts files to another format without printing the files.

InfoPrint Transform Manager for Linux transforms convert files to Advanced Function Presentation (AFP) format from:

- Adobe Portable Document Format (PDF)
- Adobe PostScript
- Graphics interchange format (GIF)
- HP Printer Control Language (PCL)
- Joint Photographic Experts Group (JPEG) file information format (JFIF)
- Tagged image file format (TIFF)

InfoPrint Transform Manager for Linux transforms also convert files from AFP (MO:DCA-P only) format to PDF format.

In addition, if InfoPrint Transform Manager for Linux adds new transforms to the AFP format in the future, you can specify a transform ID value in the **remotexf** command to use the new transforms.

The command automatically detects the format of the input file and uses the appropriate transform, such as PDF to AFP, for that data format. However, you can specify the **document-format** job attribute to override the input format.

The **remotexf** command automatically detects the format of the input file and uses the appropriate transform to AFP, such as PDF to AFP, for that data format. However, if the input file is in AFP (MO:DCA:P) format, the transform does not select the appropriate transform. You must specify the output format in the **output-format** transform attribute.

You can specify only one input file to be transformed. If you do not specify an input file name, or if you specify a dash (-) as the file name, **remotexf** uses standard input. The output file name is also optional. If you do not specify one, the **remotexf** command writes the results to standard output.

Infoprint Server writes error messages for recoverable data stream errors on a trailer error page (a page that is written at the end of the output data) when it creates an AFP document. If you do not want a trailer error page, you can specify the **trailer-error-page** transform attribute in the **xf-options** job attribute. For the AFP to PDF transform, no trailer error page is created.

Notes:

1. For information about the InfoPrint Transform Manager for Linux transforms, including functions, limitations, and transform options, see *InfoPrint Transform Manager for Linux* and *InfoPrint Transform Manager for Linux: afp2pdf Transform Installation and User's Guide* in Ricoh Production Print Information Center (info.rpp.ricoh-usa.com/help/index.jsp).

2. To use the **remotexf** command, Infoprint Server must be customized. For information, see Customizing the TCP/IP firewall in *z/OS Infoprint Server Customization*.

Options

-j "*jobattributes*"
　　Specifies one or more job attributes in the format $attribute=value$, separated by spaces. You can specify **-j** multiple times. If job attributes are repeated, the last value that is specified for the job attribute is used.

　　You can specify any of these job attributes:

- **document-format**, which specifies the format of the input document.
- **filter-options**, which specifies InfoPrint Transform Manager for Linux transform options. For information about the transform options that you can specify, see *InfoPrint Transform Manager for Linux* in Ricoh Production Print Information Center (info.rpp.ricoh-usa.com/help/index.jsp).

- **xf-options**, which specifies these transform attributes:
  - **fail-on-datastream-error**
  - **output-format**
  - **trailer-error-page**
  - **transform-id**

Tip: Instead of entering a string of job attributes on the command line, you can store job attributes and values in a file. You use a special attribute that is called **attributes** to specify the file.

For more information about the job attributes, see .

When you specify job attributes:

- If a value contains spaces, enclose the value in single or double quotation marks:

  ```
  attribute='value with spaces'
  attribute="value with spaces"
  ```

- If a job attribute (attribute=value) contains spaces or characters that might be interpreted by the shell (such as $ & ( ) > < | ' "), enclose the job attribute in single quotation marks:

  ```
  -j 'attribute1=value1 attribute2=value2'
  ```

  For information about how the shell interprets special characters, see *z/OS UNIX System Services User's Guide*.

- If both the value and the job attribute require quotation marks, do either of these:
  - Use two pairs of double quotation marks and place a backslash before each quotation mark that surrounds the value:

    ```
    -j "attribute=\"value with spaces\""
    ```

  - Use different quotation marks around the job attribute and value. For example:

    ```
    -j 'attribute="value with spaces"'
    -j "attribute='value with spaces'"
    ```

-o *outputfile*

Specifies the output path and file into which the transform output (such as AFP data) is written. The transform overwrites any existing data in the output file. If you do not specify an output file, the result is written to standard output (STDOUT).

To specify an MVS data set, such as a sequential or partitioned data set, precede the data set name with //. When you specify a fully qualified name, two sets of quotation marks are required. For example, "//'*hlq*.PDS(MYDOC)'" or "//'*hlq*.SEQDS'". When you specify a partially qualified name, you need only one set of quotation marks. For example, "//PDS(MYDOC)" or "//SEQDS".

If you specify an MVS data set, allocate and catalog the data set before you run this command. Allocate a data set that is large enough to hold the output data stream. The size of the output data stream depends on the complexity of the document and the type of image compression used. Typically, an output AFP data stream is several times as large as the input data stream. Allocate the AFP output data set with these characteristics:

- Record format: VBM
- Record length: 32 K

Tip: For InfoPrint Transform Manager for Linux, if you do not use the **-pragma afpdsrecordlength** option, allocate the data set with a record length that is at least 32017 bytes. By default, the transforms to AFP create AFP records that are 32000 bytes. To request that the transforms create AFP records that are a smaller maximum length, you can use the **-pragma afpdsrecordlength** option.

Valid values for the option are 8000 - 32000. The default is 32000. For example, to set the maximum number of bytes in a record to 8000, specify:

```
-j "filter-options='-pragma afpdsrecordlength=8000'"
```

Operand

inputfile

Specifies an input file to be transformed. The results are written to a single output file (if one is specified in **-o**) or to standard output.

If you do not specify an input file, or if you specify a dash (-) for the file name, **remotexf** uses standard input.

To specify an MVS data set, precede the data set name with //. When you specify a fully qualified name, two sets of quotation marks are required. For example, "//'*hlq*.PDS(MYDOC)'" or "//'*hlq*.SEQDS'". When you specify a partially qualified name, you need only one set of quotation marks. For example, "//PDS(MYDOC)" or "//SEQDS".

Examples -- remotexf

Transform a file

To transform the PDF file myfile.pdf into an AFP data stream and write the result to a file called myfile.afp, enter:

```
remotexf -o myfile.afp myfile.pdf
```

Transform and print a file

To transform the PDF file myfile.pdf into an AFP data stream and send the result to the default printer with the **lp** command, enter:

```
remotexf myfile.pdf | lp
```

Transform a file, specifying image size

To transform the PostScript file myfile.ps into an AFP data stream, with an image that is 8 inches high and 5 inches wide, and write the result to a file called myfile.afp, enter:

```
remotexf -j "filter-options='-l 8i -w 5i'" -o myfile.afp myfile.ps
```

Transform a file, specifying paper size

To transform the GIF file myfile.gif into an AFP data stream for A4 paper and write the result to a file called myfile.afp, enter:

```
remotexf -j "filter-options='-paper a4'" -o myfile.afp myfile.gif
```

Transform a file, specifying resolution

To transform the PostScript file myfile.ps into an AFP data stream in 300-pel resolution and write the result to a file called myfile.afp, enter:

```
remotexf -j "filter-options='-r 300'" -o myfile.afp myfile.ps
```

Transform a file, specifying resolution and omitting errors

To transform the TIFF file `myfile.tiff` into an AFP data stream in 300-pel resolution, specify that data stream error messages is not included on the trailer error page, and write the result to a file called `myfile.afp`, enter:

```
remotexf -j "filter-options='-r 300' xf-options='trailer-error-page=no'"
         -o myfile.afp myfile.tiff
```

Transform a file, creating output only if data stream is error-free

To transform the GIF file `myfile.gif` into an AFP data stream, specifying that the output is created only if it does not have data stream errors, and write the result to a file called `myfile.afp`, enter:

```
remotexf -j "xf-options='fail-on-datastream-error=yes'"
         -o myfile.afp myfile.gif
```

Transform a file with redirection

To transform the PostScript file `input.ps` into the AFP output file that is called `output.afp`, enter:

```
remotexf < input.ps > output.afp
```

Note: You can use redirection operators only with UNIX files.

Transform a UNIX file to an MVS data set

To transform file `input.pcl` into an existing, cataloged MVS output data set called `hlq.OUTPUT.AFP(member)`, where *hlq* is your user ID, enter:

```
remotexf -o "//'hlq.OUTPUT.AFP(member)'" input.pcl
```

Transform an AFP document to PDF format

To transform the AFP document in file `myfile.afp` into PDF format and write the result to a file called `myfile.pdf`, enter:

```
remotexf -j "xf-options='output-format=pdf'" -o myfile.pdf myfile.afp
```

Transform an AFP document in an MVS data set to PDF format

To transform the AFP document in MVS data set `hlq.INPUT.AFP(member)`, where *hlq* is your user ID, into PDF format and write the result to a file called `output.pdf`, enter:

```
remotexf -j "xf-options='output-format=pdf'" -o output.pdf
"//'hlq.INPUT.AFP(member)'"
```

Environment variables

The **remotexf** command uses these environment variables:

AOPRXF_CONF
  Names the Infoprint Server remote transform configuration file. This variable takes precedence over the default remote transform configuration file (`/etc/Printsrv/aoprxf.conf`). For more information, see Creating the remote transform configuration file (aoprxf.conf) in *z/OS Infoprint Server Customization*.

LANG
  Names the language that is used for messages.

LIBPATH
  Names the directory paths that the **remotexf** command searches for dynamic link libraries (DLLs).

NLSPATH
  Names the directory paths that the **remotexf** command searches for message catalogs.

PATH
  Names the directory paths that the shell searches for programs.

For information about setting and using environment variables, see *z/OS UNIX System Services User's Guide*.

Files

/etc/Printsrv/aoprxf.conf
  Contains the Infoprint Server default remote transform configuration file.

Exit values

0
  The data was transformed successfully. However, the output document might contain error messages that are related to errors in the input data stream. If a recoverable data stream error occurs and the **fail-on-datastream-error** transform attribute is no, the exit value is 0.

>0
  An error occurred. No output document was created. If any data stream errors occur and the **fail-on-datastream-error** transform attribute is yes, the exit value is >0.

Chapter 3. Using job attributes

A *job* is a set of one or more documents that you submit to Infoprint Server for printing in a single printing session. A *document* is either a file or a group of similar files.

Infoprint Server uses *job attributes* to describe jobs and the documents in jobs. For example, you can specify the number of copies of a document to print by setting a value for the **copies** job attribute.

You can specify job attributes in different ways, depending on the method you use to submit a print job. shows how to specify job attributes for different job submission methods and refers you to the section that contains more information.

Table 6. How to specify job attributes		
Job submission method	**How to specify job attributes**	**See page**
z/OS UNIX lp command	**-o** option	"#unique_49/ unique_49_Conne ct_42_lpoptpg" on page 27
z/OS UNIX remotexf command	**-j** option and **xf-options** attribute	"#unique_69/ unique_69_Conne ct_42_rxfpg" on page 39, "#unique_161/ unique_161_Con nect_42_docrxfo pg" on page 82
JCL parameters with IP PrintWay extended mode	PRTATTRS JCL parameter	"#unique_45/ unique_45_Conne ct_42_prtattrspg " on page 104
Print Interface subsystem	SUBSYS parameter on the DD JCL statement	"#unique_61/ unique_61_Conne ct_42_jclsubsysp g" on page 111
AOPPRINT JCL procedure	OPTIONS parameter on the EXEC JCL statement	"#unique_162/ unique_162_Con nect_42_aoppara mpg" on page 128
NetSpool	Embed job attributes in print data	"#unique_163/ unique_163_Con nect_42_nsattrpg " on page 143
Infoprint Port Monitor for Windows	Infoprint Port Monitor Options window (select during port configuration)	"#unique_164/ unique_164_Con nect_42_addlocp g" on page 149

Table 6. How to specify job attributes (continued)		
Job submission method	**How to specify job attributes**	**See page**
AIX enq command	**-o** option	"#unique_165/ unique_165_Con nect_42_aixpg" on page 159
IBM i LPR command	DESTOPT option	"#unique_166/ unique_166_Con nect_42_as4pg" on page 160
IBM i remote queue that is defined with CRTOUTQ	Destination options field	"#unique_166/ unique_166_Con nect_42_as4pg" on page 160
lprafp command	**-o** option	"#unique_30/ unique_30_Conne ct_42_lprafppg" on page 163

You can also use the **-j** option of these transform commands: **afpxpcl**, **afpxpdf**, and **afpxps**. For more information about the commands, see the documentation for the transform.

Job attributes are only one of the factors that determine how your job is printed. These values also affect your job:

- Print command options. For example, you can use the **-n** option of the **lp** command to specify the number of copies of a job.
- Values in the data stream. For example, the document can specify an overlay.
- Values in the page definition that are used to print the job. For example, the page definition can specify fonts.
- Values in the form definition that are used to print the job. For example, the form definition can specify duplex printing.
- Printer specifications. Infoprint Server lets the administrator specify printer characteristics for each printer.
  - The administrator can limit the jobs that a printer can accept. For example, if the administrator specifies that a certain printer can print at most five copies of a job and you submit a job with a value of 10 for the **copies** job attribute, your job is not accepted.
  - The administrator can specify default values for jobs that are printed on a printer. For example, the administrator can specify the form definition that the printer uses to print jobs that are submitted without a value for the **form-definition** attribute.
- Printer setup. The way a printer is set up can affect printing. For example, if duplexing is not specified in the PCL or PostScript data stream, the printer setup determines whether documents print on one or both sides of the paper.

Abbreviations

This publication shows attribute names and values in their complete form. Often, you can abbreviate attribute names and values by using the first letter of each word in the name or value. For example, you can use the abbreviation c-c-t for the **carriage-control-type** attribute. You can use m for the **machine** value, and specify the attribute and value pair as c-c-t=m.

Sometimes specifying only the first letter in each word is ambiguous. For example, o-b might stand for either **output-bin** or **overlay-back**. Here, specify enough of the name so that it is unique, as in o-bi and o-ba. If the values are ambiguous, Infoprint Server rejects the command and sends an error message.

Attributes files

You can predefine attribute and value pairs in permanent files. You can use the permanent attribute files when you need those attribute values with the **lp**, **afpxpcl**, **afpxpdf**, **afpxps**, and **remotexf** commands. You can also use the permanent attribute files when you need to specify those values with the AOPPRINT JCL procedure and when you use the Print Interface subsystem.

Creating an attributes file

- You can list any job attribute in an attributes file.
- You can also list the attribute **attributes**. Thus, an attributes file can call other attributes files.

  Tip: If an attributes file calls itself, the command sends an error message.
- Attributes files must not contain any attributes without values.
- When you are creating an attributes file, consider spelling out the complete attribute names and attribute values rather than using abbreviations.
- You can use spaces between the attribute name and the equal sign to align the equal sign and values. This makes your files easier to read and maintain.
- You can use comment lines in attributes files. The comment starts with a number sign, # , and ends at the end of line.

  Example: You can create an attributes file called myatts to request five copies of a job, simple duplex printing, and a specific output bin. Your file contains these lines:

  ```
  # These are my job attributes
  copies     = 5
  duplex     = yes
  output-bin = collator # Collate the job
  ```

  Tip: You can include a number sign, #, as part of an attribute value if you precede it immediately with a backslash, \#.

Using an attributes file

Use the **-o** flag to read an attributes file into the **lp** command. Use the **-j** flag to read an attributes file into the **afpxpcl**, **afpxpdf**, **afpxps**, and **remotexf** commands.

For example, to print a file that is called myfile, by using the attributes in the myatts file, enter:

```
lp -o "attributes=myatts" myfile
```

The command in the example is equivalent to this command:

```
lp -o "copies=5 duplex=yes output-bin=collator" myfile
```

For information about how to specify an attributes file with the AOPPRINT JCL procedure, see Chapter 5, "Printing with the AOPPRINT JCL procedure," on page 127.

For information about how to specify an attributes file with the Print Interface subsystem, see "JCL parameters for the Print Interface subsystem" on page 111.

Job attributes and JCL parameters

If you have previous experience with z/OS, you are accustomed to using the OUTPUT and DD statements of the Job Control Language to specify processing options for print jobs. Many job attributes correspond to parameters of the OUTPUT JCL statement. A few correspond to parameters of the DD and JOB JCL statements. For a list of JCL parameters with corresponding job attributes, see Appendix B, "JCL parameters and corresponding job attributes," on page 173.

Job attribute listing

This section lists job attributes in alphabetical order.

address-text

This multi-valued attribute specifies 1 - 4 lines of address information that can be printed in the address field of a separator sheet.

Allowed values

You can specify 1 - 4 values. If you specify more than one value, separate the values by spaces and enclose the list of values in braces {}.

For each value, you can enter a text string of up to 60 characters. If the text string you specify contains spaces, enclose the text string in single or double quotation marks. For example:

```
-o "address-text={'Acme Novelties, Inc.' '13 Division St.'
   'Foxboro, MA 02035' USA}"
```

If any string contains double quotation marks, enclose the string in single quotation marks.

Default value

The default text that the administrator defined for the printer.

Usage guidelines

- Whether the text specified by this attribute is printed depends on how the administrator configures the printer's separator sheet.
- The **address-text** attribute is equivalent to the ADDRESS parameter of the OUTPUT JCL statement.

afp-parameters

This single-valued attribute specifies the name of a data set that contains AFP Download Plus parameters. If the data set is a partitioned data set, you must also specify the name of the member that contains the parameters, as shown in the example.

Allowed values

You can enter a valid data set name, with an optional member name. For example:

```
USER.AFPPARMS
USER.PDS(AFPPARMS)
```

Default value

The default value that the administrator defined for the printer in the printer definition.

Usage guidelines

- The data set must exist and be cataloged.
- This attribute is equivalent to the AFPPARMS parameter of the OUTPUT JCL statement.

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

backup-printer-definition-name

This single-valued attribute identifies the IP PrintWay printer definition name for a backup printer. This attribute is used when the job did not print successfully and either the printer definition does not specify a backup printer or you need to override the one that is specified.

Allowed values

You can enter 1 - 17 characters for an existing printer definition. All characters except blanks are allowed. For example:

```
printer5
```

Printer definition names are case-sensitive.

Default value

None.

Usage guidelines

- The name that is specified for this attribute must be a valid printer definition name in the Printer Inventory.
- The backup printer definition must define a printer that uses the same protocol and prints similar jobs as the printer defined in the original printer definition.

building-text

This single-valued attribute specifies building information that can be printed in the building field of a separator sheet.

Allowed values

You can enter a text string of up to 60 characters. If the text string you specify contains spaces, enclose the text string in single or double quotation marks. For example:

```
-o "building-text='Building 7: third floor'"
```

If the string contains double quotation marks, enclose the string in single quotation marks.

Default value

The default text that the administrator defined for the printer.

Usage guidelines

- Whether the text specified by this attribute is printed depends on how the administrator configures the printer's separator sheet.
- This attribute is equivalent to the BUILDING parameter of the OUTPUT JCL statement.

carriage-control-type

This single-valued attribute identifies the type of carriage control characters that the printer device uses when it interprets and prints this document.

Allowed values

You can enter one of these fixed values:

```
ansi
machine
```

Default values

1. For MVS data sets, such as partitioned data sets and sequential data sets, Infoprint Server determines the carriage control type from the record format in the data set control block (DCB).
2. For UNIX files, such as z/OS File System (zFS) files, the default is none.

Usage guidelines

- This attribute is most useful for line data documents.
- Use this attribute when you print UNIX files (files in a hierarchical file system) that contain carriage controls.
- For MVS data sets, Infoprint Server determines the carriage control type from the data set. When processing MO:DCA-P (including mixed mode) UNIX files, Infoprint Server usually determines the correct carriage control type. Infoprint Server might be able to properly detect UNIX files that contain line data with machine carriage controls, but for other types of line data in UNIX files, you probably need to specify **document-format = line**, and if the carriage control type is ansi, **carriage-control-type = ansi**. For other formats printed from a UNIX file, the default is correct.

chars

This multi-valued attribute identifies 1 - 4 coded fonts that are used to print a line data document or a MO:DCA document in which no fonts are specified.

A coded font is a pair of a character set and a code page. Coded font names begin with a 2-character prefix (X0 or XZ), followed by up to four alphanumeric characters. X042B2 is an example of a coded font name. For more information about coded fonts, see *z/OS Font Collection*.

Allowed values

You can enter a text string that contains the names of the coded fonts. The name of each font can be 1 - 4 characters.

Tip: Some coded fonts have 6-character names, not counting the prefix. For these coded fonts, see *z/OS Font Collection* for the 4-character alternative coded font name.

Omit the 2-character prefix from the coded font name or the alternative coded font name.

If you specify more than one coded font, separate the font names by spaces and surround the string of font names with braces. For example:

```
-o "chars={GT10 GT12}"
```

Default values

1. The default coded fonts that the administrator defined for the printer.
2. The coded fonts that the page definition used to print the job specifies.

Usage guidelines

- This attribute is most useful for line data documents.
- This attribute applies to line data documents printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- PSF uses this attribute only if the page definition used to print the job does not specify fonts, or if the default page definition is used.
- If you specify more than one coded font with the **chars** attribute, the job must contain either shift-out-shift-in (SOSI) codes or table reference characters (TRCs) to use coded fonts other than the first one. IBM suggests that you do not mix SOSI codes and TRCs.

– If the job contains TRCs, you must specify the **table-reference-characters** attribute value as `true`. The TRC characters are used to select the corresponding coded font that is specified with the **chars** attribute.

– If the job contains SOSI codes, the first coded font that is specified with the **chars** attribute is used as the single-byte font and the second coded font is used as the double-byte font.

For more information about using multiple coded fonts, see *AFP: Programming Guide and Line Data Reference* and *PSF for z/OS: User's Guide*.

- Raster fonts are used unless the administrator requested font mapping to outline fonts and your font name is in the font mapping table.

- This attribute is equivalent to the CHARS parameter of the OUTPUT and DD JCL statements.

copies

This single-valued attribute specifies the number of copies of each document in the job to print.

Allowed values

You can enter an integer 1 - 32640.

Default values

1. The default value that the administrator defined for the printer.
2. 1

Usage guidelines

- Only one copy prints when you print on Internet Printing Protocol (IPP) printers that do not support the **copies** IPP job attribute.

- Only one copy of the file is sent to an email destination.

- The administrator can limit the number of copies that you can specify. Before it accepts a job, Infoprint Server verifies that the printer can support the value of this attribute.

- The value that you specify for this attribute overrides any value in the form definition that is used to print the job.

- This attribute is similar to the COPIES parameter of the OUTPUT and DD JCL statements.

department-text

This single-valued attribute specifies department information that can be printed in the department field of a separator sheet.

Allowed values

You can enter a text string of up to 60 characters. If the text string you specify contains spaces, enclose the text string in single or double quotation marks. For example:

```
-o "department-text='Customer Relations'"
```

If the string contains double quotation marks, enclose the string in single quotation marks.

Default value

The default text that the administrator defined for the printer.

Usage guidelines

- Whether the text specified by this attribute is printed depends on how the administrator configures the printer's separator sheet.

- This attribute is equivalent to the DEPT parameter of the OUTPUT JCL statement.

document-codepage

This single-valued attribute is the name of the code page that is used to create the document. Infoprint Server uses this name as the source when it uses the z/OS UNIX iconv utility to convert data from one code page to another.

Allowed values

You can enter the name of an IBM-supplied or custom code page that the iconv utility supports.

Default values

1. The default code page that the administrator defined for the printer.
2. The code page for the current locale of z/OS UNIX System Services. This is usually an EBCDIC code page.

Usage guidelines

- For the names of IBM-supplied code page names, see *z/OS XL C/C++ Programming Guide*.

  If you specify a custom code page, ask your administrator to make sure that conversion tables exist to convert between:

  - The custom code page and the code page that is specified in the `Printer code page` field in the printer definition for the printer in the Printer Inventory.
  - The code page for the z/OS locale and the custom code page.

  For information about how to create conversion tables, see information about code set conversion utilities in *z/OS XL C/C++ Programming Guide*.

- To print an ASCII job, you must use an ASCII code page. If the printer is not defined to use an ASCII code page, you must specify one as the value of this attribute. ISO8859-1 is an example of an ASCII code page.

- Infoprint Server uses this attribute to translate documents before it places them on the Job Entry Subsystem (JES) spool. Because Infoprint Server does not translate data streams such as MO:DCA-P, PCL, or PostScript, it ignores this attribute when it prints these data streams.

document-format

This single-valued attribute identifies the format (data type) of this document.

Allowed values

You can enter one of these fixed values:

jpeg
 Joint Photographic Experts Group (JPEG) file information format (JFIF).

line-data
 A data format whose bytes map to characters. Line data is stored as records, for example, in sequential data sets. The records can contain carriage-control characters and table-reference characters. Line data is typically found in mainframe data sets.

modca-p
 Mixed Object Document Content Architecture for Presentation (MO:DCA-P) data format.

other
 Any other data format, such as the Xerox data format.

pcl
 Printer Control Language (PCL) data format, which is defined by Hewlett-Packard.

pdf
 Portable Document Format (PDF) data format, which is defined by Adobe.

postscript
 PostScript data format, which is defined by Adobe.

sap

SAP Output Text Format (OTF) or SAP Advanced Business Application Programming (ABAP) Version 1 or Version 2 data format, which is defined by SAP AG.

text

A data format whose bytes map to characters. Text data contains no control characters other than line feed (LF), carriage return (CR), horizontal tab (HT), vertical tab (VT), and form feed (FF). Text data is typically found in workstation files.

tiff

Tagged image file format.

xml

Extensible Markup Language, which includes Extensible Stylesheet Language formatting objects (XSL-FO).

Default value

The value that Infoprint Server determines from the contents of the data stream.

Usage guidelines

- Before it accepts a job, Infoprint Server verifies that the printer can support the value of this attribute.
- IBM suggests that you do not use this attribute with NetSpool.
- Some code pages, such as IBM-850, include rarely used printable characters in the range of X'01' to X'1F'. If you create a document that includes characters with code points in this range, specify `document-format=text` so that Infoprint Server does not interpret the document's format to be "other" when you want it to be "text".

document-type

This single-valued attribute indicates that the document is either a printable document or a list of printable documents.

Allowed values

You can enter one of these fixed values:

```
file-reference
printable
```

Default value

`printable`

Usage guidelines

- A *printable document* contains data that you want to print.
- A *file-reference document* is a list of similar printable documents. Infoprint Server concatenates these documents into one printable document. Separate the document names with spaces, tabs, or new lines. For example:

```
file1.txt
file2.txt
file3.txt
```

All these documents must have the same format because Infoprint Server processes them all the same way.

- Do not combine file-reference documents and printable documents in the same job.
- Do not specify this job attribute in the SUBSYS JCL parameter.
- Do not specify this attribute when you embed job attributes in VTAM application data that NetSpool processes.

- Do not specify this job attribute when you print from a remote system. The files must be on the z/OS system.

duplex

This single-valued attribute indicates whether to print on one or both sides of the paper and the relative orientation of consecutive pages.

Allowed values

You can enter one of these fixed values:

no
The job is printed on one side of the paper.

yes
The job is printed on both sides of the paper so that the top of side 1 is the top of side 2 (for side binding).

tumble
The job is printed on both sides of the paper so that the top of side 1 is the bottom of side 2 (for top binding).

Default values

1. The default value that the administrator defined for the printer.
2. The value in the form definition that is used to print the job.

Usage guidelines

- This attribute applies to documents printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- The value that you specify for this attribute overrides any value in the form definition that is used to print the job.
- Before it accepts a job, Infoprint Server verifies that the printer can support the value of this attribute.
- This attribute is equivalent to the DUPLEX parameter of the OUTPUT JCL statement.

fail-on-transform-error

This single-valued attribute indicates whether transforms fail when data stream errors or warnings occur. Warnings can indicate degraded output.

Allowed values

You can enter one of these fixed values:

error
The transform fails when an error occurs and does not create an output document. However, the transform continues if warnings occur.

no
The transform continues processing when a warning or error occurs and creates an output document.

warning
The transform fails when a warning or error occurs and does not create an output document.

Default values

1. The value in the **Fail on error** field in the printer definition for the printer.
2. The value in the AOP_FAIL_ON_ERROR environment variable for the transform.
3. The default for the transform. The default for IBM Infoprint Transforms to AFP for z/OS is no. Other transforms might have different defaults.

Usage guidelines

For information about whether a transform supports this attribute, see the documentation for the transform.

filter-options

This single-valued attribute passes options to a filter or a transform that converts this document from one data format to another. You can pass options to:

- A transform filter that a transform product provides
- The Infoprint Server LPD compatibility filter (**lpd_compat.so**)
- The Infoprint Server remote transform filter for InfoPrint Manager for AIX or Windows (**aoprform.dll**)
- InfoPrint Transform Manager for Linux transforms
- A filter that your installation writes

Table 7. References for transforms and filters	
For information about:	**See:**
IBM transforms	- *IBM Infoprint Transforms to AFP for z/OS* - *IBM Print Transforms from AFP for Infoprint Server for z/OS*
aoprform.dll options	*z/OS Infoprint Server Operation and Administration*
InfoPrint Transform Manager for Linux options	*InfoPrint Transform Manager for Linux* in Ricoh Production Print Information Center (info.rpp.ricoh-usa.com/help/index.jsp)
x2afp options	*IBM Infoprint XT for z/OS*

Allowed values

You can enter a text string that contains the options. If the string contains blanks, enclose the string in single or double quotation marks. For example:

```
-o "filter-options='-p 5-12'"
-j "filter-options='-l 8i -w 5i'"
```

The LPD compatibility filter (**lpd_compat.so**) specifies options that correspond to parameters you can specify on the z/OS Communications Server (TCP/IP) LPR command. It accepts these options:

-f *filter*
　　Specifies the type of filter processing. This option corresponds to the FILTER parameter of the TCP/IP LPR command. The default value is **f**. Valid values are:

Filter
　　Meaning

f

　　Paginate the data, but do not add a heading. Truncate lines that exceed the maximum width. Discard any ASCII control characters except CR, FF, LF, BS, NL, VT, and HT.

l

　　Do not paginate the data or add a heading. Pass through all control characters.

p

　　Paginate the data, adding a heading to each page. The heading includes the date and time that Infoprint Server received the data, the title, and the page number. After a page of text, a new page is started with a new page number. Truncate lines that exceed the maximum width.

r

    Interpret the first column of each input line as an ANSI (FORTRAN) carriage control. The ANSI standard limits the carriage control values to blank, "1", "0", "+", and "-". Truncate lines that exceed the maximum width.

-l *length*

    Specifies the maximum number of lines to include on a page. This value applies only to filters **f** and **p**. This option corresponds to the LINECOUNT parameter of the TCP/IP LPR command. The default value is 60 lines. To prevent Infoprint Server from inserting page breaks, specify 0.

-w *width*

    Specifies the maximum number of columns to allow on a line. Lines longer than the number specified (except for the title line) are truncated. The number that is specified does not include the carriage control character at the beginning of each line. This value applies only to filters **f**, **p**, and **r**. This option corresponds to the WIDTH parameter of the TCP/IP LPR command. The default action is that lines are not truncated.

For examples that show how to specify this attribute on the **lp** command, see .

Default value

The default filter options that the administrator defined for the printer. If the administrator did not define a filter option, the default value for the option is used.

Usage guidelines

- The filter options that you specify in this attribute take effect only if the administrator specifies the filter for the printer in the Printer Inventory. The administrator can also specify filter options in the Printer Inventory.

- The administrator can control whether the filter options that you specify with this attribute are used. For information about how the administrator can control whether your filter options take effect, see the description of the **%filter-options** option in *z/OS Infoprint Server Operation and Administration*.

- The LPD compatibility filter can be used for text and line data when you print to an AFP printer or a JES line printer. For more information about this filter, see *z/OS Infoprint Server Operation and Administration*.

form-definition

This single-valued attribute identifies the form definition that is used when you are printing this document.

Allowed values

You can enter a text string of up to 8 characters that contains the identification for this resource. You can specify the form definition name either with or without the **F1** prefix.

Default value

The default form definition that the administrator defined for the printer.

Usage guidelines

- This attribute applies to line data and AFP documents that are printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- If the document has an inline form definition, specify either the name of that form definition or dummy.
- To select a form definition from your user library:

    1. See the user library that contains the form definition in the **resource-library** attribute.

    2. Specify the name of the form definition in the **form-definition** attribute.

- This attribute is equivalent to the FORMDEF parameter of the OUTPUT JCL statement.

forms

This single-valued attribute identifies the form (medium) on which this job is printed.

Allowed values

You can enter a text string of up to 8 characters.

Default values

1. The default form that the administrator defined for the printer.
2. The default form that the administrator defined for the installation.

Usage guidelines

- This attribute applies to line data and AFP documents that are printed on an AFP printer.
- Before it accepts a job, Infoprint Server verifies that the printer can support the value of this attribute.
- This attribute is equivalent to the FORMS parameter of the OUTPUT JCL statement.

hold

This single-valued attribute indicates whether Infoprint Server holds all data sets in the job on the JES spool.

Allowed values

You can enter one of these fixed values or synonyms:

Fixed value

> true
> false

Input synonym

> yes
> no

Default values

1. The default value that the administrator defined for the printer.
2. `false`

Usage guidelines

- A held job remains in the queue until the z/OS operator releases it.

input-tray

This single-valued attribute identifies an input tray on the printer device that contains the medium that is used for normal document pages.

Allowed values

You can enter any value that the administrator defined. Some typical values are:

> alternate
> bottom
> envelope
> large-capacity
> main

```
manual
middle
side
top
```

Default values

1. The default input tray that the administrator defined for the printer.

2. The input tray that the form definition used to print the job specifies.

Usage guidelines

- This attribute applies to line data and AFP documents that are printed on an AFP printer.
- The value of this attribute is mapped to an **input-tray-number** value. For example, **letter** might be mapped to **input-tray-number=2**. The administrator defines the mapping from **input-tray** to **input-tray-number** in the printer definition.
- The AFP to PCL, AFP to PDF, and AFP to PostScript transforms map the **input-tray-number** to the appropriate printer tray. For example, **2** might be mapped to **PCL input tray 4**. In this example, if you specify **letter** on this attribute and the AFP file is being transformed automatically to PCL, the PCL printer uses input tray 4. For the default **input-tray-number** to printer tray mapping, see .
- Before it accepts a job, Infoprint Server verifies that the printer can support the value of this attribute.
- The value that you specify for this attribute overrides any input tray selection in the data stream or form definition.
- If the tray name contains blanks or special characters, enclose the name in single or double quotation marks.
- This attribute is similar to the INTRAY parameter of the OUTPUT JCL statement.

input-tray-number

This single-valued attribute identifies an input tray number on the printer device that contains the medium that is used for normal document pages.

Allowed values

You can enter any number that the AFP printer supports. Some typical values are:

```
1 - 255
```

Default values

1. The default input tray that the administrator defined for the printer.

2. The input tray that the form definition used to print the job specifies.

Usage guidelines

- This attribute applies to line data and AFP documents that are printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- The value that you specify for this attribute overrides any input tray selection in the data stream or form definition.
- This attribute is equivalent to the INTRAY parameter of the OUTPUT JCL statement.
- These guidelines apply only to the AFP to PCL, AFP to PDF, and AFP to PostScript transforms:
  - Your administrator sets up the mapping of AFP printer tray numbers to PCL, PDF, or PostScript printer tray numbers. All values greater than 9 map to the same PCL, PDF, or PostScript printer tray number. The defaults are tray 2 for PCL and PostScript output, tray 1 for PDF output.

- For PDF output, the page size for the entire document is the size of paper the administrator specifies for the selected printer tray.
- Always specify the AFP printer input bin number, not the PCL, PDF, or PostScript bin number, on this attribute. When you print on a PCL, PDF, or PostScript printer, the transforms use the tray number of the AFP printer to select a corresponding input tray number for the PCL or PostScript printer. The default mapping is shown in . For example, if you want to print from input tray 4 on a PCL printer, specify `input-tray-number=2`. Contact your administrator to confirm that this mapping is valid for the transform you are using.

Table 8. input-bin-number default mapping	
Data stream	**Mapping**
PCL	1,4,0,0,0,0,0,0,0,2
PostScript	1,2,0,0,0,0,0,0,0,2
PDF	1,1,1,1,1,1,1,1,1,1
Tip: "0" indicates that the paper tray is not installed.	

jes-form-length

This single-valued attribute indicates the paper length in inches or centimeters. This field is used to change the paper length of the physical paper at the printer without reconfiguring the printer. The value must contain at least one digit and an abbreviation for inches or centimeters.

Allowed values

You can enter a value in the format `nn.mmmuu`:

nn
A number 0 - 99. You must specify at least one digit to the left of the decimal point.

mmm
A number 0 - 999. The decimal point and the digits after it are optional.

uu
The unit of measurement. One of these fixed values:

Value
Meaning

in
Inches

cm
Centimeters

For example, these values are valid:

```
jes-form-length=9.5in
jes-form-length=12.345cm
jes-form-length=2in
jes-form-length=0.5cm
```

Default value

The default form length that the administrator defined for the printer.

Usage guidelines

- This attribute applies to line data and AFP documents that are printed on an AFP printer.
- This attribute is equivalent to the FORMLEN parameter of the OUTPUT JCL statement.

jes-priority

This single-valued attribute indicates the scheduling priority for the job.

Allowed values

You can enter an integer 0 - 255.

Default value

The default value that the administrator defined for the printer.

Usage guidelines

- 255 is the highest priority. 0 is the lowest.
- JES might override or ignore this attribute, depending on how JES is configured in your installation.
- This attribute is equivalent to the PRTY parameter of the OUTPUT JCL statement.

mail-bcc-addresses

This multi-valued attribute specifies the email addresses for the blind copy (bcc) recipients of an email. A *bcc* means that other recipients of the email do not see the bcc recipient listed.

Allowed values

You can specify 1 - 32 email addresses. If you specify more than one value, separate the values with spaces and enclose the list of values in braces {}. If the email address contains the special character @, enclose the value in braces even if only one value exists.

Each email address can be 1 - 60 characters. You can specify any EBCDIC text characters; however, blanks are not allowed. If the email address contains special characters (such as @ $ & ( ) > < | ' " #), enclose the entire email address in single or double quotation marks.

For example:

```
-o "mail-bcc-addresses={'user1@xyz.com' 'user2@xyz.com' dept01list}"
-o "mail-bcc-addresses={'user1@xyz.com'}"
```

If the email address contains double quotation marks, enclose the address in single quotation marks.

Default value

The default value that the administrator defines in the printer definition.

Usage guidelines

- The email address can be an alias name that is defined to the sendmail bridge. For more information, see "Using the email address list in an alias file" on page 88.
- This attribute is equivalent to the MAILBCC parameter of the OUTPUT JCL statement.

mail-cc-addresses

This multi-valued attribute specifies the email addresses for the copy (cc) recipients of an email. A *cc* means that other recipients of the email can see the cc recipient listed.

Allowed values

You can specify 1 - 32 email addresses. If you specify more than one value, separate the values with spaces and enclose the list of values in braces {}. If the email address contains the special character @, enclose the value in braces even if only one value exists.

Each email address can be 1 - 60 characters. You can specify any EBCDIC text characters; however, blanks are not allowed. If the email address contains special characters (such as @ $ & ( ) > < | ' " #), enclose the entire email address in single or double quotation marks.

For example:

```
-o "mail-cc-addresses={'user1@xyz.com' 'user2@xyz.com' dept01list}"
-o "mail-cc-addresses={'user1@xyz.com'}"
```

If the email address contains double quotation marks, enclose the address in single quotation marks.

Default value

The default value that the administrator defines in the printer definition.

Usage guidelines

- The email address can be an alias name that is defined to the sendmail bridge. For more information, see "Using the email address list in an alias file" on page 88.
- This attribute is equivalent to the MAILCC parameter of the OUTPUT JCL statement.

mail-embedded-headers

This single-valued attribute indicates whether a line-data document contains an email header.

Allowed values

You can enter one of these fixed values:

yes
> IP PrintWay extended mode looks for an email header in the line-data document. It sends the email to the email addresses specified in the header.

no
> IP PrintWay extended mode does not look for email headers.

Default value

The default value that the administrator defined in the printer definition.

Usage guidelines

- For more information, see Chapter 11, "Creating an email header," on page 165.
- IP PrintWay basic mode ignores this attribute.

mail-file-name

This single-valued attribute specifies the file name of the attachment to an email.

Allowed values

You can specify a name that is 1 - 60 characters. You can specify any EBCDIC text characters, including blanks. If the name contains blanks or special characters (such as @ $ & ( ) > < | ' " #), enclose the entire name in single or double quotation marks. For example:

```
-o "mail-file-name='February 2004 sales report'"
```

If the name contains double quotation marks, enclose the name in single quotation marks.

Default value

The default value in one of these:

- IP PrintWay, spooled by Print Interface:

    1. The **sysout-dataset-name** job attribute
    2. The last 8 characters of the file name

If the first character is not a letter, #, $, or @, it is converted to a #. If one of the remaining characters is not a letter, number, #, $, or @, it is converted to a #. Lowercase letters are converted to uppercase letters.

- IP PrintWay, spooled by NetSpool:

  1. The **sysout-dataset-name** job attribute
  2. The VTAM PLU name of the application that sent the data

Usage guidelines

- This attribute is equivalent to the MAILFILE parameter of the OUTPUT JCL statement.

mail-from-name

This single-valued attribute specifies the descriptive name or other identifier of the sender of an email.

Allowed values

You can specify a name that is 1 - 60 characters. You can specify any EBCDIC characters. If the name contains blanks or special characters (such as @ $ & ( ) > < | ' " #), enclose the entire name in single or double quotation marks. For example:

```
-o "mail-from-name='John Q. Sender'"
```

If the name contains double quotation marks, enclose the name in single quotation marks.

Default value

The default value that the administrator defined in the printer definition.

Usage guidelines

- This attribute is equivalent to the MAILFROM parameter of the OUTPUT JCL statement.

mail-inline-message

This single-valued attribute specifies data that IP PrintWay extended mode includes inline at the beginning of each email. For example, you can specify a standard greeting and text.

Allowed values

Up to 292 letters, numbers, blanks, and special characters. If the message contains blanks or special characters, enclose the entire message in single or double quotation marks. You can include control values, such as:

<LF>
    New line

<SP>
    Blank character

Default value

No inline message is included in the body of the email.

Usage guidelines

- The message that this attribute specifies is included in the email after the text data specified with the **mail-inline-text-attribute** job attribute.
- Infoprint Server converts each blank in the message to <SP>. If the message exceeds 292 characters, it is truncated.
- Email programs can interpret control values in different ways.
- IP PrintWay basic mode ignores this attribute.

mail-inline-text

This single-valued attribute indicates whether to include data in a text or line-data document inline in the body of the email.

Allowed values

You can enter one of these fixed values:

yes
Text and line data is included inline.

no
Text and line data is not included inline. The document is sent as an attachment.

Default value

The default value that the administrator defined in the printer definition.

Usage guidelines

- Documents in other formats (such as AFP and PDF) are always sent as attachments.
- IP PrintWay basic mode ignores this attribute.

mail-inline-text-attribute

This single-valued attribute specifies an existing text job attribute that IP PrintWay extended mode includes inline as a text string at the beginning of each email.

Allowed values

You can specify a single-valued text job attribute, such as:

- **building-text**
- **department-text**
- **name-text**
- **room-text**
- **title-text**

For example, if `mail-inline-text-attribute=name-text` and `name-text="Mr. Jones"`, then `Mr. Jones` is included on the first line in the email.

Default value

No text data is included at the beginning of the email.

Usage guidelines

- The text string that this attribute specifies is included at the beginning of the email before the data that is specified with the **mail-inline-message** job attribute.
- IP PrintWay basic mode ignores this attribute.

mail-reply-address

This single-valued attribute specifies the email address that recipients of an email can reply to.

Allowed values

You can specify a name that is 1 - 60 characters. You can specify any EBCDIC text characters; however, blanks are not allowed. If the name contains special characters (such as @ $ & ( ) > < | ' " #), enclose the entire name in single or double quotation marks. For example:

```
-o "mail-reply-address='user1@xyz.com'"
```

If the email address contains double quotation marks, enclose the address in single quotation marks.

Default value

The default value that the administrator defined in the printer definition. If none is specified in the printer definition, most email programs use the sender's email address. The default is *userid@domainname*. The user ID of the job submitter is *userid*. The domain name where Infoprint Server is running is *domainname*.

Usage guidelines

- This attribute is equivalent to the REPLYTO parameter of the OUTPUT JCL statement.

mail-to-addresses

This multi-valued attribute specifies the email addresses for the recipients of an email.

Allowed values

You can specify 1 - 32 email addresses. If you specify more than one value, separate the values by spaces and enclose the list of values in braces {}. If the email address contains the special character @, enclose the value in braces even if only one value exists.

Each email address can be 1 - 60 characters. You can specify any EBCDIC text characters; however, blanks are not allowed. If the email address contains special characters (such as @ $ & ( ) > < | ' " #), enclose the entire email address in single or double quotation marks.

For example:

```
-o "mail-to-addresses={'user1@xyz.com' 'user2@xyz.com' dept01list}"
-o "mail-to-addresses={'user1@xyz.com'}"
```

If the email address contains double quotation marks, enclose the address in single quotation marks.

Default value

The default value that the administrator defines in the printer definition.

Usage guidelines

- The email address can be an alias name that is defined to the sendmail bridge. For more information, see "Using the email address list in an alias file" on page 88.
- This attribute is equivalent to the MAILTO parameter of the OUTPUT JCL statement.

name-text

This single-valued attribute specifies name information that can be printed in the name field of a separator sheet.

Allowed values

You can enter a text string of up to 60 characters. If the text string you specify contains spaces, enclose the text string in single or double quotation marks. For example:

```
-o "name-text='C. J. Brown'"
```

If the string contains double quotation marks, enclose the string in single quotation marks.

Default value

The default text that the administrator defined for the printer.

Usage guidelines

- Whether the text specified by this attribute is printed depends on how the administrator configures the printer's separator sheet.
- This attribute is equivalent to the NAME parameter of the OUTPUT JCL statement.

output-bin

This single-valued attribute specifies the name of the output bin to which you want Infoprint Server to direct the output from your job.

Allowed values

You can enter any value that the administrator defined. Some typical values are:

```
bottom
collator
face-down
face-up
large
left
middle
private
right
side
top
```

Default values

1. The default output bin that the administrator defined for the printer.
2. The output bin that the form definition used to print the job specifies.

Usage guidelines

- This attribute applies to line data and AFP documents that are printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- The value of this attribute is mapped to an **output-bin-number** value. For example, **bottom** might be mapped to **output-bin-number=2**. The administrator defines the mapping from **output-bin** to **output-bin-number** in the printer definition.
- Before it accepts a job, Infoprint Server verifies that the printer can support the value of this attribute.
- The value that you specify for the **output-bin** attribute overrides any output bin that the form definition used to print the job specifies.
- If the bin name contains blanks or special characters, enclose the name in single or double quotation marks.
- This attribute is similar to the OUTBIN parameter of the OUTPUT JCL statement.

output-bin-number

This single-valued attribute specifies the number of the output bin to which you want Infoprint Server to direct the output from your job.

Allowed values

You can enter any number that the AFP printer supports. Some typical values are:

```
1 - 16
```

Default values

1. The default output bin that the administrator defined for the printer.
2. The output bin that the form definition used to print the job specifies.

Usage guidelines

- This attribute applies to line data and AFP documents that are printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- When you print on a PCL or PostScript printer, instead of on an AFP printer, specify the output bin number of the PCL or PostScript printer.
- The value that you specify for the **output-bin-number** attribute overrides any output bin that the form definition used to print the job specifies.
- This attribute is equivalent to the OUTBIN parameter of the OUTPUT JCL statement.

overlay-back

This single-valued attribute specifies the name of an overlay that is placed on the back of each page in a two-sided job. An overlay contains predefined data, such as lines, shading, text, boxes, or logos that can merge with variable data on a page.

Allowed values

You can enter an overlay name of up to 8 characters. The first character must be alphabetic. For overlays, unlike form definitions and page definitions, you must specify the complete name, including the **O1** prefix.

Default value

The default overlay that the administrator defined for the printer.

Usage guidelines

- This attribute applies to line data and AFP documents that are printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- This overlay prints in addition to any overlay specified by the form definition for the job.
- This attribute is equivalent to the OVERLAYB parameter of the OUTPUT JCL statement.

overlay-front

This single-valued attribute specifies the name of an overlay that is placed on the front of each page in the job. An overlay contains predefined data, such as lines, shading, text, boxes, or logos that can merge with variable data on a page.

Allowed values

You can enter an overlay name of up to 8 characters. The first character must be alphabetic. For overlays, unlike form definitions and page definitions, you must specify the complete name, including the **O1** prefix.

Default value

The default overlay that the administrator defined for the printer.

Usage guidelines

- This attribute applies to line data and AFP documents that are printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- This overlay prints in addition to any overlay specified by the form definition for the job.

- This attribute is equivalent to the OVERLAYF parameter of the OUTPUT JCL statement.

owner

This single-valued attribute specifies the owner of a NetSpool job. You can embed this attribute in NetSpool print data. The identifying information can be printed on output header pages, or can help identify the user to charge in an accounting system for printing jobs. This attribute applies only to NetSpool.

Allowed values

You can enter a text string of up to 8 characters. The first character must be a letter or a national (#, $, @) character. Other characters can be letters, numbers, or national (#, $, @) characters. If the text string contains #, $, or @, enclose the text string in single or double quotation marks. For example:

```
 -o "owner='$SMITH'"
```

Lowercase letters are converted to uppercase letters.

Default value

The default owner that the administrator defined in the printer definition. If none is specified in the printer definition, the default value is the ID of the user who started the Infoprint Server daemons.

Usage guidelines

- This attribute applies only when you embed job attributes in NetSpool print data. To embed job attributes in NetSpool print data, your administrator must configure the **embedded-attributes-prefix** attribute in the printer definition, and you must precede the job attributes in the print data with the embedded-attributes-prefix value that your administrator specified.
- This attribute is equivalent to the USER parameter of the JOB JCL statement.
- You can use this attribute to search for print jobs with Infoprint Central.

page-definition

This single-valued attribute identifies the page definition that is used to print a line data document.

Allowed values

You can enter a text string of up to 8 characters. You can specify the page definition name either with or without the **P1** prefix.

Default value

The default page definition that the administrator defined for the printer.

Usage guidelines

- This attribute applies to line data documents printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- If the document has an inline page definition, specify either the name of that page definition or dummy.
- This attribute is equivalent to the PAGEDEF parameter of the OUTPUT JCL statement.

pdf-author

This single-valued attribute specifies the PDF author, which can be an author of the PDF output file. This value is displayed in the **Author** field of the PDF document properties.

Allowed values

Any combination of 1 - 255 of letters (a-z, A-Z), numbers (0-9), blanks, and special characters. If the value contains blanks or special characters (such as: @ $ & ( ) > < | ' " #), enclose it in single or double quotation marks.

Default value

None.

pdf-digital-certificate-name

This single-valued attribute specifies the name of the digital certificate used to create the signed PDF document.

Allowed values

Any combination of 1 - 255 of letters (a-z, A-Z), numbers (0-9), blanks, and special characters. If the value contains blanks or special characters (such as: @ $ & ( ) > < | ' " #), enclose it in single or double quotation marks.

Default value

None.

Usage guidelines

- The value of this field is combined with the environment variable AOP_DIGITAL_CERTIFICATE_LOCATION to locate the digital certificate.
- The certificate repository might limit the characters that you can use in this field.

pdf-encryption-level

This single-valued attribute specifies the level of encryption that is used to encrypt PDF documents. A high level of encryption provides enhanced security. However, some users might not be able to open PDF documents that use a high level of encryption.

Allowed values

You can enter one of these fixed values:

bits40
    A low level of encryption (a 40-bit encryption key) is used. Select this value if you email PDF documents to countries that do not use 128-bit encryption, or for Adobe Acrobat Reader 3.0 - 4.x.

bits128
    A high level of encryption (a 128-bit encryption key) is used. Select this value for sensitive PDF documents.

AES128
    Advanced Encryption Standard (AES) 128-bit encryption is used. Select this value for sensitive PDF documents.

AES256
    AES 256-bit encryption is used. Select this value for sensitive PDF documents.

Notes:

1. AES is a modern block cipher that is documented in the FIPS-197 publication.
2. AES encryption requires Integrated Cryptographic Service Facility (ICSF) to be installed and active at the time of use.

Default value

```
bits128
```

Usage guidelines

- AFP to PDF transforms can support this attribute. For information, see the documentation for the transform.

pdf-keywords

This single-valued attribute specifies a list of one or more PDF keywords that highlight the important content within a document.. This value is displayed in the **Keywords** field of the PDF document properties.

Allowed values

Any combination of 1 - 255 of letters (a-z, A-Z), numbers (0-9), blanks, and special characters. If the value contains blanks or special characters (such as: @ $ & ( ) > < | ' " #), enclose it in single or double quotation marks. For example:

```
-j 'pdf-keywords="'monthly report' template"'
```

Default value

None.

pdf-owner-identifier

This single-valued attribute specifies the identifier of the owner of an encrypted PDF document. The owner identifier is associated with a password that is stored in a separate database. An owner password is required to restrict actions with the **pdf-protect** attribute.

Allowed values

You can enter a text string of 1 - 256 characters. You can enter any combination of letters, numbers, blanks, and special characters that the Password exit allows. Your administrator sets up the Password exit. This text string might be case-sensitive, depending on the Password exit. If the text string you specify contains blanks or special characters (such as @ $ & ( ) > < | ' " #), enclose the text string in single or double quotation marks. For example:

```
-j "pdf-owner-identifier='Nurse-Lee@hospital.com'"
```

If the string contains double quotation marks, enclose the string in single quotation marks.

Default value

The owner identifier that the administrator specified in the printer definition. If none is specified, there is no default.

Usage guidelines

- AFP to PDF transforms can support this attribute. For information, see the documentation for the transform.
- The transform encrypts a PDF document when a user identifier, an owner identifier, or both is specified. Encrypting a PDF document protects it from unauthorized access.
- In most cases, the user and owner identifiers need to be different because the passwords must be different.

pdf-protect

This multi-valued attribute specifies one or more actions that users cannot do on encrypted PDF documents.

Allowed values

You can enter one or more fixed values to restrict actions. If you specify more than one value, separate the values with spaces and enclose the list of values in braces {}. For example:

```
-j "pdf-protect=all"
-j "pdf-protect={copy update}"
```

Value:	Actions users cannot do:
all	• All actions (copy, print, update)
copy	• Copy or extract content to another document • Extract content for accessibility
print	• Print at low resolution (150 dpi) • Print at high resolution
update	• Change the document • Assemble the document (insert, delete, rotate pages) • Add comments • Complete form fields or sign • Create template pages

Default value

The value that the administrator specified in the printer definition. If none is specified, no actions are restricted.

Usage guidelines

• AFP to PDF transforms can support this attribute. For information, see the documentation for the transform.

pdf-signature-contact

This single-valued attribute specifies contact information for the person or authority signing the PDF document. This value is stored in the **/ContactInfo** field of the PDF signature dictionary.

Allowed values

Any combination of 1 - 255 of letters (a-z, A-Z), numbers (0-9), blanks, and special characters. If the value contains blanks or special characters (such as: @ $ & ( ) > < | ' " #), enclose it in single or double quotation marks.

Default value

None.

pdf-signature-location

This single-valued attribute specifies the server name or the physical location where the PDF document was signed. This value is stored in the **/Location** field of the PDF signature dictionary.

Allowed values

Any combination of 1 - 255 of letters (a-z, A-Z), numbers (0-9), blanks, and special characters. If the value contains blanks or special characters (such as: @ $ & ( ) > < | ' " #), enclose it in single or double quotation marks.

Default value

None.

pdf-signature-name

This single-valued attribute specifies the name of the person or authority signing the PDF document. This value is stored in the **/Name** field of the PDF signature dictionary.

Allowed values

Any combination of 1 - 255 of letters (a-z, A-Z), numbers (0-9), blanks, and special characters. If the value contains blanks or special characters (such as: @ $ & ( ) > < | ' " #), enclose it in single or double quotation marks.

Default value

None.

Usage guidelines

Specify this field only when it is not possible to extract the name from the certificate.

pdf-signature-reason

This single-valued attribute specifies the reason for signing the PDF document. This value is stored in the **/Reason** field of the PDF signature dictionary.

Allowed values

Any combination of 1 - 255 of letters (a-z, A-Z), numbers (0-9), blanks, and special characters. If the value contains blanks or special characters (such as: @ $ & ( ) > < | ' " #), enclose it in single or double quotation marks.

Default value

None.

pdf-subject

This single-valued attribute specifies the PDF subject, which can be the subject of the PDF output file. This value is displayed in the **Subject** field of the PDF document properties.

Allowed values

Any combination of 1 - 255 of letters (a-z, A-Z), numbers (0-9), blanks, and special characters. If the value contains blanks or special characters (such as: @ $ & ( ) > < | ' " #), enclose it in single or double quotation marks.

Default value

None.

pdf-title

This single-valued attribute specifies the PDF title, which can describe the use or origin of the PDF output file. This value is displayed in the **Title** field of the PDF document properties.

Allowed values

Any combination of 1 - 255 of letters (a-z, A-Z), numbers (0-9), blanks, and special characters. If the value contains blanks or special characters (such as: @ $ & ( ) > < | ' " #), enclose it in single or double quotation marks.

Default value

None.

pdf-user-accessibility-control-file

This single-valued attribute specifies the UNIX file name of the Index Control File (ICF) for PDF user accessibility. This file contains rules that the Accessible PDF Transform uses to find specific text strings, images, and objects in the input and insert specific tags for them in the PDF output.

Allowed values

Any combination of 1 - 255 of letters (a-z, A-Z), numbers (0-9), and special characters, with a suggested file extension of `.icf`. Blanks are not allowed. The value is case-sensitive. If the value contains special characters (such as: @ $ & ( ) > < | ' " #), enclose it in single or double quotation marks.

Default value

None.

Usage guidelines

The value of this field is combined with the environment variable AOP_UACF_LOCATION at run time to fully qualify the location of the ICF. If this environment variable is not specified, the ICF must be a UNIX file located in the default directory, `/usr/lpp/IBMPrintXform/V1R2/samples`.

pdf-user-identifier

This single-valued attribute specifies the identifier of the user of an encrypted PDF document. The user identifier is associated with a password that is stored in a separate database. The user enters the user password when the encrypted PDF document is opened.

Allowed values

You can enter a text string of 1 - 256 characters. You can enter any combination of letters, numbers, blanks, and special characters that the Password exit allows. Your administrator sets up the Password exit. This text string might be case-sensitive, depending on the Password exit. If the text string you specify contains blanks or special characters (such as @ $ & ( ) > < | ' " #), enclose the text string in single or double quotation marks. For example:

```
-j "pdf-user-identifier='Dr-Smith@hospital.com'"
```

If the string contains double quotation marks, enclose the string in single quotation marks.

Default value

The user identifier that the administrator specified in the printer definition. If none is specified, any user can open the PDF document without a password.

Usage guidelines

- AFP to PDF transforms can support this attribute. For information, see the documentation for the transform.
- The transform encrypts a PDF document when a user identifier, an owner identifier, or both is specified. Encrypting a PDF document protects it from unauthorized access.
- In most cases, the user and owner identifiers need to be different because the passwords must be different.

print-error-reporting

This single-valued attribute indicates the type of data fidelity problems (print-positioning errors or invalid-character errors) that the printer reports while it prints this document.

Allowed values

You can enter one of these fixed values:

all
> Report both print-positioning and invalid-character errors.

character
> Report only invalid-character errors.

none
> Report no errors.

position
> Report only print-positioning errors.

Default value

The default value that the administrator defined for the printer.

Usage guidelines

- This attribute applies to line data and AFP documents that are printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- Before it accepts a job, Infoprint Server verifies that the printer can support the value of this attribute.
- This attribute is similar to the DATACK parameter of the OUTPUT JCL statement.

print-queue-name

This single-valued attribute specifies the name of the print queue on the target printer.

Allowed values

You can enter a text string up to 127 characters.

Default value

The default print queue that the administrator defined for the printer.

Usage guidelines

- The value in this attribute overrides the print queue name that is specified in the printer definition. You must use this attribute for local area network (LAN) printers that are not defined by your administrator.
- If the printer definition does not specify the LPR protocol, IP PrintWay ignores this parameter.
- This attribute is equivalent to the PRTQUEUE parameter of the OUTPUT JCL statement.

printer-ip-address

This single-valued attribute identifies the Internet Protocol (IP) address of the target printer.

Allowed values

You can enter a text string of up to 115 characters. The string must be one of these types of address:

Dotted decimal address
> A series of integers in the range of 0 - 255, separated by periods (decimal address). For example:

```
9.99.12.85
```

Host name

A series of domain names that can contain alphanumeric characters and dashes (-), separated by periods (.). The first character must be alphabetic or numeric. For example:

```
printer1.boulder.IBM.com
```

Colon-hexadecimal address

An IPv6 address in colon-hexadecimal format. These rules apply:

- You can omit leading zeros in each hexadecimal value.
- You can omit one sequence of repeat zero values
- You can specify the last two hexadecimal values in dotted decimal notation.

For example:

```
2001:0db8:85a3:0000:0000:8a2e:0370:7334
```

If you run IP PrintWay basic mode, do not specify a colon-hexadecimal address because IP PrintWay does not support IPv6.

Default value

The IP address that the administrator defined for the printer.

Usage guidelines

- The value in this attribute overrides the IP address that is specified in the printer definition. Use this attribute when you submit jobs to LAN printers not defined by your administrator.
- If the printer definition does not specify the LPR or direct sockets printing protocol, IP PrintWay ignores this parameter.
- For printers attached with the i-data 7913 Intelligent Printer Data Stream (IPDS) Printer LAN Attachment, use the IP address of the 7913.
- This attribute is equivalent to the DEST=IP: parameter of the OUTPUT JCL statement.

resource-directories

This multi-valued attribute defines the directories that contain TrueType and OpenType fonts that PSF uses to process data sets. PSF searches these directories before it searches system-defined resource directories. PSF searches the directories in the order that you specify them.

Allowed values

You can enter up to eight directories. Each directory name can be up to 255 characters. The first character must be a slash. If a name contains blanks or special characters other than a period or a slash (such as $ & ( ) > < | ' " #), enclose the name in single or double quotation marks. Separate multiple directories with spaces and surround the string of directories with braces. For example:

```
 -o 'resource-directories={/u/myuserid/truetype /u/myuserid/opentype}'
```

Default values

1. The default resource directories that the administrator defined for the printer.
2. PSF determines the resource directories.

Usage guidelines

- PSF must be enabled for Unicode. If a PSF FSS definition exists, the **Unicode enabled** field must be selected.
- This attribute is equivalent to the USERPATH parameter of the OUTPUT JCL statement.
- To find out how to install fonts, see *PSF for z/OS: User's Guide*.

resource-library

This multi-valued attribute defines the location for document-specific resources: fonts, form definitions, overlays, and page definitions.

Allowed values

You can enter up to eight names of cataloged MVS data sets. Each name can be up to 44 characters. Separate multiple library names with spaces and surround the string of library names with braces. For example:

```
-o 'resource-library={FONT.LIBRARY OVERLAY.LIBRARY}'
```

Default values

1. The default resource libraries that the administrator defined for the printer.
2. PSF or the transform determines the resource libraries.

Usage guidelines

- This attribute applies to line data and AFP documents that are printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- If a resource cannot be found, PSF prints the job and prints error messages at the end of the job. Infoprint Server reports the job as completed. For information about how transforms handle missing resources, see the documentation for the transform.
- If Infoprint Server transforms the data from AFP format to PCL, PostScript, or PDF format, the user who starts the Infoprint Server daemons must have RACF authorization to read the AFP user resource libraries. For more information, see the documentation for the transform.
- You must have RACF authorization to read any AFP user resource library that you specify in the **resource-library** job attribute or USERLIB JCL parameter. If you use a job-submission method that does not authenticate your z/OS user ID (for example, the Infoprint Port Monitor), the AFP resource library must allow universal read access.
- This attribute is equivalent to the USERLIB parameter of the OUTPUT JCL statement.

restrict-printable-area

This single-valued attribute indicates whether an area on each page of printed output is reserved for the security label. When an area is reserved for a security label, the printed output is shifted on each page. You cannot print data in the reserved area.

Allowed values

You can enter one of these fixed values:

yes
An area on each page is reserved for the security label.

no
An area is not reserved for the security label.

Default value

PSF sets the default based on whether PSFMPL is active.

Usage guidelines

- This attribute does not apply to IP PrintWay printer definitions.
- This attribute is equivalent to the SYSAREA parameter of the OUTPUT JCL statement.

room-text

This single-valued attribute specifies room information that can be printed in the room field of a separator sheet.

Allowed values

You can enter a text string of up to 60 characters. If the text string you specify contains spaces, enclose the text string in single or double quotation marks. For example:

```
-o "room-text='Room 306-B'"
```

If the string contains double quotation marks, enclose the string in single quotation marks.

Default value

The default text that the administrator defined for the printer.

Usage guidelines

- Whether the text specified by this attribute is printed depends on how the administrator configures the printer's separator sheet.
- This attribute is equivalent to the ROOM parameter of the OUTPUT JCL statement.

save-afp-statistics

This single-valued attribute indicates whether you want PSF to generate an AFP Statistics (AFPSTATS) report. An AFPSTATS report gives you detailed information about the data set, such as where resources were found and what significant events happened.

Allowed values

You can enter one of these fixed values:

yes
An AFPSTATS report is generated.

no
An AFPSTATS report is not generated.

Default value

An AFPSTATS report is not generated.

Usage guidelines

- This attribute is equivalent to the AFPSTATS parameter of the OUTPUT JCL statement.

shift-out-shift-in

This single-valued attribute specifies the printer scanning modes that are used when processing EBCDIC line data that prints with either a single-byte or a double-byte font.

Allowed values

You can enter one of these fixed values:

one
Each shift-out, shift-in code is converted to a blank and a Set Coded Font Local text control.

two
Each shift-out, shift-in code is converted to a Set Coded Font Local text control.

three
Each shift-in code is converted to a Set Coded Font Local text control and two blanks. Each shift-out code is converted to a Set Coded Font Local text control.

four
> PSF skips each shift-out, shift-in code and does not count the code when it calculates offsets for the print data set. SOSI4 is used when double-byte character set (DBCS) text is converted from ASCII to EBCDIC. The IBM transforms from AFP (AFP to PCL, AFP to PDF, and AFP to PostScript) do not support SOSI4.

Default value

The default value that the administrator defined for the printer.

Usage guidelines

- This attribute applies to line data documents printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- For the shift-in, shift-out process to work correctly, either the **chars** attribute or the page definition that is used to print the job must specify two coded fonts. The first must be a single-byte font, and the second must be a double-byte font.
- IBM suggests that you do not mix SOSI codes and TRCs in the same job.
- This attribute is similar to the PRMODE parameter of the OUTPUT JCL statement.

sysout-dataset-name

This single-valued attribute specifies the name to assign to the system output data sets (sysout data sets) that Infoprint Server creates on the JES spool. It becomes the last qualifier of the fully qualified data set name on the JES spool. The fully qualified data set name can be printed on a separator page that is created by your installation. It can also be printed on a separator page (banner page) printed by the printer's LPD. If the file is sent to an email destination instead of to a printer and the **mail-file-name** job attribute is not specified, the name you specify in this parameter is used as the name of the email attachment.

Allowed values

You can enter a text string of up to 8 characters. The first character must be a letter or a national (#, $, @) character. Other characters can be letters, numbers, or national (#, $, @) characters. If the text string contains #, $, or @, enclose the text string in single or double quotation marks. For example:

```
  -o "sysout-dataset-name='$MYFILE'"
```

Lowercase letters are converted to uppercase letters.

Default value

The last 8 characters of the name of the file. If the first character is not a letter, #, $, or @, it is converted to a #. If one of the remaining characters is not a letter, number, #, $, or @, it is converted to a #.

Usage guidelines

- If you use the Print Interface subsystem, the **lpstat** command displays this name.
- If you do not use the Print Interface subsystem, the **lpstat** command displays the original file name instead of this name to provide more information about the file.
- This attribute is similar to the DSNAME parameter of the DD JCL statement.

sysout-job-id

This single-valued attribute specifies the job ID to assign to the system output data sets (sysout data sets) that Infoprint Server creates on the JES spool. The system operator can use this job ID to locate the sysout data sets on the JES spool.

Allowed values

You can enter a text string of up to 8 characters. The first character must be a letter or a national (#, $, @) character. Other characters can be letters, numbers, or national (#, $, @) characters. If the text string contains #, $, or @, enclose the text string in single or double quotation marks. For example:

```
-o "sysout-job-id='#123'"
```

Lowercase letters are converted to uppercase letters.

Default values

1. If you use the Print Interface subsystem, the job ID that z/OS assigns to your job is used.

2. If you do not use the Print Interface subsystem, the Infoprint Server job ID is used. The Infoprint Server job ID is a unique identifier that is composed of the 2-character prefix (default is **PS**) followed by a unique number. You can use this number to query or cancel your job with the **lpstat** or **cancel** commands.

Usage guidelines

- You cannot use the value that you specify to query or cancel your job with the **lp** or **lpstat** command.
- The job ID you specify is not written in the SMF type 6 accounting record that either IP PrintWay or PSF writes.
- JES commands do not display this job ID. JES commands display the job ID that z/OS assigns to the job.
- You can use this attribute to search for print jobs with Infoprint Central.
- If this attribute is specified with the PRTATTRS JCL parameter, IP PrintWay ignores it.

sysout-job-name

This single-valued attribute specifies the job name to assign to the system output data sets (sysout data sets) that Infoprint Server creates on the JES spool. The system operator can use this job name to locate the sysout data sets on the JES spool. This name can be printed on a separator page that is created by your installation. It can also be printed on a separator page (banner page) printed by the printer's LPD.

Allowed values

You can enter a text string of up to 8 characters. The first character must be a letter or a national (#, $, @) character. Other characters can be letters, numbers, or national (#, $, @) characters. If the text string contains #, $, or @, enclose the text string in single or double quotation marks. For example:

```
-o "sysout-job-name='$MYJOB'"
```

Lowercase letters are converted to uppercase letters.

Default values

1. If you use the Print Interface subsystem, the job name that is specified on the JOB JCL statement, or the name that is assigned by the z/OS system, is used.

2. If you do not use the Print Interface subsystem, the first 8 characters of your user ID are used.

Usage guidelines

- Whether the job name specified by this attribute is printed depends on how your administrator configures the printer's separator sheet or how the printer's LPD is implemented.
- The job name that you specify is written in the SMF type 6 accounting record that either IP PrintWay or PSF writes.
- This attribute is equivalent to the job name you can specify on a JOB JCL statement.
- You can use this attribute to search for print jobs with Infoprint Central.
- If this attribute is specified with the PRTATTRS JCL parameter, IP PrintWay ignores it.

table-reference-characters

This single-valued attribute specifies whether the document contains table-reference characters (TRCs). A TRC selects a font character set named by the **chars** attribute or in the page definition that is used to print the job. A TRC is the first character of each line in the document unless the first character is a carriage control character. In that case, the TRC is the second character.

Allowed values

You can enter one of these fixed values or synonyms:

Fixed value

> true
> false

Input synonym

> yes
> no

Default value

The default value that the administrator defined for the printer.

Usage guidelines

- This attribute applies to line data documents printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- If the value of this attribute is **true** and the page definition does not identify fonts, you must specify fonts with the **chars** attribute.
- If the line data contains TRCs and you do not specify this attribute, your printed output is not correct because TRCs are interpreted as text characters instead of font identifiers.
- IBM suggests that you do not mix SOSI codes and TRCs in the same job.
- This attribute is equivalent to the TRC parameter of the OUTPUT JCL statement.
- For more information about using table-reference characters, see *AFP: Programming Guide and Line Data Reference*.

title-text

This single-valued attribute describes the contents of the file. This value can be printed on a separator page that is created by your installation. It can also be printed on a separator page (banner page) printed by the printer's LPD. If the file is sent to an email destination, this value is the subject of the email.

Allowed values

You can enter a text string of up to 60 characters. If the text string you specify contains spaces, enclose the text string in single or double quotation marks. For example:

```
-o "title-text='Meeting Agenda'"
```

If the string contains double quotation marks, enclose the string in single quotation marks. For example:

```
-o "title-text='A New Interpretation of "Finnegans Wake"'"
```

Default values

1. For a separator page created by an IP PrintWay or PSF exit: The default value is the title that your administrator specified in the Allocation section of the printer definition. If none is specified, there is no default value.

2. For the LPD's separator page: The default value is the title that your administrator specified in the Allocation section of the printer definition. If none is specified, the default value is the title or file name that your administrator specified in the Protocol section of the printer definition. If none is specified, the default value is the data set name.

3. For the subject of an email: The default value is the title that is specified in the Allocation section of the printer definition. If none is specified, the default value is the job name. Depending on how the print request was submitted, the job name might be the ID of the user who submitted the print request.

Usage guidelines

- Whether the text specified by this attribute is printed depends on how your administrator configures the printer's separator sheet or how the LPD is implemented.
- This attribute is equivalent to the TITLE parameter of the OUTPUT JCL statement.

trailer-transform-error-page

This single-valued attribute indicates whether the transform writes messages for data stream errors and warnings to a trailer page. The trailer page is the last page in the output document. Warnings can indicate degraded output.

Allowed values

You can enter one of these fixed values:

error
The transform writes error messages, but not warning messages, to a trailer page. This option does not apply when **fail-on-transform-error=error** or **fail-on-transform-error=warning** because no output document is created when an error occurs.

no
The transform does not write messages to a trailer page.

warning
The transform writes error and warning messages to a trailer page. This option does not apply when **fail-on-transform-error=warning** because no output document is created when an error or warning occurs.

Default values

1. The value that is selected in the **Trailer error page** field in the printer definition for the printer.
2. The value in the AOP_TRAILER_ERROR_PAGE environment variable for the transform.
3. The default for the transform. The default for IBM Infoprint Transforms to AFP for z/OS is **warning**. Other transforms might have different defaults.

Usage guidelines

For information about whether a transform supports this attribute, see the documentation for the transform.

x-image-shift-back

This single-valued attribute specifies the X offset of the logical page origin to the right of the physical page origin on the back side of a double-sided sheet.

Allowed values

You can enter a number from 000.000 - 999.999, followed by the unit of measure (optional). The default unit of measure is millimeters. No blank spaces are allowed. These units are valid:

Unit
    Meaning

IN
> Inches

CM
> Centimeters

MM
> Millimeters (default unit)

PELS
> Picture elements (1/240 inch)

POINTS
> Points (1/72 inch)

For example, you can enter these values:

```
x-image-shift-back=25.4
x-image-shift-back=25.4MM
x-image-shift-back=2.54CM
x-image-shift-back=1IN
x-image-shift-back=240PELS
x-image-shift-back=72POINTS
```

Default values

1. The default X offset that the administrator defined for the printer.
2. The X offset that the form definition used to print the job specifies.

Usage guidelines

- This attribute applies to line data and AFP documents that are printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- This attribute overrides the X-offset value in the form definition that is used to print the job.
- This attribute is similar to the OFFSETXB parameter of the OUTPUT JCL statement.

x-image-shift-front

This single-valued attribute specifies the X offset of the logical page origin to the right of the physical page origin on the front of the sheet.

Allowed values

You can enter a value 0 - 999.999, followed by the unit of measure (optional). The default unit of measure is millimeters. No blanks are allowed. For information about the allowed values, see "x-image-shift-back" on page 80.

Default values

1. The default X offset that the administrator defined for the printer.
2. The X offset that the form definition used to print the job specifies.

Usage guidelines

- This attribute applies to line data and AFP documents that are printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- This attribute overrides the X-offset value in the form definition that is used to print the job.
- This attribute is similar to the OFFSETXF parameter of the OUTPUT JCL statement.

xf-options

This multi-valued attribute specifies transform attributes that apply only when you use InfoPrint Transform Manager for Linux, which converts a document from one data format, such as PostScript, to another, such as AFP format. Administrators can also specify these transform attributes in the remote transform filter (**aoprxf.so**) in the Printer Inventory.

Tip: These transform attributes are different from the InfoPrint Transform Manager for Linux transform options, which you specify in the **filter-options** job attribute.

Allowed values

You can enter one or more of these transform attributes:

fail-on-datastream-error
> Indicates whether the transformation of the document fails if the data stream has errors. Use this transform attribute if you want to make sure that output is produced only if it does not have errors.
>
> Values are:
>
> **yes**
>> The transformation of the document fails if the data stream has any errors, including recoverable data stream errors. Output is produced only if it does not have any errors. If any data stream errors occur, the exit value for the transform is >0. Error messages for data stream errors are not included on a trailer error page (a page that is written at the end of the output data).
>
> **no**
>> The transformation of the document does not fail if the data stream has a recoverable error. Output is produced even if it has errors. If a recoverable data stream error occurs, the exit value for the transform is 0. This is the default.

output-format
> Specifies the format of the output document. To use the AFP to PDF transform, you must specify this attribute.
>
> Values are:
>
> **modca-p**
>> Mixed Object Document Content Architecture for Presentation (MO:DCA-P) format. This is the default.
>
> **pdf**
>> Adobe Portable Document Format (PDF).

trailer-error-page
> Indicates whether error messages for recoverable data stream errors are included on a trailer error page (a page that is written at the end of the output data). Use this transform attribute if you want to make sure that error pages are not created.
>
> This attribute does not apply to the AFP to PDF transform because Infoprint Server does not create a trailer error page for this transform.
>
> Values are:
>
> **yes**
>> Error messages are included on a trailer error page. This is the default.
>
> **no**
>> A trailer error page is not created.

transform-id
> Specifies an InfoPrint Transform Manager for Linux transform ID for a specific transform. You do not need to specify this transform attribute to use any of the transforms that InfoPrint Transform Manager for Linux currently supports. However, if it adds new transforms to the AFP format in the future, you can use this transform attribute to specify them. Values are listed in *InfoPrint Transform Manager for Linux* in the Ricoh Production Print Information Center (info.rpp.ricoh-usa.com/help/index.jsp).

You can enter a text string that contains the transform attributes. If the string contains blanks, enclose the string in single or double quotation marks. For example:

```
-j "xf-options='fail-on-datastream-error=no trailer-error-page=yes'"
```

Default value

The values that the administrator specified for the printer. If none are specified, the default values are used.

Usage guidelines

- The values that you specify in this job attribute take effect only if you specify them on the **remotexf** command or if the administrator specifies the **aoprxf.so** filter for the printer in the Printer Inventory. The administrator can also specify these values in the Printer Inventory.
- The administrator can control whether the values that you specify with this job attribute are used. For information about how the administrator can control whether your values take effect, see the description of the **%xf-options** option in *z/OS Infoprint Server Operation and Administration*.

y-image-shift-back

This single-valued attribute specifies the Y offset of the logical page origin below the physical page origin on the back side of a double-sided sheet.

Allowed values

You can enter a value 0 - 999.999, followed by the unit of measure (optional). The default unit of measure is millimeters. No blanks are allowed. For information about the allowed values, see "x-image-shift-back" on page 80.

Default values

1. The default Y offset that the administrator defined for the printer.
2. The Y offset that the form definition used to print the job specifies.

Usage guidelines

- This attribute applies to line data and AFP documents that are printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- This attribute overrides the Y-offset value in the form definition that is used to print the job.
- This attribute is similar to the OFFSETYB parameter of the OUTPUT JCL statement.

y-image-shift-front

This single-valued attribute specifies the Y offset of the logical page origin below the physical page origin on the front of the sheet.

Allowed values

You can enter a value 0 - 999.999, followed by the unit of measure (optional). The default unit of measure is millimeters. No blanks are allowed. For information about the allowed values, see "x-image-shift-back" on page 80.

Default values

1. The default Y offset that the administrator defined for the printer.
2. The Y offset that the form definition used to print the job specifies.

Usage guidelines

- This attribute applies to line data and AFP documents that are printed on an AFP printer.
- Products that transform AFP documents can support this attribute. For information, see the documentation for the transform.
- This attribute overrides the Y-offset value in the form definition that is used to print the job.
- This attribute is similar to the OFFSETYF parameter of the OUTPUT JCL statement.

Chapter 4. Printing from batch applications with DD and OUTPUT JCL statements

The following information explains how to code the OUTPUT and DD statements of the Job Control Language (JCL) to use Infoprint Server to process an output data set:

- "Printing output with IP PrintWay" on page 85
- "Transforming output data" on page 88
- "Specifying job attributes" on page 94
- "JCL parameters" on page 94
- "JCL examples" on page 116

Printing output with IP PrintWay

Using IP PrintWay, you can:

- Print output data sets on a printer or a print server in your Internet Protocol network.
- Send output data sets to an email destination.

To direct an output data set to IP PrintWay, you must specify one of these on the DD or OUTPUT JCL statement for the data set:

- The work-selection criteria that your administrator defines to JES for the IP PrintWay basic mode functional subsystem application (FSA)
- The job selection criteria that your administrator defines in the Printer Inventory for IP PrintWay extended mode

For example, if your administrator customized IP PrintWay to select output data sets in output class P, specify class P on the DD or OUTPUT JCL statement for the data set. Ask your administrator for the appropriate selection values to specify.

If you use the Print Interface subsystem, your administrator can specify the selection values in the printer definition in the Printer Inventory. In this case, you do not need to specify them in JCL. For example, if your administrator specifies class P as the output class in the printer definition, you do not need to specify class P on your OUTPUT statement.

To direct your output to a particular printer or email destination, you can use one of these methods:

- Specify the name of the printer definition that your administrator creates for the printer or email destination.
- Specify the output class, destination name, or form name that is assigned to the printer definition.
- Specify the printer's IP address and either print queue name or port number.

Specifying the printer definition name

You can specify the name of the printer definition that your administrator created for the printer or email destination in the Printer Inventory. You specify the printer definition name in the **FSSDATA='printer'** parameter on the OUTPUT JCL statement. You can use the **FSSDATA='printer'** parameter with both IP PrintWay basic mode and IP PrintWay extended mode. However, if you use the Print Interface subsystem, you instead specify the printer definition name in the SUBSYS parameter on the DD JCL statement. The printer definition name is case-sensitive and must exactly match the name of the printer definition that is created by your administrator in the Infoprint Server Printer Inventory.

IP PrintWay can use the IP address or the email address in the named printer definition to find the printer or email destination. However, if you specify an IP address in the DEST=IP: parameter of the OUTPUT JCL

statement, or an email address in the MAILTO parameter of the OUTPUT JCL statement, IP PrintWay uses that address to find the printer or email destination instead of the address in the printer definition. You might want to specify the DEST=IP: parameter or MAILTO parameter when your administrator did not create a printer definition for your printer or email destination.

Related information: For an example, see "Direct output to an IP PrintWay printer by specifying the printer definition name" on page 116.

Specifying class, destination, or form

If you do not know the printer definition name, you can specify a value for at least one of the CLASS, DEST, and FORMS parameters on the OUTPUT JCL statement. You can specify any or all of these values. IP PrintWay sends the print data set to a printer or email destination whose printer definition matches the values that you specify. Ask your administrator to determine the values that you can specify.

Related administrative task: The administrator must specify the CLASS, DEST, and FORMS values in the printer definition and select the **Use DEST, CLASS, and FORMS for IP PrintWay printer selection** option in the printer definition.

Limitation: If you use the Print Interface subsystem, you cannot use the CLASS, DEST, and FORMS JCL parameters to select the printer definition. Instead, you must specify the name of the printer definition.

Related information: For an example, see "Direct output to an IP PrintWay printer by specifying DEST, CLASS, or FORMS" on page 117.

Specifying the printer's IP address

To print a data set on a printer for which your administrator did not create a printer definition, specify the DEST=IP: parameter on the OUTPUT JCL statement. Specify the IP address or host name of the printer or the system to which the printer is attached. When you specify DEST=IP:, you must also specify either the PRTQUEUE parameter or the PORTNO parameter on the OUTPUT JCL statement.

If you also specify the name of a printer definition in either the FSSDATA or SUBSYS parameter, IP PrintWay uses printing options that are specified in that printer definition, but uses the printer's IP address that is specified in the DEST=IP: parameter. If you do not specify the name of a printer definition, IP PrintWay uses printing options that are specified in the IP PrintWay default printer definition.

Limitation: If the resubmit for filtering function is used (IP PrintWay basic mode), do not code the DEST=IP:, PRTQUEUE, and PORTNO parameters on the OUTPUT JCL statement because IP PrintWay ignores these parameters and instead uses the IP address, print queue name, and port number in the printer definition.

Related information: For an example, see "Direct output to an IP PrintWay printer by specifying a host name or an IP address" on page 117.

Sending output to an email destination

When you submit a print request, you can send the output to an email destination instead of to a printer.

You can specify email addresses of the primary and secondary recipients in one of these ways:

- In the **to**, **cc**, and **bcc** fields in an email header (line data only). For information, see Chapter 11, "Creating an email header," on page 165.
- In the MAILTO, MAILCC, and MAILBCC parameters on the OUTPUT JCL statement.
- In the printer definition in the Printer Inventory.

The email has these characteristics:

- If the output contains text or line data, the output can be sent inline in the body of the email or as an email attachment. To send the output inline, specify the **mail-inline-text** job attribute. Or, the administrator can select the **Inline text and line data** field in the printer definition.

- If the output is not text or line data, it is sent as an attachment. The name of the attachment is one of these:

    1. MAILFILE parameter on the OUTPUT statement
    2. DSNAME parameter on the DD statement
    3. Job name

- If your job creates multiple output data sets in the same output group, IP PrintWay can send the output data sets as attachments in the same email. To obtain this function:

    IP PrintWay basic mode
    In the printer definition, the administrator selects the **Concatenate job** option in the **Dataset grouping** field.

    JES output grouping is not supported when either the resubmit for filtering function or the Print Interface subsystem is used. In these situations, each output data set is sent in a separate email.

    IP PrintWay extended mode
    In the printer definition, the administrator selects the **Automatic dataset grouping** field, or selects the **Concatenate job** option in the **Dataset grouping** field.

    JES output grouping is not supported when the Print Interface subsystem is used.

- The subject of the email is one of these:

    1. **Subject** field in the email header
    2. TITLE parameter on the OUTPUT JCL statement
    3. **Title** field in the printer definition
    4. Job name

    The title in the printer definition is used only if you use IP PrintWay basic mode resubmit for filtering or the Print Interface subsystem.

- The sender is the user ID of the user who ran the job. You can add a descriptive name of the sender in one of these ways:

    1. **From** field in the email header
    2. MAILFROM parameter on the OUTPUT JCL statement
    3. **From name** field in the printer definition

To receive replies at an email address on a non-z/OS system, specify a reply email address in one of these ways:

1. **Reply-to** field in the email header
2. REPLYTO parameter on the OUTPUT JCL statement
3. **Reply address** field in the printer definition

> ⚠️ **Attention:** You cannot receive replies from an email if you are using your TSO or z/OS UNIX System Services ID.

Table 9 on page 87 shows the tasks that are related to sending output to an email destination. Required tasks are necessary for all installations. Optional tasks are required only if the listed condition applies.

Table 9. Sending output to an email destination

Task	Condition
"Modifying JCL to send output to an email destination" on page 88	Required
"Using the email address list in an alias file" on page 88	Optional: If a sendmail alias name is specified in the printer definition.

Modifying JCL to send output to an email destination

If you currently use JCL to print output with IP PrintWay, in most cases you need to make only minimal changes to the JCL. You might need to modify these JCL parameters:

- Specify the name of the printer definition for the email destination in the FSSDATA parameter on the OUTPUT statement, or specify the DEST, CLASS, and FORMS parameters that your administrator associated with the printer definition.
- If you currently specify the IP address of the printer in the DEST=IP: parameter on the OUTPUT statement, remove the DEST=IP: parameter.
- Remove the RETRYL and RETRYT parameters from the OUTPUT statement, or specify values of 0, because retransmissions are not suggested when you send output to email destinations.

You can specify these optional JCL parameters to customize your emails:

MAILBCC
> The email addresses for the blind copy (bcc) recipients of an email. A *bcc* means that other recipients of the email do not see the bcc recipient listed.

MAILCC
> The email addresses for the copy (cc) recipients of an email. A *cc* means that other recipients of the email can see the cc recipient listed.

MAILFILE
> The file name of the attachment to an email.

MAILFROM
> The descriptive name or other identifier of the sender of an email.

MAILTO
> The email addresses for the recipients of an email.

REPLYTO
> The email address that recipients of an email can reply to.

TITLE
> The subject of the email.

To send output data sets that contain either AFP data or line data that requires AFP resources, all AFP resources must be included inline in the data set so that the file can be viewed with the AFP Viewer. If the required AFP resources are not already inline, you can use the IBM AFP Conversion and Indexing Facility (ACIF) program, a feature of PSF, to create a file that contains the AFP resources. Then, you can concatenate that resource file to the data file.

Related information: For examples of JCL to use when you send output to an email destination, see .

Using the email address list in an alias file

Your administrator can specify one or more alias names in the printer definition, and you can specify alias names in some JCL parameters. An alias name is a file that is defined to the sendmail bridge and that lists one or more actual email addresses. For example, alias name `dept123` might represent the email addresses of all employees in department 123:

```
user1@xyz.com,user2@xyz.com,user3@xyz.com,user4@xyz.com,user5@xyz.com
```

In z/OS V2R3, only existing alias files are supported. You cannot create new alias files to be used with the sendmail bridge.

Transforming output data

Infoprint Server works with several separate transform products. For information about the transform products that work with Infoprint Server, see *z/OS Infoprint Server Introduction*.

Infoprint Server can transform data that is created by a batch application from one format to another before the data is printed or sent to an email destination. Infoprint Server provides these methods that you can use to transform and print output data sets:

Print Interface subsystem
> The Print Interface subsystem can transform data before it writes it to an output data set on the JES spool. IP PrintWay or PSF can then print the data, or IP PrintWay can send it to an email destination. To use the Print Interface subsystem, you specify the SUBSYS parameter on the DD JCL statement for the output data set.

IP PrintWay extended mode
> IP PrintWay extended mode can transform data in an output data set before it prints the data or sends it to an email destination.

IP PrintWay basic mode
> IP PrintWay basic mode can send data in an output data set to Print Interface. Print Interface can transform the data and write the transformed data to a new output data set on the JES spool. IP PrintWay then can print the data or send it to an email destination. Your administrator must select the resubmit for filtering function in the printer definition.

Table 10 on page 89 compares the advantages and limitations of these transform methods.

Table 10. Comparison of transform methods

Method	Advantages	Limitations
Print Interface subsystem	• You can use standard DD and OUTPUT JCL statements with minimal JCL changes. • You can specify Infoprint Server job attributes. • The data set can be printed on any printer or sent to an email destination.	• Only one OUTPUT JCL statement for each data set is supported. • DEST, HOLD, MODIFY, SEGMENT, and SYSOUT parameters on the DD JCL statement are not supported. • JES output grouping is not supported.
IP PrintWay extended mode	• You can use standard DD and OUTPUT JCL statements with no JCL changes (in most cases). • You can specify Infoprint Server job attributes.	• The data set can be sent only to a printer or email destination that IP PrintWay extended mode controls.
IP PrintWay basic mode (resubmit for filtering function)	• You can use standard DD and OUTPUT JCL statements with no JCL changes (in most cases).	• The data set can be sent only to a printer or email destination that IP PrintWay basic mode controls. • Less efficient than the subsystem because data is written to the JES spool twice. • DEST=IP:, PRTQUEUE, and PORTNO parameters on the OUTPUT JCL statement are not supported. • JES output grouping is not supported. • All AFP user libraries must have universal read access, or the administrator must set the AOPRESUBMITUSER environment variable (not suggested). For more information, see the USERLIB parameter.

You can also use these methods to transform and print existing data sets:

AOPPRINT JCL procedure

The AOPPRINT JCL procedure uses Print Interface to transform data in an existing MVS data set or UNIX file and to write the transformed data to an output data set on the JES spool. The output data set on the JES spool can be printed on any printer or sent to an email destination. For more information, see Chapter 5, "Printing with the AOPPRINT JCL procedure," on page 127.

Transform commands

The z/OS UNIX transform commands, which you can run by using the AOPBATCH program, transform data in existing MVS data sets or UNIX files. The transform commands write the transformed output to an MVS data set or UNIX file but do not write the data set to an output data set on the JES spool for printing. For more information, see Chapter 6, "Transforming data with the AOPBATCH program," on page 133.

Transforming data with the Print Interface subsystem

The Print Interface subsystem can transform data that is created by a batch application from one data format to another and then write the transformed data to an output data set on the JES spool. The output data set on the JES spool can then be printed on any printer or sent to an email destination. You might want to use the Print Interface subsystem in these situations:

- To print PCL, PostScript, and PDF data on AFP printers that PSF controls
- To print line data and AFP data on PCL, PostScript, and PDF printers that IP PrintWay controls
- To send line data and AFP data in PDF format to email destinations with the IP PrintWay email function
- To specify Infoprint Server job attributes

To use the Print Interface subsystem, code these JCL parameters:

- SUBSYS parameter on the DD JCL statement, with these subparameters:

  - Name of the Print Interface subsystem. Ask your administrator for the subsystem name. The subsystem name is usually AOP1.

  - Name of a printer definition in the Infoprint Server Printer Inventory. Ask your administrator for the printer definition name.

  - Infoprint Server job attributes for special printing requirements. For the job attributes you can specify, see Chapter 3, "Using job attributes," on page 45.

    Most of the Infoprint Server job attributes correspond to parameters on the DD and OUTPUT JCL statements. For example, the **copies** job attribute corresponds to the COPIES JCL parameter. Therefore, in most cases, specify the JCL parameters that you are familiar with and do not specify job attributes.

  However, you might need to specify one of these job attributes:

  document-codepage

  - Specifies a code page for the input data.
  - Required only if you print data that uses a different code page than the document code page specified in the printer definition or the default document code page.

  document-format

  - Specifies the data format.
  - Required only if you print data whose format Infoprint Server cannot detect.

  filter-options

  - Specifies transform options.
  - Your administrator can specify transform options in the printer definition. However, you might want to specify a different transform option for a specific data set.

xf-options

- – Specifies transform attributes that apply only when you use InfoPrint Transform Manager for Linux, which converts this document from one data format, such as PostScript, to another, such as AFP format.
- – Your administrator can specify transform options in the printer definition. However, you might want to specify a different transform option for a specific data set.

- If you code the DSNAME parameter on the DD JCL statement, code the format that is suitable for a sysout data set: &&*dsname*.
- Print-related parameters on the DD and OUTPUT JCL statements. Your administrator can specify default values for these JCL parameters in the printer definition. Therefore, you can omit any JCL parameters that have suitable defaults. If your administrator does not provide a default value for a JCL parameter, the standard default value applies. However, JES default values for the CHARS, UCS, PAGEDEF, and FCB parameters are not used to transform data.

Limitations:

1. You cannot use the DEST, CLASS, and FORMS parameters on the OUTPUT JCL statement to select the IP PrintWay printer definition.
2. Do not code the SEGMENT and SYSOUT parameters on the DD JCL statement. If you do, you receive a JCL error.
3. Do not code the DEST, HOLD, and MODIFY parameters on the DD JCL statement. The Print Interface subsystem ignores these parameters. You can, however, specify the OUTDISP parameter on the OUTPUT JCL statement instead of the HOLD parameter on the DD JCL statement.
4. Specify only one OUTPUT JCL statement for each DD statement. The Print Interface subsystem uses only one OUTPUT JCL statement, in this order:

    a. The first OUTPUT JCL statement referred to in the OUTPUT parameter on the DD statement.

    b. The first OUTPUT JCL statement with DEFAULT=YES in the same job step.

    c. The first OUTPUT JCL statement with DEFAULT=YES in the job.

5. Each output data set that the Print Interface subsystem creates on the JES spool is placed in a separate JES output group from other output data sets in the same job step, regardless of the value that is specified in the GROUPID parameter on the OUTPUT JCL statement.
6. The QSAM and BSAM access methods and the OPEN, CLOSE, and PUT functions are supported. Other access methods and functions (such as CHECKPOINT, GET, and LOCATE) are not supported.
7. JES2 /*OUTPUT JCL statements and JES3 //*FORMAT JCL statements are ignored.
8. If your application writes multiple output data sets that require data transforms, your job and other jobs might not complete if your administrator limits the maximum number of data transforms. Therefore, before you use the Print Interface subsystem, contact your administrator to determine whether the **maximum-active** attribute in the transform configuration file is suitable for your application.

Error handling: When the Print Interface subsystem detects an error, it writes an error message to your job log, and it does not write any output data to the JES spool for the job step. If the subsystem detects an error during PUT and CLOSE operations in your application, it ends abnormally with abend code 09B after it writes an error message. Some situations that can cause an abnormal termination are:

- The printer does not support the format of the data that your application writes to the DD statement. Your administrator specifies the supported data formats in the printer definition. For information about the supported data formats, see "document-format" on page 52.
- The data transform is not installed or is not customized correctly.

Related information:

- "JCL parameters for the Print Interface subsystem" on page 111
- JCL examples:

- "Print line or AFP data on a PostScript printer with the Print Interface subsystem" on page 123
- "Print PostScript, PCL, or PDF data on an AFP printer with the Print Interface subsystem" on page 124
- "Print GIF, JPEG, or TIFF data on an AFP printer with the Print Interface subsystem" on page 125

Modifying JCL to use the Print Interface subsystem

These examples show how to modify the JCL you might use to print a data set to the same printer:

Examples:

1. JCL that does not use the Print Interface subsystem:

```
//DD1      DD SYSOUT=E,DEST=PRT003,DSNAME=&&MYDATA
```

2. JCL that uses the Print Interface subsystem:

```
//DD1      DD SUBSYS=(AOP1,'printer003'),DSNAME=&&MYDATA
```

These examples assume that these fields for the printer definition `printer003` in the Infoprint Server Printer Inventory contain these values:

CLASS
    E

DEST
    PRT003

FORMS
    Not specified (JES default value is used)

These changes were made in these JCL examples:

- In Example 2, the SYSOUT parameter on the DD JCL statement was replaced with the SUBSYS parameter. In the SUBSYS parameter, the name of the Print Interface subsystem (AOP1) and the name of the printer definition that your administrator defined for the printer (printer003) are specified.
- In Example 2, the class, destination, and forms values are not specified because the printer definition contains the same values as shown in Example 1. However, to override these values in the printer definition, you can code the CLASS, DEST, and FORMS parameters on an OUTPUT JCL statement.

Transforming data with IP PrintWay extended mode

IP PrintWay extended mode can transform data in an output data set from one data format to another and then send it to a remote printer or to an email destination. You might want to transform data in these situations:

- To print line data and AFP data on remote PCL, PostScript, and PDF printers
- To send line data and AFP data in PDF format to an email destination
- To specify Infoprint Server job attributes

To use the IP PrintWay extended mode transform function, you do not need to specify any special JCL parameters. When you print a data set that contains line or AFP data, you can specify the same JCL parameters as you usually do when you print on a PSF-controlled printer. However, you must direct the data set to IP PrintWay instead of to the PSF printer.

To specify one or more Infoprint Server job attributes that do not have corresponding JCL parameters, such as **document-codepage** or **document-format**, code the PRTATTRS JCL parameter. For a list of valid job attributes, see Chapter 3, "Using job attributes," on page 45.

Most of the Infoprint Server job attributes correspond to parameters on the DD and OUTPUT JCL statements. For example, the **copies** job attribute corresponds to the COPIES JCL parameter. Therefore, in most cases, specify the JCL parameters that you are familiar with and do not specify job attributes.

However, you might need to specify one of these job attributes:

document-codepage

- Specifies a code page for the input data.
- Required only if you print data that uses a different code page than the document code page specified in the printer definition or the default document code page.

document-format

- Specifies the data format.
- Required only if you print data whose format Infoprint Server cannot detect.

filter-options

- Specifies transform options.
- Your administrator can specify transform options in the printer definition. However, you might want to specify a different transform option for a specific data set.

xf-options

- Specifies transform attributes that apply only when you use InfoPrint Transform Manager for Linux, which converts this document from one data format, such as PostScript, to another, such as AFP format.
- Your administrator can specify transform options in the printer definition. However, you might want to specify a different transform option for a specific data set.

Related information:

- "JCL parameters for printing with IP PrintWay" on page 94
- JCL examples:

    - "Print line or AFP data on a PostScript or PCL printer with IP PrintWay extended mode" on page 122
    - "Send line or AFP data to an email destination as PDF data and print the AFP data on an AFP printer" on page 121

Transforming data with IP PrintWay basic mode

IP PrintWay basic mode, with the resubmit for filtering function enabled, can transform data in an output data set from one data format to another (if necessary) and then send it to a remote printer or to an email destination. You might want to use the resubmit for filtering function in these situations:

- To print line data and AFP data on remote PCL, PostScript, and PDF printers
- To send line data and AFP data in PDF format to an email destination

To use the resubmit for filtering function, you do not need to specify any special JCL parameters. When you print a data set that contains line or AFP data, you can specify the same JCL parameters as you usually do when you print on a PSF-controlled printer. However, you must direct the data set to IP PrintWay instead of to the PSF printer. In the printer definition, your administrator can specify default values for some of the parameters that you can specify on the DD and OUTPUT JCL statements. Therefore, you can omit JCL parameters that have suitable defaults.

Limitations:

1. Do not code the DEST=IP:, PRTQUEUE, and PORTNO JCL parameters on the OUTPUT JCL statement because IP PrintWay ignores these parameters.

2. JES output grouping is not supported. Each output data set is placed in a separate JES output group, regardless of the value that is specified in the GROUPID parameter on the OUTPUT JCL statement.

3. All AFP user libraries must have universal read access, or the administrator must set the AOPRESUBMITUSER environment variable (not suggested). For more information, see the USERLIB parameter.

Related information:

- JCL examples:
  - "Print line or AFP data on a PostScript or PCL printer with the IP PrintWay basic mode resubmit for filtering function" on page 123
  - "Send line or AFP data to an email destination as PDF data and print the AFP data on an AFP printer" on page 121
- *z/OS Infoprint Server Operation and Administration* contains more information about how the resubmit for filtering function works and how to select it in the printer definition.

Specifying job attributes

If you use IP PrintWay extended mode, you can specify one or more job attributes with the PRTATTRS JCL parameter on the OUTPUT JCL statement. For example, you can specify the **document-codepage** job attribute with the PRTATTRS JCL parameter to control code-page translation for a data set.

By using the PRTATTRS JCL parameter, you can specify Infoprint Server job attributes that do not have corresponding JCL parameters, such as **document-codepage** or **document-format**. In addition, if Infoprint Server adds a job attribute in the future, you can use the PRTATTRS JCL parameter to specify the new attribute.

For more information, see "JCL parameters for printing with IP PrintWay" on page 94.

JCL parameters

JCL parameters that have special considerations when you print data sets with IP PrintWay or when you use the Print Interface subsystem are described here. You can find detailed information about these types of JCL parameters:

- "JCL parameters for printing with IP PrintWay" on page 94
- "JCL parameters for the Print Interface subsystem" on page 111
- "JCL parameters for distribution information" on page 115
- Parameters for printing with InfoPrint Manager for AIX or InfoPrint Manager for Windows; see "AFP parameters for remote printing" on page 116

For more information about JCL parameters, see *z/OS MVS JCL Reference*.

JCL parameters for printing with IP PrintWay

JCL parameters that IP PrintWay uses when it sends a data set to a printer or to an email destination are described here. You can specify some of these JCL parameters on either the DD or OUTPUT JCL statement. If you specify the same parameter on both JCL statements, the parameter on the DD statement is used.

Tip: IP PrintWay ignores the KEEP and LEAVE subparameters of the OUTDISP parameter (OUTDISP is JES2 only). Unless a retention time is specified in the RETAINF or RETAINS JCL parameter or in the printer definition, IP PrintWay deletes all data sets after it sends the data to a printer or email destination. Therefore, to keep a data set on the JES spool after IP PrintWay processes it, specify RETAINF or RETAINS instead of KEEP or LEAVE.

```
DD JCL Statement:

COPIES=nnn
DEST={(node,destination_name) | destination_name}
DSNAME=&&dataset_name
FCB=fcb_name
SYSOUT=(class,,form_name)
TITLE='description of output'

OUTPUT JCL Statement:

CLASS=class
COPIES=nnn
DEST={[node.]destination_name | '[node.]IP:host'}
DUPLEX={NO | NORMAL | TUMBLE}
FCB=fcb_name
FORMS=form_name
FSSDATA='printer=printer_definition_name'
MAILBCC=('username[@domainname]'[,...])
MAILCC=('username[@domainname]'[,...])
MAILFILE='filename'
MAILFROM='sendername'
MAILTO=('username[@domainname]'[,...])
NOTIFY=([node.]userid,...)
PORTNO=port_number | PRTQUEUE='print_queue'
PRTATTRS='attribute=value ...'
PRTOPTNS='component_name'
REPLYTO='username[@domainname]'
RETAINF={'hhhh:mm:ss' | FOREVER}
RETAINS={'hhhh:mm:ss' | FOREVER}
RETRYL=nnnnn
RETRYT='hhhh:mm:ss'
TITLE='description of output'
```

Figure 9. Summary of JCL parameters for all output processed by IP PrintWay

CLASS=*class*

Specifies the 1-character alphanumeric output class of the data set. If the Print Interface subsystem does not process the data set, IP PrintWay can use this parameter, in combination with the destination name and form name, to select a printer definition in the Printer Inventory to format and print the data set. Ask your administrator which class to specify.

Defaults:

1. If the Print Interface subsystem processes the data set, the class in the printer definition is used. If none is specified, JES determines the default class.

2. If the Print Interface subsystem does not process the data set, JES determines the default class.

Tips:

1. You can also specify the class in the SYSOUT parameter of a DD JCL statement.

2. If you specify more than one parameter that can be used to find a printer or email destination, IP PrintWay uses these priorities:

   a. The printer's host name or address that is specified by the DEST=IP: parameter, or the email address that is specified in the MAILTO parameter

   b. The printer's address or the email address in the printer definition that is specified in the SUBSYS parameter

   c. The printer's address or the email address in the printer definition that is specified in the FSSDATA parameter

   d. The printer's address or the email address that is specified in the printer definition that matches the values of any combination of the DEST=*destination_name,* CLASS, and FORMS parameters

Examples:

1. In this example, IP PrintWay uses the printer definition that is associated with CLASS P and DEST MYPRINT to process the data set:

```
//OUTDS  OUTPUT CLASS=P,DEST=MYPRINT
//DD1    DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

2. In this example, the Print Interface subsystem and IP PrintWay use the printer definition that is named `myprinter` to process the data set. CLASS=P does not affect which printer definition is used. However, the Print Interface subsystem allocates the data set on the JES spool in JES output class P and with destination name MYPRINT.

```
//OUTDS  OUTPUT CLASS=P,DEST=MYPRINT
//DD1    DD SUBSYS=(AOP1,'myprinter'),OUTPUT=(*.OUTDS)
```

COPIES=*nnn*

Specifies the number of copies you want to print, 1 - 255.

Tips:

1. Only one copy prints when you print on Internet Printing Protocol (IPP) printers that do not support the **copies** IPP job attribute.

   To print copies in these cases, specify multiple OUTPUT statements and refer to them in the OUTPUT parameter of the DD statement. For example:

   ```
   //OUTDS1 OUTPUT FSSDATA='printer=myprinter'
   //OUTDS2 OUTPUT FSSDATA='printer=myprinter'
   //DD1    DD SYSOUT=P,OUTPUT=(*.OUTDS1,*.OUTDS2)
   ```

   This work-around creates multiple output data sets on the JES spool. However, this work-around cannot be used if the Print Interface subsystem processes the data set because the subsystem ignores all but the first reference to an OUTPUT statement.

2. Group values that you specify on this parameter are ignored.

3. This parameter is ignored when you send data to an email destination.

4. The administrator can limit the number of copies that you can specify. If you request more than the allowed number of copies, the data set does not print.

5. If you use the Print Interface subsystem to process the data set, you can specify up to 32640 copies in the **copies** job attribute. Specify the **copies** job attribute in the SUBSYS parameter on the DD JCL statement.

Defaults:

1. If the Print Interface subsystem processes the data set, the number of copies in the printer definition is used. If none is specified, JES determines the default number of copies.

2. If the Print Interface subsystem does not process the data set, JES determines the default number of copies.

Examples:

```
//DD1    DD     COPIES=14
```

```
//OUTDS  OUTPUT COPIES=14
```

DEST={[*node.*]*destination_name* | '[*node.*]IP:*host*'}

Specifies either the destination name or the IP address of the printer's host system.

DEST=[*node.*]*destination_name*

Specifies the node name and destination name of the printer's host system.

node

Specifies the 1 - 8 character node name of the printer's host system. The node name is optional. If you specify the node name in the DEST parameter on a DD JCL statement, use this format: DEST=(*node,name*).

Defaults:

1. If the Print Interface subsystem processes the data set, the JES node in the printer definition is used. If none is specified, JES determines the default node.

2. If the Print Interface subsystem does not process the data set, JES determines the default node.

destination_name
Specifies the destination name of the printer. The name must consist of 1 to 8 alphanumeric or national ($,#,@) characters. If the Print Interface subsystem does not process the data set, IP PrintWay can use this parameter, in combination with the class and form name, to select a printer definition to format and print the data set. Ask your administrator which destination name to specify.

Note: If you use the Print Interface subsystem, specify the DEST parameter on the OUTPUT JCL statement. The subsystem ignores the DEST parameter on the DD statement.

Examples: In these examples, IP PrintWay uses the printer definition that is associated with CLASS P and DEST PRT003 to process the data set:

```
//DD1    DD      SYSOUT=P,DEST=PRT003
```

or

```
//OUTDS OUTPUT DEST=BOULDER.PRT003
//DD1    DD      SYSOUT=P,OUTPUT=(*.OUTDS)
```

DEST='[*node.*]IP:*host*'
Specifies the node name and the IP address of the printer's host system.

node
Specifies the 1 - 8 character node name of the printer's host system. The node name is optional.

Defaults:

1. If the Print Interface subsystem processes the data set, the JES node in the printer definition is used. If none is specified, JES determines the default node.

2. If the Print Interface subsystem does not process the data set, JES determines the default node.

host
Specifies the 1 - 115 character IP address of the printer's host system in either of these formats (always enclose the IP keyword and value in single quotation marks):

Dotted decimal
A series of integers in the range of 0 to 255, separated by periods (decimal address). For example:

```
9.99.12.85
```

Host name
A series of domain names that can contain alphanumeric characters and dashes (-), separated by periods (.). The first character must be alphabetic or numeric. For example:

```
leo.boulder.xyz.com
```

Colon-hexadecimal
An IPv6 address in colon-hexadecimal format. These rules apply:

• You can omit leading zeros in each hexadecimal value.

• You can omit one sequence of repeat zero values.

- You can specify the last two hexadecimal values in dotted decimal notation.

  For example:

  ```
  2001:0db8:85a3:0000:0000:8a2e:0370:7334
  ```

  If you run IP PrintWay basic mode, do not specify a colon-hexadecimal address because IP PrintWay basic mode does not support IPv6.

  Default: The printer's IP address or host name in the printer definition is used.

  Examples:

  ```
  //OUTDS   OUTPUT DEST='IP:99.153.123.232'
  ```

  ```
  //OUTDS   OUTPUT DEST='IP:XYZ.COM'
  ```

  ```
  //OUTDS   OUTPUT DEST='NODE01.IP:XYZ.COM'
  ```

  ```
  //OUTDS   OUTPUT DEST='IP:2001:0db8:85a3:0000:0000:8a2e:0370:7334'
  ```

Tips:

1. If you specify more than one parameter that can be used to find the printer or email destination, IP PrintWay uses these priorities:

   a. The printer's host name or address that is specified by the DEST=IP: parameter, or the email address that is specified in the MAILTO parameter

   b. The printer's address or the email address in the printer definition that is specified in the SUBSYS parameter

   c. The printer's address or the email address in the printer definition that is specified in the FSSDATA parameter

   d. The printer's address or the email address in the printer definition that matches the values of any combination of the DEST=*name*, CLASS, and FORMS parameters

2. If you specify a printer definition name in the FSSDATA or SUBSYS parameter and the printer definition does not specify the LPR or direct sockets printing protocol, IP PrintWay ignores the DEST=IP: parameter.

3. Use the same method to identify the host system, either the host name or the IP address, in all references to the host system. Also, use the same lowercase and uppercase characters. These tips ensure that data sets transmitted to the same printer are transmitted in the correct order.

4. IP PrintWay basic mode: If the resubmit for filtering function is used, do not specify the DEST=IP: parameter because IP PrintWay ignores it and instead uses the IP address in the printer definition.

5. IP PrintWay extended mode: If your job creates multiple output data sets, see "JCL considerations for IP PrintWay extended mode" on page 110.

DSNAME=&&*dataset_name*

Specifies the data set name to assign to the sysout data set. The z/OS system generates a qualified name for the sysout data set and uses the value that you specify in the DSNAME parameter as the last qualifier in the name.

Begin the name with two ampersands (&&). Follow the ampersands with 1 to 8 alphanumeric or national ($,#,@) characters, a hyphen, or a character X'C0'. The first character after the ampersands must be alphabetic or national ($,#,@).

Guidelines: Specify a DSNAME parameter so that you can identify printed output more easily:

1. The fully qualified data set name can be printed on page headers and on separator pages. Therefore, if you specify the DSNAME parameter, you can identify your output more easily. Whether a header or separator page prints depends on the IP PrintWay options that your administrator selects in the printer definition and how your administrator configures the printer's separator page.

2. **IP PrintWay basic mode:** If the resubmit for filtering function is used, the value you specify in the DSNAME parameter is also the last qualifier of the data set name of the second data set that Infoprint Server dynamically allocates on the JES spool while it processes the data. Therefore, if you specify the DSNAME parameter, you can find this second data set on the JES spool more easily.

Default: The last qualifier of the fully qualified data set name is a question mark (?).

Example:

```
//DD1 DD SYSOUT=P,DSNAME=&&FEBSALES
```

The z/OS system generates a data set name such as:

```
userid.jobname.jobid.Ddsnumber.FEBSALES
```

FEBSALES is the last qualifier of the fully qualified name of the second data set that Print Interface allocates on the JES spool when the resubmit for filtering function (IP PrintWay basic mode) is used. For email, FEBSALES is the name of the email attachment if the MAILFILE parameter is not specified.

DUPLEX={NO | NORMAL | TUMBLE}
Specifies whether the data set is printed on one or both sides of each sheet.

This parameter applies only to documents printed on an AFP printer or transformed to another format with a transform from AFP.

NO
The data set is printed only on the front side of each sheet.

NORMAL
The data set is printed on both sides of the sheet so that the top of side 1 is the top of side 2 (for side binding).

TUMBLE
The data set is printed on both sides of the sheet so that the top of side 1 is the bottom of side 2 (for top binding).

Defaults:

1. IP PrintWay basic mode: NORMAL
2. IP PrintWay extended mode: the duplex value in the printer definition is used.

Example:

```
//OUTDS OUTPUT DUPLEX=NORMAL
```

FCB=*fcb_name*
Specifies the 1 - 4 character name of the forms control buffer (FCB) member of the SYS1.IMAGELIB library.

IP PrintWay searches the library first for FCB4*fcb_name*, next for FCB2*fcb_name*, and then for FCB3*fcb_name*.

IP PrintWay extended mode always uses the FCB to format the data if the FCB parameter is specified. However, IP PrintWay basic mode uses the FCB only if the administrator selects the IP PrintWay **Use FCB** formatting option in the printer definition.

Defaults:

1. If the Print Interface subsystem processes the data set, the FCB in the printer definition is used. If none is specified:

   • If IP PrintWay extended mode processes the data set, no default FCB exists.
   • If IP PrintWay basic mode processes the data set, JES can provide a default FCB.

2. If the Print Interface subsystem does not process the data set:

- If IP PrintWay extended mode processes the data set, the FCB in the printer definition is used.
- If IP PrintWay basic mode processes the data set, JES can provide a default FCB. If JES does not provide a default FCB and the resubmit for filtering function is used, the FCB in the printer definition is used.

Examples:

```
//DD1     DD      FCB=STD2
```

```
//OUTDS   OUTPUT FCB=STD2
```

FORMS=*form_name*

Specifies the 1 - 8 character form name. If the Print Interface subsystem does not process the data set, IP PrintWay can use this parameter, in combination with the class and destination name, to select a printer definition to format and print the data set. Ask your administrator which form name to specify.

Tips:

1. You can also specify the form name in the SYSOUT parameter of a DD JCL statement.
2. If you specify more than one parameter that can be used to find a printer or email destination, IP PrintWay uses these priorities:

   a. The printer's host name or address that is specified by the DEST=IP: parameter, or the email address that is specified in the MAILTO parameter
   b. The printer's address or the email address in the printer definition that is specified in the SUBSYS parameter
   c. The printer's address or the email address in the printer definition that is specified in the FSSDATA parameter
   d. The printer's address or the email address in the printer definition that matches the values of any combination of the DEST=*name*, CLASS, and FORMS parameters

3. The administrator can limit the values that you can specify in this parameter. If you specify a value that is not allowed, the data set might not print.

Defaults:

1. If the Print Interface subsystem processes the data set, the form name in the printer definition in the Printer Inventory is used. If none is specified, JES provides a default form name.
2. If the Print Interface subsystem does not process the data set, JES provides a default form name.

Example:

```
//OUTDS   OUTPUT FORMS=WIDE
```

FSSDATA='printer=*printer_definition_name*'

Specifies the 1 - 17 character name of the printer definition in the Printer Inventory.

Rules:

1. Enter the **printer** subparameter in lowercase.
2. Enter the printer definition name with the same uppercase and lowercase letters that are used in the printer definition. The printer definition name is case-sensitive.

If you specify more than one parameter that can be used to find a printer or email destination, IP PrintWay uses these priorities:

1. The printer's host name or address that is specified by the DEST=IP: parameter, or the email address that is specified in the MAILTO parameter
2. The printer's address or the email address in the printer definition that is specified in the SUBSYS parameter

3. The printer's address or the email address in the printer definition that is specified in the FSSDATA parameter

4. The printer's address or email address in the printer definition that matches the values of any combination of the DEST=*name*, CLASS, and FORMS parameters

IP PrintWay extended mode: If your job creates multiple output data sets, see "JCL considerations for IP PrintWay extended mode" on page 110.

Defaults:

1. If the Print Interface subsystem processes the data set and no printer definition is named in the SUBSYS parameter, the Infoprint Server default printer definition is used.

2. If the Print Interface subsystem does not process the data set:

   - If the DEST=IP: parameter is specified, the IP PrintWay default printer definition is used.
   - If the DEST=IP: parameter is not specified, the printer definition that matches the class, destination, and forms name is used.

Example:

```
//OUTDS  OUTPUT FSSDATA='printer=Printer5'
```

MAILBCC=('*username*[@*domainname*]'[,...])
Specifies the email addresses for the blind copy (bcc) recipients of an email. A *bcc* means that other recipients of the email do not see the bcc recipient listed.

username
Specifies the name of the recipient, or an alias name that is defined to the sendmail bridge. For example, user1.

@*domainname*
Specifies the domain of the recipient. For example, @xyz.com. If you specify an alias name, omit @*domainname*.

Rules:

1. You can specify 1 - 32 email addresses.

2. Each email address can be 1 - 60 characters.

3. You can specify any characters, including blanks.

4. If the email address contains special characters or lowercase letters, enclose the entire email address in apostrophes.

5. If you specify only one email address, you can omit the parentheses.

6. You cannot specify null values. For example, you cannot specify MAILBCC=(,*username*) or MAILBCC=(*username*,,*username*).

IP PrintWay extended mode: If your job creates multiple output data sets, see "JCL considerations for IP PrintWay extended mode" on page 110.

Default: IP PrintWay sends the email to any bcc recipients specified in the printer definition.

Example: In this example, user1@xyz.com receives the email, and user2@xyz.com and all the recipients that are defined in the sendmail alias that is named "dept01list" receive a bcc of the email:

```
//OUTDS  OUTPUT MAILTO='user1@xyz.com',MAILBCC=('user2@xyz.com',dept01list)
```

MAILCC=('*username*[@*domainname*]'[,...])
Specifies the email addresses for the copy (cc) recipients of an email. A *cc* means that other recipients of the email can see the cc recipient listed.

username
Specifies the name for the recipient, or an alias name that is defined to the sendmail bridge. For example, user1.

@*domainname*
> Specifies the domain for the recipient. For example, `@xyz.com`. If you specify an alias name, omit @*domainname*.

Rules:

1. You can specify 1 - 32 email addresses.

2. Each email address can be 1 - 60 characters.

3. You can specify any characters, including blanks.

4. If the email address contains special characters or lowercase letters, enclose the entire email address in apostrophes.

5. If you specify only one email address, you can omit the parentheses.

6. You cannot specify null values. For example, you cannot specify MAILCC=(,*username*) or MAILCC=(*username,,username*).

IP PrintWay extended mode: If your job creates multiple output data sets, see "JCL considerations for IP PrintWay extended mode" on page 110.

Default: IP PrintWay sends the email to any cc recipients specified in the printer definition.

Example: In this example, `user1@xyz.com` receives the email, and `user2@xyz.com` and all the recipients that are defined in the sendmail alias that is named "dept01list" receive a cc of the email:

```
//OUTDS  OUTPUT MAILTO='user1@xyz.com',MAILCC=('user2@xyz.com',dept01list)
```

MAILFILE='*filename*'
Specifies the file name of the attachment to an email.

Rules:

1. The name can be 1 - 60 characters.

2. You can specify any characters, including blanks.

3. If the name contains special characters, blanks, or lowercase letters, enclose the entire name in apostrophes.

Default: IP PrintWay uses the last qualifier of the data set name or file name as the name of the email attachment. You can specify the last qualifier in the DSNAME parameter of the DD statement. However, the DSNAME parameter specifies only 8 characters (see the description of the DSNAME parameter). If you do not specify the DSNAME parameter, IP PrintWay uses the job name.

Tip: If you specify a file name (in the **mail-file-name** job attribute) with a suffix that indicates the type of data in the file, ask your administrator to request that Infoprint Server not add another suffix. For example, if the file name is `myfile.doc`, ask your administrator to request that Infoprint Server not add suffixes for file names that contain the `.doc` suffix. For information, see customizing IP PrintWay in *z/OS Infoprint Server Customization*.

Example: In this example, the email attachment is `February 2004 sales report.txt` and the attachment is in text format unless a transform is specified in the mail printer definition:

```
//OUTDS  OUTPUT MAILFILE='February 2004 sales report'
```

MAILFROM='*sendername*'
Specifies the descriptive name or other identifier of the sender of an email.

Rules:

1. The name can be 1 - 60 characters.

2. You can specify any characters, including blanks.

3. If the name contains special characters, blanks, or lowercase letters, enclose the entire name in apostrophes.

IP PrintWay always includes *userid*@*domainname* to identify the sender. The user ID of the job submitter is *userid*. The domain name where Infoprint Server is running is *domainname*. For example: JOHN@SYSTEM1.

IP PrintWay extended mode: If your job creates multiple output data sets, see "JCL considerations for IP PrintWay extended mode" on page 110.

Default: IP PrintWay uses the value that is specified in the printer definition.

Tip: To specify the email address that recipients of an email can reply to, use the REPLYTO parameter.

Example:

This specification:

```
//OUTDS   OUTPUT MAILFROM='John Q. Sender'
```

Puts this information in the email:

```
From: John Q. Sender <JOHN@SYSTEM1>
```

MAILTO=('*username*[@*domainname*]'[,...])
Specifies the email addresses for the recipients of an email.

username
Specifies the name for the recipient, or an alias name that is defined to the sendmail bridge. For example, user1.

@*domainname*
Specifies the domain of the recipient. For example, @xyz.com. If you specify an alias name, omit @*domainname*.

Rules:

1. You can specify 1 - 32 email addresses.
2. Each email address can be 1 - 60 characters.
3. You can specify any characters, including blanks.
4. If the email address contains special characters or lowercase letters, enclose the entire email address in apostrophes.
5. If you specify only one email address, you can omit the parentheses.
6. You cannot specify null values. For example, you cannot specify MAILTO=(,*username*) or MAILTO=(*username*,,*username*).

IP PrintWay extended mode: If your job creates multiple output data sets, see "JCL considerations for IP PrintWay extended mode" on page 110.

Default: IP PrintWay sends the email to the email recipients specified in the printer definition.

Example: In this example, user1@xyz.com, user2@xyz.com, and all the recipients that are defined in the sendmail alias that is named "dept01list" receive the email:

```
//OUTDS   OUTPUT MAILTO=('user1@xyz.com','user2@xyz.com',dept01list)
```

NOTIFY=([*node*.]*userid*,...)
Specifies up to four user IDs that IP PrintWay notifies when the data set is successfully or unsuccessfully transmitted. Separate the user IDs with commas.

node
Specifies a 1 - 8 character node name. The node name is optional.

userid
Specifies a 1 - 8 character user ID.

Defaults:

1. IP PrintWay basic mode: If either the Print Interface subsystem processes the data set or the resubmit for filtering function is used, the notify values in the printer definition apply. Otherwise, no users are notified.
2. IP PrintWay extended mode: The notify values in the printer definition are used.

Example:

```
//OUTDS   OUTPUT NOTIFY=(SEATTLE.JOE,SEATTLE.MARY)
```

PORTNO=*port_number*
Specifies the number of the port to use for a direct socket printing connection. The valid range is 100 - 65535.

Tips:

1. Do not code both PORTNO and PRTQUEUE.
2. If you code DEST=IP: but do not specify a printer definition name in either the FSSDATA or SUBSYS parameter, also code either PRTQUEUE or PORTNO.
3. If the printer definition does not specify the direct sockets printing protocol, IP PrintWay ignores this parameter.
4. If you code DEST=IP: and PORTNO but do not specify a printer definition name in either the FSSDATA or SUBSYS parameter, IP PrintWay uses the direct sockets printing protocol to transmit the data to the specified port number.
5. If the resubmit for filtering function is used (IP PrintWay basic mode), do not code PORTNO because IP PrintWay ignores it and instead uses the port number that is specified in the printer definition.

Default: The printer's port number in the printer definition is used.

Example:

```
//OUTDS   OUTPUT PORTNO=2501
```

PRTATTRS='*attribute=value* ...'
Specifies one or more Infoprint Server job attributes that you want IP PrintWay extended mode to use.

This parameter specifies job attributes that do not have corresponding JCL parameters, such as **document-codepage** or **document-format**. You can specify any job attribute, but IP PrintWay ignores these attributes: **sysout-job-id**, **sysout-job-name**. For a list of valid job attributes, see Chapter 3, "Using job attributes," on page 45.

Rules:

1. The list of job attributes can be 1 - 127 characters.
2. Attribute names and values are case-sensitive. All attribute names are lowercase.
3. Enclose the entire list of job attributes in single quotation marks.
4. Separate job attributes with one or more spaces.
5. If an attribute value contains blanks, lowercase letters, or special characters, enclose that attribute value in double quotation marks.
6. You can store attributes and values in a UNIX file (for example, a zFS file) or in an MVS data set. Use the job attribute that is called **attributes** to specify the UNIX file name of the DD name for the MVS data set that contains the attributes. (See "Examples".)

Default: The first value that is found for each job attribute, in this order:

1. The SUBSYS JCL parameter
2. The PRTATTRS JCL parameter
3. The JCL parameter that corresponds to the job attribute (for example, the FORMDEF JCL parameter corresponds to the **form-definition** job attribute)

4. If the Print Interface subsystem is used, the printer attribute in the printer definition that corresponds to the job attribute (for example, the **form-definition** printer attribute corresponds to the **form-definition** job attribute)

Examples:

```
//OUTDS  OUTPUT PRTATTRS='document-codepage="IBM-1147"'
//OUTDS  OUTPUT PRTATTRS='hold=yes document-codepage="IBM-1147"'
//OUTDS  OUTPUT PRTATTRS='attributes=bigjob.att'
```

PRTOPTNS='*component_name*'

Specifies the 1 - 16 character name of one or more components that contain printing options you want IP PrintWay to use. Ask your administrator for the name of components suitable for your data set. The component name is case-sensitive. Enter it exactly as the components are defined in the Printer Inventory. If the name contains special characters (such as a dash) or lowercase letters, enclose the name in single quotation marks.

A *component* is an entity in the Printer Inventory. IP PrintWay uses printing options that are specified in these three types of components: Processing, IP PrintWay Options, and Protocol. If more than one type of component exists with the specified name, IP PrintWay uses options that are specified in all of the components with the specified name. If a component of one of the three types does not exist, IP PrintWay uses default values for the printing options that can be specified in the missing component.

IP PrintWay uses only a subset of all options that can be specified in these components. IP PrintWay ignores other options that are specified in these components and instead uses the options that are specified in the printer definition. For more information about which options IP PrintWay uses from components and about how to define components for use with the PRTOPTNS parameter, see *z/OS Infoprint Server Operation and Administration*.

Note: If the resubmit for filtering function is used (IP PrintWay basic mode), do not specify the PRTOPTNS parameter. IP PrintWay ignores it and instead uses options that are specified in the printer definition.

Default: IP PrintWay determines the default printing options:

1. The options that are specified in the printer definition are used.
2. For options not specified in the printer definition, IP PrintWay uses hardcoded default values.

Example:

```
//OUTDS  OUTPUT PRTOPTNS='PostScript'
```

PRTQUEUE='*print_queue*'

Specifies the 1 - 127 character alphanumeric name of the target print queue.

This parameter might be case-sensitive. For example, on UNIX systems, lp0 and LP0 refer to different print queues. If the name contains special characters (such as a dash) or lowercase letters, enclose the name in single quotation marks.

Tips:

1. Do not code both PORTNO and PRTQUEUE.
2. If you code DEST=IP: but do not specify a printer definition name in either the FSSDATA or SUBSYS parameter, also code either PRTQUEUE or PORTNO.
3. If the printer definition does not specify the LPR printing protocol, IP PrintWay ignores this parameter.
4. If you code DEST=IP: and PRTQUEUE parameter, but do not specify a printer definition name in either the FSSDATA or SUBSYS parameter, IP PrintWay uses the LPR printing protocol to transmit the data to the specified print queue.

5. If the resubmit for filtering function is used (IP PrintWay basic mode), do not code PRTQUEUE because IP PrintWay ignores it and instead uses the print queue name that is specified in the printer definition.

6. TEXT and RAW are queue names on some IBM printers, most HP printers, and most Lexmark printers. Specify the RAW queue for data that contains a carriage return at the end of each line, PCL data, and PostScript data.

7. TEXT and PASS are used for some IBM printers. Specify the PASS queue for text data that contains a carriage return at the end of each line, PCL data, and PostScript data.

8. If you specify the PASS or RAW queue and you run IP PrintWay basic mode, your administrator must also specify 0D25 in the **Line termination** field in the printer definition. This specification causes IP PrintWay basic mode to add a carriage return at the end of each line when it converts line data to text data. IP PrintWay extended mode adds a carriage return at the end of each line by default.

Default: The print queue name in the printer definition is used.

Example:

```
//OUTDS   OUTPUT PRTQUEUE='RAW'
```

REPLYTO='*username*[@*domainname*]'
Specifies the email address that recipients of an email can reply to.

username
Specifies the name portion of the address, or an alias name that is defined to the sendmail bridge. For example, `user1`.

@*domainname*
Specifies the domain portion of the address. For example, `@xyz.com`.

Rules:

1. The name can be 1 - 60 characters.

2. You can specify any characters, including blanks.

3. If the name contains special characters or lowercase letters, enclose the entire name in apostrophes.

IP PrintWay extended mode: If your job creates multiple output data sets, see "JCL considerations for IP PrintWay extended mode" on page 110.

Default: IP PrintWay uses the value that is specified in the printer definition. If none is specified in the printer definition, most email programs use the sender's email address. The default is *userid*@*domainname*. The user ID of the job submitter is *userid*. The domain name where Infoprint Server is running is *domainname*.

Example:

```
//OUTDS   OUTPUT REPLYTO='user1@xyz.com'
```

RETAINF={'*hhhh*:*mm*:*ss*' | FOREVER }
Specifies the amount of time that IP PrintWay retains the data set on the JES spool after a transmission fails and all requested retransmissions are attempted.

Specify the time in the format *hhhh*:*mm*:*ss*:

hhhh
Number of hours (range 0 - 9999)

mm
Number of minutes (range 0 - 59)

ss
Number of seconds (range 0 - 59)

You can omit zeros and colons to the left of the significant portion of the time value. Enclose the entire value in single quotation marks. To retain data sets forever, specify FOREVER. In this case, IP PrintWay does not automatically delete the failed data set from the JES spool.

IP PrintWay extended mode: If your job creates multiple output data sets, see "JCL considerations for IP PrintWay extended mode" on page 110.

Default: IP PrintWay determines the default value:

1. The retain value in the printer definition is used.
2. No retention.

Table 11 on page 107 explains the state of retained data sets.

Table 11. State of retained data sets for RETAINF		
When IP PrintWay retains a data set in this mode:	**In JES2, IP PrintWay treats the data set this way:**	**In JES3, IP PrintWay treats the data set this way:**
Basic mode	Keeps the acquired data set.	Keeps the acquired data set.
Extended mode	• Releases the data set. • Puts the data set in the HELD state.	• Releases the data set. • Puts the data set in the KEEP state.

Examples:

1. This OUTPUT statement specifies that IP PrintWay retains the data set on the JES spool for 48 hours:

```
//OUTDS   OUTPUT RETAINF='48:00:00'
```

2. This OUTPUT statement specifies that IP PrintWay retains the data set on the JES spool until the administrator deletes it or retransmits it:

```
//OUTDS   OUTPUT RETAINF=FOREVER
```

RETAINS={'*hhhh*:*mm*:*ss*' | FOREVER}
Specifies the amount of time that IP PrintWay retains the data set on the JES spool after a successful transmission.

Specify the time in the format *hhhh*:*mm*:*ss*:

hhhh
    Number of hours (range 0 to 9999)

mm
    Number of minutes (range 0 to 59)

ss
    Number of seconds (range 0 to 59)

You can omit zeros and colons to the left of the significant portion of the time value. Enclose the entire value in single quotation marks. To retain data sets forever, specify FOREVER. In this case, IP PrintWay does not automatically delete the data set from the JES spool. The operator can delete a retained data set from the JES spool, print it again on the same printer, or move it to another IP PrintWay printer.

IP PrintWay extended mode: If your job creates multiple output data sets, see "JCL considerations for IP PrintWay extended mode" on page 110.

Default: IP PrintWay determines the default value:

- The retain value in the printer definition is used.
- No retention.

Table 12 on page 108 explains the state of retained data sets.

Table 12. State of retained data sets for RETAINS		
When IP PrintWay retains a data set in this mode:	**In JES2, IP PrintWay treats the data set this way:**	**In JES3, IP PrintWay treats the data set this way:**
Basic mode	Keeps the acquired data set.	Keeps the acquired data set.
Extended mode	• Releases the data set. • Puts the data set in the HELD state.	• Releases the data set. • Puts the data set in the KEEP state.

Examples:

1. This OUTPUT statement specifies that IP PrintWay retains the data set on the JES spool for 4 hours:

```
//OUTDS   OUTPUT RETAINS='04:00:00'
```

2. This OUTPUT statement specifies that IP PrintWay does not retain the data set on the JES spool:

```
//OUTDS   OUTPUT RETAINS='0'
```

RETRYL=*nnnnn*
Specifies the maximum number of times that IP PrintWay retransmits an unsuccessful transmission. Specify a number 0 - 32767.

IP PrintWay extended mode: If your job creates multiple output data sets, see "JCL considerations for IP PrintWay extended mode" on page 110.

Guidelines:

1. When you send the output data set to an email destination, omit both the RETRYL and RETRYT parameters.
2. Do not specify this parameter so that the value your administrator specifies in the printer definition is used. The value that you specify can affect IP PrintWay performance.

Default: The retry value in the printer definition is used. If none is specified, see Table 13 on page 108.

Example:

```
//OUTDS   OUTPUT RETRYL=10
```

Table 13. How retry limit and retry time work together		
Retry limit	**Retry time**	**IP PrintWay action**
0 or blank	Any value	IP PrintWay does not try the transmission again.
>0	0 or blank	IP PrintWay automatically tries the transmission again one time immediately after the original transmission fails. Then, IP PrintWay tries again for the specified number of times at the specified interval. If retry time is blank, IP PrintWay tries again approximately every second.

RETRYT='*hhhh*:*mm*:*ss*'

Specifies the time interval between attempts to retransmit an unsuccessful transmission.

Specify the retry time in the format *hhhh*:*mm*:*ss*:

hhhh
Number of hours (range 0 - 9999)

mm
Number of minutes (range 0 - 59)

ss
Number of seconds (range 0 - 59)

You can omit zeros and colons to the left of the significant portion of the time value. Enclose the retry time in single quotation marks.

IP PrintWay extended mode: If your job creates multiple output data sets, see "JCL considerations for IP PrintWay extended mode" on page 110.

Guidelines:

1. When you send the output data set to an email destination, omit both the RETRYL and RETRYT parameters.

2. Do not specify this parameter so that the value your administrator specifies in the printer definition is used. The value that you specify can affect IP PrintWay performance.

Default: The retry value in the printer definition is used. If none is specified, see Table 13 on page 108.

Examples: These examples both specify that IP PrintWay retransmits one time immediately, and then waits 1 minute between subsequent retransmissions:

```
//OUTDS   OUTPUT RETRYT='0000:01:00'
```

or

```
//OUTDS   OUTPUT RETRYT=1:00
```

SYSOUT=(*class,,form_name*)

Specifies the class and the form name.

class
Specifies a 1-character alphanumeric class.

form_name
Specifies a 1 - 4 character form name.

You can also specify the output class and the form name in the CLASS parameter and FORMS parameter of an OUTPUT statement. To specify a form name longer than 4 characters, you must use the FORMS parameter of an OUTPUT statement.

Note: You must code either the SYSOUT or SUBSYS parameter, but do not code both parameters.

Example:

```
//DD1   DD SYSOUT=(P,,WIDE)
```

TITLE='*description of output*'

Describes the output. This value can be printed on an IP PrintWay separator page or on a separator page (banner page) written by the printer's LPD. Whether this value prints on a separator page depends on how your administrator configures the separator page or how the LPD is implemented. If the output data set is sent to an email destination, this value is the subject of the email.

Specify 1 - 60 characters. If the description contains spaces, special characters, or lowercase characters, enclose the value in quotation marks.

IP PrintWay basic mode: If you want to send multiple output data sets in the same job step in the same email, specify the TITLE parameter with the same value for all output data sets.

Defaults:

1. For IP PrintWay extended mode, the title value in the printer definition is used.

2. For a separator page that an IP PrintWay exit created:

   - If the resubmit for filtering function (IP PrintWay basic mode) is used, the default value is the fully qualified data set name (to enable the resubmitted and original data sets to be correlated).

   - If the Print Interface subsystem processes the data set, the default value is the title that is specified in the Allocation section of the printer definition in the Printer Inventory. If no title is specified in the Allocation section, no default value exists.

   - Otherwise, no default value exists.

3. For the LPD's separator page:

   - If the resubmit for filtering function (IP PrintWay basic mode) is used, the default value is the fully qualified data set name (to enable the resubmitted and original data sets to be correlated).

   - If the Print Interface subsystem processes the data set, the default value is the title that is specified in the Allocation section of the printer definition in the Printer Inventory. If no title is specified in the Allocation section, the default value is the title or file name that your administrator specifies in the Protocol section of the printer definition. If none is specified, the default value is the fully qualified data set name.

   - Otherwise, the default value is the title or file name that your administrator specifies in the Protocol section of the printer definition. If none is specified, the default value is the fully qualified data set name.

4. For the subject of an email:

   - If the resubmit for filtering function (IP PrintWay basic mode) is used, the default value is the fully qualified data set name (to enable the resubmitted and original data sets to be correlated).

   - If the Print Interface subsystem processes the data set, the default value is the title that is specified in the Allocation section of the printer definition in the Printer Inventory. If no title is specified in the Allocation section, the default value is the job name.

   - Otherwise, the default value is the job name.

Example:

```
//OUTDS  OUTPUT TITLE='Annual Report'
```

JCL considerations for IP PrintWay extended mode

You can use the same JCL for IP PrintWay extended mode as you do for IP PrintWay basic mode with these exceptions:

- IP PrintWay basic mode can print data sets in the same JES output group on different printers. However, IP PrintWay extended mode prints all data sets in the same JES output group on the same printer. Also, IP PrintWay extended mode uses the same retry times, and retention values for all data sets in the output group.

  If your job creates more than one output data set and you specify different values in the DEST=IP:, FSSDATA, MAILBCC, MAILCC, MAILFROM, MAILTO, REPLYTO, RETAINF, RETAINS, RETRYL, or RETRYT parameter for each data set, make sure that JES places each output data set in a different output group. To do this, specify one of these JCL parameters with a different value for each data set: ADDRESS, BUILDING, BURST, CLASS, DEPT, DEST, FCB, FLASH, FORMS, GROUPID (JES2), NAME, OUTDISP (JES2), PRMODE, ROOM, TITLE, or WRITER.

Examples:

1. IP PrintWay extended mode prints both output data sets on the same printer (`printer1`) because JES places both data sets in the same JES output group:

```
//OUTDS1   OUTPUT DEST='IP:printer1',PRTQUEUE='RAW'
//OUTDS2   OUTPUT DEST='IP:printer2',PRTQUEUE='RAW
//DD1      DD SYSOUT=P,OUTPUT=(*.OUTDS1)
//DD2      DD SYSOUT=P,OUTPUT=(*.OUTDS2)
```

2. JES2: IP PrintWay extended mode prints the output data sets on different printers (`printer1` and `printer2`) because JES2 places each data set in a separate output group:

```
//OUTDS1   OUTPUT DEST='IP:printer1',PRTQUEUE='RAW',GROUPID=GROUP1
//OUTDS2   OUTPUT DEST='IP:printer2',PRTQUEUE='RAW',GROUPID=GROUP2
//DD1      DD SYSOUT=P,OUTPUT=*.OUTDS1
//DD2      DD SYSOUT=P,OUTPUT=*.OUTDS2
```

3. JES2 or JES3: IP PrintWay extended mode prints the output data sets on different printers (`printer1` and `printer2`) because JES places each data set in a separate output group:

```
//OUTDS1   OUTPUT DEST='IP:printer1',PRTQUEUE='RAW',TITLE=TITLE1
//OUTDS2   OUTPUT DEST='IP:printer2',PRTQUEUE='RAW',TITLE=TITLE2
//DD1      DD SYSOUT=P,OUTPUT=*.OUTDS1
//DD2      DD SYSOUT=P,OUTPUT=*.OUTDS2
```

- IP PrintWay basic mode sends each data set that is in the same JES output group to the email addresses specified for the data set. However, IP PrintWay extended mode, by default, sends all data sets that are in the same JES output group to the email addresses specified for the first data set in the output group. The administrator can set the AOP_MAIL_USE_FIRST_ADDRESS=NO environment variable or the **mail-use-first-address=no** configuration attribute so that IP PrintWay extended mode sends each data set that is in the same output group to the email addresses specified for the data set.

- The PRTATTRS JCL parameter works only with IP PrintWay extended mode. IP PrintWay basic mode ignores it.

- For these JCL parameters, IP PrintWay extended mode uses the values in the printer definition as the default: ADDRESS, BUILDING, DEPT, DUPLEX, FCB, FORMDEF, NAME, PAGEDEF, ROOM, TITLE.

- JES3: If you specify the HOLD=YES parameter on the DD statement, the operator cannot use Infoprint Central to release or delete the data set, or change any characteristics of the data set. To hold an output data set, IBM suggests that you instead specify a held output class on the DD or OUTPUT statement. This suggestion applies whether you print on IP PrintWay extended mode printers or on PSF printers.

JCL parameters for the Print Interface subsystem

This information describes how to code the SUBSYS JCL parameter to request that the Print Interface subsystem process a data set. It also describes the parameters of the DD and OUTPUT JCL statements that apply when you use the Print Interface subsystem.

DD JCL Statement:

SUBSYS=(*subsystem_name*[,['*printer_definition_name*'][,'*attribute=value* ...']])

Figure 10. SUBSYS parameter for the Print Interface subsystem

---

SUBSYS=(*subsystem_name*[,'[*printer_definition_name*'][,'*attribute=value* ...']])
    Specifies that the Print Interface subsystem is to process this data set.

The Print Interface subsystem supports these positional subparameters:

subsystem_name
    Specifies the name of the Print Interface subsystem. This name must be the same as the Inventory name that is specified in the Infoprint Server configuration file. The Printer Inventory name is usually AOP1.

    Default: None.

'*printer_definition_name*'
> Specifies the name of the printer definition in the Printer Inventory that the subsystem uses to process the data set. This name is case-sensitive. If the name includes any lowercase characters or special characters, enclose the name in single quotation marks. If you want to omit this parameter, but still specify job attributes, code a comma to indicate that the printer definition name is omitted.
>
> **Default:** The first printer definition name that is found, in this order:
>
> 1. The printer definition name that is specified in the FSSDATA parameter on the OUTPUT JCL statement.
> 2. The Infoprint Server default printer definition. The name of the Infoprint Server default printer definition is specified in the Printer Inventory. The default name is lp1.

'*attribute=value ...*'
> Specifies Infoprint Server job attributes that the subsystem uses to process and print the data set. For a list of valid job attributes, see Chapter 3, "Using job attributes," on page 45.
>
> **Rules:**
>
> 1. Attribute names and values are case-sensitive. All attribute names are lowercase.
> 2. Enclose the entire list of job attributes in single quotation marks.
> 3. Separate job attributes with one or more spaces.
> 4. If an attribute value contains blanks or special characters, enclose that attribute value in double quotation marks.
> 5. You can specify up to 127 characters of job attributes.
> 6. To continue the SUBSYS parameter on another line, end the first line with a comma at the end of a complete subparameter.
> 7. If you cannot fit all job attributes on one line, see *z/OS MVS JCL Reference* for information about how to continue a parameter field that is enclosed in single quotation marks.
>
> **Tip:** If you want to specify more than 127 characters of job attributes, instead, specify the JCL parameter that corresponds to the job attribute. For example, specify the COPIES JCL parameter instead of the **copies** job attribute. Or, specify the job attributes in an attributes file.
>
> **Overrides:** Job attributes override values that are specified in corresponding parameters of the DD and OUTPUT JCL statements. For a list of job attributes and their corresponding JCL parameters, see Appendix B, "JCL parameters and corresponding job attributes," on page 173.
>
> **Using an attributes file:** You can store attributes and values in an MVS data set or in a UNIX file (such as a zFS file). Follow these rules:
>
> - Specify the name of the MVS data set or the UNIX file in an attribute called attributes.
> - Because Print Interface must be able to read the attributes data set, make sure that the ID assigned to the Infoprint Server daemons has the necessary authority.
> - For information about how to specify the attributes in the attributes file, see "Attributes files" on page 47.
>
> **Default:** The first value that is found for each job attribute, in this order:
>
> 1. The value in a corresponding JCL parameter that is specified on the DD statement.
> 2. The value in a corresponding JCL parameter that is specified on the first OUTPUT statement referred to in the OUTPUT parameter on the DD statement.
> 3. The value in a corresponding JCL parameter that is specified on the first default OUTPUT statement in the job step.
> 4. The value in a corresponding JCL parameter that is specified on the first default OUTPUT statement in the job.
> 5. The value that is specified in the printer definition.

6. The JES default value for the corresponding JCL parameter. However, the JES default values for the CHARS, UCS, PAGEDEF, or FCB parameters are not used to transform data.

Examples:

1. This example shows how to submit output to the Print Interface subsystem named AOP1:

```
//DD1 DD SUBSYS=(AOP1,'myprinter')
```

2. This example shows how to submit output to the subsystem named AOP1 and specify that the output from the transform includes only pages 1 - 10 and is printed on both sides of the sheet. The PCL to AFP, PostScript to AFP, and PDF to AFP transforms support the **-p** option.

```
//DD1 DD SUBSYS=(AOP1,'myafpprinter',
//        'filter-options="-p 1-10" duplex=yes')
```

3. This example shows how to submit output to the subsystem named AOP1 and specify attributes in a UNIX file named /u/myuserid/myattributes:

```
//DD1 DD SUBSYS=(AOP1,'myprinter','attributes=/u/myuserid/myattributes')
```

Parameters of the DD JCL statement that the Print Interface subsystem supports

Table 14 on page 113 summarizes the parameters on the DD JCL statement, other than the SUBSYS parameter, that the Print Interface subsystem supports. It also describes the special considerations that apply when you use the Print Interface subsystem.

Table 14. Parameters of the DD JCL statement that the Print Interface subsystem supports

DD statement parameter	Print Interface subsystem considerations
BURST CHARS COPIES FLASH UCS	If you do not specify one of these parameters, the corresponding value in the printer definition is used. If none is specified, the standard default value is used. However, JES default values for the CHARS and UCS parameters are not used to transform data.
COPIES	If you do not specify one of these parameters, the corresponding value in the printer definition is used. If none is specified, the default is 1 copy.
	The administrator can limit the number of copies that you can print. If you exceed the allowed limit, the Print Interface subsystem does not print any data sets in the job step.
	If you specify COPIES on both the DD and the OUTPUT JCL statement, COPIES on the DD statement is used.
DCB	Specify values in the DCB parameter that are suitable for data that your application writes to this DD statement.
	If you do not specify either the DCB OPTCD=J subparameter or the TRC parameter on the OUTPUT JCL statement, the TRC value in the printer definition is used.
	Tip: If the DCB RECFM parameter is not specified on the DD statement or by the application that writes the data, the default is RECFM=U (undefined records with no carriage controls). Therefore, if the data contains carriage controls, you must specify the type of carriage controls in the DCB RECFM parameter.

Table 14. Parameters of the DD JCL statement that the Print Interface subsystem supports (continued)

DD statement parameter	Print Interface subsystem considerations
DSNAME	Begin the name with two ampersands (&&). Follow the ampersands with 1 - 8 alphanumeric or national ($,#,@) characters, a hyphen, or a character X'C0'. The first character after the ampersands must be alphabetic or national ($,#,@). If you specify another format, you receive a JCL error.
LRECL	Specify values in this parameter that are suitable for data that the application writes to this DD statement.
OUTPUT	Refer to only one OUTPUT JCL statement. The Print Interface subsystem ignores all references except for the first one.
SEGMENT SYSOUT	Not allowed. If you specify one of these parameters with the SUBSYS parameter, you receive a JCL error.
All other DD parameters	The Print Interface subsystem does not use any other DD parameters. However, JES might use them.

Parameters of the OUTPUT JCL statement that the Print Interface subsystem supports

summarizes the parameters of the OUTPUT JCL statement that the Print Interface subsystem supports. It also describes some special considerations that apply when you use the Print Interface subsystem.

Table 15. Parameters of the OUTPUT JCL statement that the Print Interface subsystem supports

OUTPUT statement parameter	Print Interface subsystem considerations
CLASS DEST FORMS	IP PrintWay does not use these values to select a printer definition. The Print Interface subsystem and IP PrintWay use only the printer definition that is specified in the SUBSYS parameter or, if none is specified, the printer definition in the FSSDATA parameter.
	If you do not specify one of these parameters, the corresponding value in the printer definition is used. If none is specified, the standard JES default is used.
	The administrator can limit the values that you can specify in the FORMS parameter. If you specify a value that is not allowed, you receive a JCL error.
COPIES DATACK DUPLEX	If you do not specify one of these parameters, the corresponding value in the printer definition is used. If none is specified, the standard JES default is used.
	The administrator can limit the values that you can specify in these parameters. If you specify a value that is not allowed, you receive a JCL error.
DEFAULT	The Print Interface subsystem uses only one OUTPUT JCL statement, in this order: 1. The first OUTPUT JCL statement referred to in the OUTPUT parameter on the DD statement 2. The first OUTPUT JCL statement with DEFAULT=YES in the same job step 3. The first OUTPUT JCL statement with DEFAULT=YES in the job

Table 15. Parameters of the OUTPUT JCL statement that the Print Interface subsystem supports (continued)

OUTPUT statement parameter	Print Interface subsystem considerations
GROUPID	The Print Interface subsystem uses the specified group ID. However, JES always places the output data set that Print Interface allocates on the JES spool in a separate JES output group regardless of the value that is specified in this parameter.
JESDS	Ignored.
PRTATTRS	The Print Interface subsystem uses the first value that is found for each job attribute, in this order: 1. The SUBSYS JCL parameter 2. The PRTATTRS JCL parameter 3. The JCL parameter that corresponds to the job attribute (for example, the FORMDEF JCL parameter corresponds to the **form-definition** job attribute) 4. The printer definition
All other OUTPUT parameters	If you do not specify a parameter on the OUTPUT statement, the corresponding value that is specified in the printer definition is used. If none is specified, the standard JES default is used. However, the JES default values for the PAGEDEF and FCB parameters are not used to transform data.

JCL statements that the Print Interface subsystem does not support

The Print Interface subsystem does not support these JCL statements:

- The JES2 /*OUTPUT JCL statement is ignored.
- The JES3 //*FORMAT JCL statement is ignored.

JCL parameters for distribution information

summarizes the parameters that you can specify on an OUTPUT JCL statement to help identify and distribute output:

OUTPUT JCL Statement:

```
ADDRESS=('address text'[,...])
BUILDING='building text'
DEPT='department text'
NAME='name text'
ROOM='room text'
TITLE='description of output'
```

Figure 11. Summary of JCL parameters for the distribution of output

The values that you specify in these parameters can be printed on a separator sheet if your installation writes an IP PrintWay exit that creates a separator sheet. IP PrintWay can also pass the value that is specified in the TITLE parameter to a remote printer. Depending on how the printer definition and the printer are configured, this title can print on the separator page (banner page) generated by the printer's LPD.

For IP PrintWay extended mode, the default for these parameters is the value in the printer definition.

AFP parameters for remote printing

JCL parameters are listed here that you can specify on an OUTPUT or DD statement for IP PrintWay to send to either InfoPrint Manager or Infoprint Server running on a remote system. IP PrintWay sends these parameters to the target system only if the administrator selects the **Remote PSF** option in the printer definition in the Printer Inventory.

These JCL parameters specify AFP options that InfoPrint Manager and PSF use when you print on an AFP printer. Also, transform products can use some of these parameters when they transform AFP and line data to another format, such as PCL or PostScript.

IP PrintWay sends the values for these JCL parameters to the target system:

ADDRESS	DEST	NAME	PAGEDEF
BUILDING	DUPLEX	OFFSETXB	PRMODE (see Note)
CHARS	FCB	OFFSETXF	ROOM
CLASS	FORMDEF	OFFSETYB	TITLE
COPIES	FORMS	OFFSETYF	TRC
DATACK	INTRAY	OUTBIN	UCS
DEPT			

Note: Values other than SOSI1, SOSI2, SOSI3, and SOSI4 are ignored. The transforms from AFP (AFP to PCL, AFP to PDF, and AFP to PostScript) do not support SOSI4.

Related information: For information about how IP PrintWay sends these and other JCL values to InfoPrint Manager, see *z/OS Infoprint Server Operation and Administration*.

JCL examples

In the examples, assume that:

- Class P is a JES work-selection criterion for the IP PrintWay basic mode FSA or an IP PrintWay extended mode job selection criterion.
- Class P and destination DEPT001 are printer-selection values that are specified in a printer definition.
- Class P, destination DEPT002, and form name WIDE are printer-selection values that are specified in another printer definition.
- pcl1 is a printer definition that does not specify a form name.
- PS1 is a destination name.
- myoptions is the name of a set of components in the Printer Inventory.
- afpprinter is the printer definition for a printer that is attached to a remote system that is running InfoPrint Manager or Infoprint Server.

The examples are all JES2 examples. For differences between JES2 and JES3, see *z/OS MVS JCL Reference*.

Direct output to an IP PrintWay printer by specifying the printer definition name

These examples show how to direct an output data set to an IP PrintWay printer by specifying the printer definition name.

Because these examples do not specify retry values, retention periods, or the name of an options component, IP PrintWay uses the values that are defined by your administrator in this printer definition. If these values are not defined in the printer definition, IP PrintWay uses the standard defaults that are described in "JCL parameters" on page 94.

1. In this example, the OUTPUT statement specifies the printer definition name `myprinter`.

```
//PWAYJOB1 JOB …
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,FSSDATA='printer=myprinter'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

2. In this example, the OUTPUT statement specifies the printer definition name `myprinter` and IP address `99.153.123.232`. IP PrintWay uses this IP address instead of the address that is defined in `myprinter`. It uses the rest of the information in the `myprinter` printer definition.

```
//PWAYJOB2 JOB …
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,FSSDATA='printer=myprinter',DEST='IP:99.153.123.232'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

Direct output to an IP PrintWay printer by specifying a host name or an IP address

These examples show how to direct an output data set to an IP PrintWay printer by specifying the host name or IP address of the target printer and the name of the print queue.

Because these examples do not specify retry values, retention periods, or the name of an options component, IP PrintWay uses default values that are defined in the default printer definition or, if none exists in IP PrintWay basic mode, the standard defaults that are described in .

1. In this example, the OUTPUT statement specifies the printer's host name (PRINTER1.XYZ.COM) and print queue (RAW).

```
//PWAYJOB3 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,DEST='IP:PRINTER1.XYZ.COM',PRTQUEUE='RAW'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

2. In this example, the OUTPUT statement specifies the printer IP address (99.153.123.232) and the name of the print queue (RAW).

```
//PWAYJOB4 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,DEST='IP:99.153.123.232',PRTQUEUE='RAW'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

Direct output to an IP PrintWay printer by specifying DEST, CLASS, or FORMS

These examples show how to specify the destination, class, or form name to direct an output data set to a printer that IP PrintWay controls. IP PrintWay uses a printer whose printer definition values match the values you specify in the JCL. You can override the name of the print queue in the printer definition, as shown in Example .

1. In this example, the DD statement specifies a destination name, class, and form name. The destination name and class match values in a printer definition. The DD statement also specifies a form name, but the printer definition does not specify one. Therefore, IP PrintWay does not use the form name as a printer selection criterion.

```
//PWAYJOB5 JOB …
//STEP1    EXEC PGM=USERA
//DD1      DD SYSOUT=(P,,WIDE),DEST=DEPT001
```

Note: If the form name is more than 4 characters, you must specify the name on the OUTPUT statement, as shown in Example .

2. In this example, the OUTPUT statement specifies destination name and class. It does not specify a form name. A JES default is used for the form name.

```
//PWAYJOB6 JOB …
//STEP1    EXEC PGM=USERA
```

```
//OUTDS     OUTPUT CLASS=P,DEST=DEPT001
//DD1       DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

3. In this example, the OUTPUT statement specifies the destination name, class, and form name. The print queue name (RAW) overrides the name of the print queue that is specified in the printer definition.

```
//PWAYJOB7 JOB …
//STEP1     EXEC PGM=USERA
//OUTDS     OUTPUT CLASS=P,FORMS=WIDE,DEST=DEPT002,PRTQUEUE='RAW'
//DD1       DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

Direct output to multiple IP PrintWay printers

These examples show how to direct a data set to IP PrintWay and to send it to more than one printer at the same time by specifying multiple OUTPUT statements. The OUTPUT parameter on the DD statement refers to two OUTPUT JCL statements. Therefore, JES creates two output data sets.

1. In this example, the OUTPUT statements specify two different destination names:

```
//PWAYJOB8 JOB ...
//STEP1     EXEC PGM=USERA
//OUTDS1    OUTPUT CLASS=P,DEST=PRINTER1
//OUTDS2    OUTPUT CLASS=P,DEST=PRINTER2
//DD1       DD SYSOUT=(,),OUTPUT=(*.OUTDS1,*.OUTDS2)
```

2. In this example, the OUTPUT statements specify the host names of two different printers. Because different GROUPID parameters are specified, JES2 places the output data sets in two separate output groups. For more information, see .

```
//PWAYJOB9 JOB ...
//STEP1     EXEC PGM=USERA
//OUTDS1    OUTPUT DEST='IP:printer1.xyz.com',PRTQUEUE='RAW',GROUPID=GROUP1
//OUTDS2    OUTPUT DEST='IP:printer2.xyz.com',PRTQUEUE='RAW',GROUPID=GROUP2
//DD1       DD SYSOUT=P,OUTPUT=(*.OUTDS1,*.OUTDS2)
```

Specify components in the Printer Inventory

These examples show how to specify the name of Printer Inventory components that are defined by your administrator and used by IP PrintWay.

1. In this example, the OUTPUT statement specifies the name of a printer definition and the name of components in the Printer Inventory that contain IP PrintWay options. IP PrintWay uses components that are named myoptions instead of the options in the printer definition.

```
//PWAYJOBA JOB …
//STEP1     EXEC PGM=USERA
//OUTDS     OUTPUT FSSDATA='printer=myprinter',PRTOPTNS='myoptions'
//DD1       DD SYSOUT=P,OUTPUT=(*.OUTDS)
```

2. In this example, the OUTPUT statement specifies the name of the print queue and the IP address of the host. IP PrintWay uses components that are named myoptions instead of the options in the default printer definition.

```
//PWAYJOBB JOB …
//STEP1     EXEC PGM=USERA
//OUTDS     OUTPUT CLASS=P,DEST='IP:99.153.123.232',PRTQUEUE='RAW',
//          PRTOPTNS='myoptions'
//DD1       DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

Specify retry values

These examples show how to specify these IP PrintWay retry values:

- Retry time of 1 minute. IP PrintWay retransmits a failed transmission one time immediately, and then waits 8 minutes between subsequent retransmissions.

- Retry limit of 3 times. If the immediate retransmission fails, IP PrintWay retransmits a maximum of 3 more times.

1. In this example, the OUTPUT statement specifies a printer definition name. IP PrintWay uses the retry values specified on the OUTPUT statement instead of the values in this printer definition.

```
//PWAYJOBC JOB …
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT FSSDATA='printer=myprinter',
//         RETRYL=3,RETRYT='0000:09:00'
//DD1      DD SYSOUT=P,OUTPUT=(*.OUTDS)
```

2. In this example, the OUTPUT statement specifies the name of the print queue and the IP address of the host. IP PrintWay uses the retry values specified on the OUTPUT statement instead of the values in the default printer definition.

```
//PWAYJOBD JOB …
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,DEST='IP:99.153.123.232',PRTQUEUE='RAW',
//         RETRYL=3,RETRYT='0000:09:00'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

Specify retention periods

These examples show how to specify these IP PrintWay retention periods:

- Retention period of 1 day (24 hours) if the transmission is successful
- Retention period of 4 days (96 hours) if the transmission fails

1. In this example, the OUTPUT statement specifies a printer definition name. IP PrintWay uses the retention values specified on the OUTPUT statement instead of the values in this printer definition.

```
//PWAYJOBE JOB …
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT FSSDATA='printer=myprinter',
//         RETAINF='96:00:00',RETAINS='24:00:00'
//DD1      DD SYSOUT=P,OUTPUT=(*.OUTDS)
```

2. In this example, the OUTPUT statement specifies a form and destination name. IP PrintWay uses the retention values specified on the OUTPUT statement instead of the values in the printer definition for the printer that matches this form and destination name.

```
//PWAYJOBF JOB …
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,FORMS=WIDE,DEST=DEPT001,
//         RETAINF='96:00:00',RETAINS='24:00:00'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

3. In this example, the OUTPUT statement specifies the name of the print queue and the IP address of the host. IP PrintWay uses the retention values specified on the OUTPUT statement instead of the values in the default printer definition.

```
//PWAYJOBG JOB …
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,DEST='IP:99.153.123.232',PRTQUEUE='RAW',
//         RETAINF='96:00:00',RETAINS='24:00:00'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

Specify AFP resources for printing on a remote PSF system

This example shows how to specify a page definition and coded font for printing on an AFP printer that is attached to a system that is running either InfoPrint Manager or Infoprint Server with PSF. IP PrintWay prefixes P1 to the specified page definition name before it transmits the value.

```
//PWAYJOBH JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,FSSDATA='printer=afpprinter',
```

```
//        CHARS=60DB,PAGEDEF=000001
//DD1     DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

Note: The administrator must select the **Remote PSF** option in the printer definition in the Infoprint Server Printer Inventory.

Specify email addresses on the OUTPUT JCL statement

This example shows how to specify email recipient addresses, the sender's name and reply address, the email subject line, and the email attachment name in parameters on the OUTPUT JCL statement.

This example assumes that the administrator set up a printer definition in the Printer Inventory:

- The IP PrintWay printer definition is named `mail`.

- The email protocol is selected and an email address is specified for the primary recipient. However, the email address that you specify in the MAILTO parameter on the OUTPUT JCL statement overrides the email address in the printer definition.

```
//PWAYJOBI JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,FSSDATA='printer=mail',
//         MAILTO='user1@xyz.com',MAILCC='user2@xyz.com',
//         MAILBCC='user3@xyz.com',MAILFROM='John Q. Sender',
//         REPLYTO='secretary@xyz.com',
//         MAILFILE='January report',TITLE='Monthly Report'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

Results:

1. The recipient of the email is `user1@xyz.com`.
2. The "copy (cc)" recipient of the email is `user2@xyz.com`. A *cc* means that other recipients of the email can see the cc recipient listed.
3. The "blind copy (bcc)" recipient of the email is `user3@xyz.com`. A *bcc* means that other recipients of the email do not see the bcc recipient listed.
4. The sender of the email is `John Q. Sender<JOHN@SYSTEM1>`. JOHN is the user ID of the user who ran the job, and SYSTEM1 is the system where the sendmail bridge is running.
5. The email address that recipients of an email can reply to is `secretary@xyz.com`.
6. The email attachment is `January report.txt`. The attachment is in text format unless a transform is specified in the mail printer definition.
7. The subject of the email is `Monthly Report`.

Send two data sets to an email destination as text data

This example shows how to send two output data sets that contain line data as attachments in text format in the same email. This example specifies the subject of the email in the TITLE parameter, and the names of the attachments in the MAILFILE parameters.

This example assumes that the administrator set up the printer definition in the Printer Inventory:

- The IP PrintWay printer definition is named `deptmail`.

- The email protocol is selected, and the recipient email address list or a sendmail alias name is specified.

- No transform is specified for line data. Therefore, IP PrintWay converts line data in the data sets to text format.

- The **Automatic dataset grouping (extended mode)** field or the **Concatenate job** option in the **Dataset grouping** field is selected. This causes IP PrintWay to send output data sets that are in the same JES output group in the same email.

```
//PWAYJOBJ JOB ...
//STEP1    EXEC    PGM=USERA
//OUTDS1   OUTPUT CLASS=P,TITLE='Monthly Report',MAILFILE='Sales',
//         FSSDATA='printer=deptmail'
//OUTDS2   OUTPUT CLASS=P,TITLE='Monthly Report',MAILFILE='Inventory',
```

```
//          FSSDATA='printer=deptmail'
//DD1       DD      SYSOUT=(,),OUTPUT=(*.OUTDS1)
//DD2       DD      SYSOUT=(,),OUTPUT=(*.OUTDS2)
```

Results: The recipients that are listed in the printer definition receive an email:

1. The sender of the email is the user ID who ran the job. For example, USER1@DOMAIN1.

2. The subject of the email is `Monthly Report`.

3. The email has two attachments: `Sales.txt` and `Inventory.txt`. Both attachments are in text format and can be viewed with any text editor.

Send line or AFP data to an email destination as PDF data and print the AFP data on an AFP printer

This example shows how to (1) send an output data set with either line or AFP data to one or more email addresses as an attachment in PDF format and (2) print it on an AFP printer that PSF controls. This example specifies the subject of the email in the TITLE parameter and the name of the attachment in the MAILFILE parameter.

This example assumes that the administrator set up a printer definition for the email destination in the Printer Inventory:

- The IP PrintWay printer definition is named `deptmail`.
- The email protocol is selected and the recipient email address list or a sendmail alias name is specified in the printer definition.
- The AFP to PDF transform is specified for the line data and MO:DCA-P data formats.
- AFP resource libraries are specified either in the printer definition or in the transform configuration file, `aopxfd.conf`. If not, you must specify the USERLIB JCL parameter on the OUTDS1 OUTPUT statement.
- IP PrintWay basic mode: The **Resubmit for filtering** option is selected.

This example also assumes that the system programmer defined the PSF-controlled printer to JES so that JES directs data sets with CLASS F and DEST PRT633 to the PSF-controlled printer.

```
//PWAYJOBK JOB ...
//STEP1    EXEC    PGM=USERA
//OUTDS1   OUTPUT CLASS=P,FORMDEF=MYDEF,TITLE='Monthly Report',
//         FSSDATA='printer=deptmail',MAILFILE='January Report'
//OUTDS2   OUTPUT CLASS=F,FORMDEF=MYDEF,TITLE='Monthly Report',
//         DEST=PRT633
//DD1      DD      SYSOUT=(,),OUTPUT=(*.OUTDS1,*.OUTDS2)
```

Results:

1. The recipients that are listed in the printer definition `deptmail` receive an email:

   - The sender of the email is the user ID who ran the job. For example, USER1@DOMAIN1.
   - The subject of the email is `Monthly Report`.
   - The email attachment is named `January Report.pdf` and is in PDF format. The attachment can be viewed with a PDF viewer such as Adobe Acrobat Reader.

2. The file is printed on the PSF-controlled printer that is defined with JES work-selection criteria of CLASS F and DEST PRT633.

Send line or AFP data to an email destination as AFP data

This example shows how to send an output data set that contains either AFP data or line data with AFP resources to an email destination as an AFP file. This example specifies the subject of the email in the TITLE parameter and the name of the attachment in the MAILFILE parameter.

This example uses the IBM ACIF program to collect AFP resources into a separate file and concatenate that file to the line or AFP data file so that the email recipient can view the file with the AFP Viewer plug-in for Windows and also print the file.

This example assumes that the administrator set up the printer definition in the Printer Inventory:

- The IP PrintWay printer definition is named `deptmail`.
- The email protocol is selected and the recipient email address list or a sendmail alias name is specified in the printer definition.
- No transform is specified for the AFP data format.
- IP PrintWay basic mode: The **none** formatting option is selected.

```
//PWAYJOBL JOB ...
//ACIF     EXEC PGM=APKACIF,PARM='PARMDD=PARMS'
//SYSPRINT DD   SYSOUT=*
//INPUT    DD   DSNAME=MYFILE.AFP,DISP=SHR
//OUTPUT   DD   DUMMY
//RESOBJ   DD   DSNAME=&&RESLIB,DISP=(,PASS),
//         SPACE=(CYL,(5,5),RLSE),
//         UNIT=3390,VOL=SER=USR003,
//         DCB=(LRECL=12284,BLKSIZE=12288,RECFM=VBM)
//PARMS    DD   *
 INDEXOBJ = NONE          /* Do not create INDEX output */
 RESTYPE  = ALL           /* Collect all resource types */
 CCTYPE   = M             /* Carriage control type      */
 MCF2REF  = CF            /* Collect coded fonts        */
 FONTLIB  = SYS1.FONT300, /* Font libraries             */
           SYS1.SFNTILIB
 USERLIB  = MY.USERLIB    /* Other user resources       */
 FDEFLIB  = SYS1.FDEFLIB  /* Form definition library    */
 FORMDEF  = F1MYFDEF      /* Form definition to use     */
/*
//IEBGENER EXEC  PGM=IEBGENER,COND=(0,NE)
//SYSPRINT DD    SYSOUT=*
//SYSIN    DD    DUMMY
//OUTDS    OUTPUT CLASS=P,TITLE='Monthly Report',
//         FSSDATA='printer=deptmail',MAILFILE='January Report'
//SYSUT1   DD    DSNAME=*.ACIF.RESOBJ,DISP=(OLD,DELETE)
//         DD    DSNAME=MYFILE.AFP,DISP=SHR
//SYSUT2   DD    SYSOUT=(,),OUTPUT=(*.OUTDS)
```

Results: The recipients that are listed in the printer definition `deptmail` receive an email:

1. The sender of the email is the user ID who submitted the job. For example, USER1@DOMAIN1.
2. The subject of the email is `Monthly Report`.
3. The email attachment is named `January Report.afp` and is in AFP format with all AFP resources inline. The attachment can be viewed with the AFP Viewer plug-in for Windows.

Print line or AFP data on a PostScript or PCL printer with IP PrintWay extended mode

These examples show how to print line data and AFP data on a PostScript or PCL printer. These examples assume that your administrator configured the printer definition in the Printer Inventory to use the AFP to PostScript or AFP to PCL transform. Because the AFP to PCL and AFP to PostScript transforms use the same JCL parameters as PSF uses, you can specify the same JCL parameters as you do when you print on an AFP printer.

1. In this example, AFP output is sent to a PostScript printer.

```
//TRJOB1 JOB …
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,DEST=PS1
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

2. In this example, an AFP job is sent to a PCL printer. It is printed with a user-defined form definition F1MYDEF, which is in the user library MYLIB.

```
//TRJOB2 JOB …
//STEP1    EXEC PGM=USERA
```

```
//OUTDS1   OUTPUT CLASS=P,FORMDEF=MYDEF,USERLIB=MYLIB,FSSDATA='printer=pcl1'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS1)
```

Print line or AFP data on a PostScript or PCL printer with the IP PrintWay basic mode resubmit for filtering function

These examples show how to print line data and AFP data on a PostScript or PCL printer. These examples assume that your administrator configured the printer definition in the Printer Inventory to use the AFP to PostScript or AFP to PCL transform and also selected the **Resubmit for filtering** option. Because the AFP to PCL and AFP to PostScript transforms use the same JCL parameters as PSF uses, you can specify the same JCL parameters as you do when you print on an AFP printer.

In these examples, the DSNAME parameter specifies a data set name. The last qualifier of the fully qualified data set name on the JES spool is MYFILE. Because the **Resubmit for filtering** option is selected in the printer definition, Infoprint Server dynamically allocates a second output data set on the JES spool during processing. The last qualifier of this data set's fully qualified name is also MYFILE.

1. In this example, AFP output is sent to a PostScript printer.

```
//TRJOB1 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,DEST=PS1
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS),DSNAME=&&MYFILE
```

2. In this example, an AFP job is sent to a PCL printer. It is printed with a user-defined form definition F1MYDEF, which is in the user library MYLIB.

```
//TRJOB2 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS1   OUTPUT CLASS=P,FORMDEF=MYDEF,USERLIB=MYLIB,FSSDATA='printer=pcl1'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS1),DSNAME=&&MYFILE
```

Print line or AFP data on a PostScript printer with the Print Interface subsystem

These examples show how to print line data and AFP data on a PostScript printer. These examples assume that your administrator created two IP PrintWay printer definitions that are named `mypsprinter` and `anypsprinter` in the Infoprint Server Printer Inventory:

- The AFP to PostScript transform is specified in both printer definitions.
- Class P is specified in both printer definitions. Therefore, CLASS=P is not specified on the OUTPUT JCL statement in these examples.
- Printer definition `mypsprinter` contains the printer's IP address and print queue name.
- Printer definition `anypsprinter` specifies the LPR transmission protocol, but does not specify your printer's IP address and print queue name. Example 3 shows how to specify your printer's IP address and print queue name on the OUTPUT JCL statement.

1. In this example, the Print Interface subsystem that is named AOP1 transforms the data in two data sets to PostScript format and writes the PostScript data to two output data sets on the JES spool. The last qualifiers of the data sets names are DATA1 and DATA2. The subsystem uses options that are specified in `mypsprinter`. IP PrintWay then prints both data sets on the printer whose address is specified in `mypsprinter`.

```
//SSJOB1 JOB ...
//STEP1  EXEC PGM=USERA
//DD1    DD SUBSYS=(AOP1,'mypsprinter'),DSNAME=&&DATA1
//DD2    DD SUBSYS=(AOP1,'mypsprinter'),DSNAME=&&DATA2
```

2. In this example, the Print Interface subsystem that is named AOP1 transforms the data to PostScript format and writes the PostScript data to an output data set on the JES spool. The subsystem uses options that are specified in `mypsprinter`. However, it uses form definition F1MYDEF in library MYLIB

to transform the data. IP PrintWay then prints the data on the printer whose address is specified in `mypsprinter`.

```
//SSJOB2 JOB ...
//STEP1  EXEC PGM=USERA
//OUTDS1 OUTPUT FORMDEF=MYDEF,USERLIB=MYLIB
//DD1    DD SUBSYS=(AOP1,'mypsprinter'),OUTPUT=(*.OUTDS1)
```

3. In this example, the Print Interface subsystem that is named AOP1 transforms the data to PostScript format and writes the PostScript data to an output data set on the JES spool. The subsystem uses options that are specified in `anypsprinter`. IP PrintWay then prints the data to queue RAW on the printer with IP address 99.153.123.232.

```
//SSJOB3 JOB ...
//STEP1  EXEC PGM=USERA
//OUTDS1 OUTPUT DEST='IP:99.153.123.232',PRTQUEUE='RAW'
//DD1    DD SUBSYS=(AOP1,'anypsprinter'),OUTPUT=(*.OUTDS1)
```

Print PostScript, PCL, or PDF data on an AFP printer with the Print Interface subsystem

These examples show how to print PostScript, PCL, and PDF data on an AFP printer that PSF controls. These examples assume that your administrator created two PSF printer definitions that are named `myafpprinter` and `anyafpprinter` in the Infoprint Server Printer Inventory:

- The PostScript to AFP, PCL to AFP, and PDF to AFP transforms are specified in both printer definitions. The **%filter-options** transform option is also specified to allow job submitters to specify transform options as shown in example 2.
- Printer definition `myafpprinter` specifies the class and destination name of the PSF-controlled printer. (CLASS and DEST are JES work-selection parameters that are typically used to direct output from the JES spool to a PSF-controlled printer.)
- Printer definition `anyafpprinter` does not specify the CLASS and DEST values for your PSF-controlled printer. Example 3 shows how to specify your printer's CLASS and DEST work-selection values on the OUTPUT JCL statement.

1. In this example, the Print Interface subsystem that is named AOP1 transforms the data to AFP format and writes the AFP data to output data sets on the JES spool. The last qualifiers of the data sets names are DATA1 and DATA2. The subsystem uses options that are specified in printer definition `myafpprinter`. PSF then prints the data sets on the AFP printer whose CLASS and DEST values match those values that are specified in `myafpprinter`.

```
//SSJOB4 JOB ...
//STEP1  EXEC PGM=USERA
//DD1    DD SUBSYS=(AOP1,'myafpprinter'),DSNAME=&&DATA1
//DD2    DD SUBSYS=(AOP1,'myafpprinter'),DSNAME=&&DATA2
```

2. In this example, the Print Interface subsystem that is named AOP1 transforms the data to AFP format and writes the AFP data to an output data set on the JES spool. The subsystem uses options that are specified in printer definition `myafpprinter`. Because the **filter-options** attribute is specified in the SUBSYS parameter, it writes only the first 10 pages of the transformed data to the output data set. PSF then prints the data set on the AFP printer whose CLASS and DEST values match those values that are specified in `myafpprinter`. PSF uses form definition F1MYDEF, which is in library MYLIB, to format the AFP data.

```
//SSJOB5 JOB ...
//STEP1  EXEC PGM=USERA
//OUTDS1 OUTPUT FORMDEF=MYDEF,USERLIB=MYLIB
//DD1    DD SUBSYS=(AOP1,'myafpprinter',
//         'filter-options="-p 1-10"'),
//         OUTPUT=(*.OUTDS1)
```

3. In this example, the Print Interface subsystem that is named AOP1 transforms the data to AFP format and writes the AFP data to an output data set on the JES spool. The subsystem uses options that are specified in printer definition `anyafpprinter`. The subsystem allocates the output data set with

CLASS=F and DEST=PRT003. PSF then prints the data set on the AFP printer that processes data sets with CLASS=F and DEST=PRT003.

```
//SSJOB6 JOB ...
//STEP1  EXEC PGM=USERA
//OUTDS1 OUTPUT CLASS=F,DEST=PRT003
//DD1    DD SUBSYS=(AOP1,'anyafpprinter'),OUTPUT=(*.OUTDS1)
```

Print GIF, JPEG, or TIFF data on an AFP printer with the Print Interface subsystem

This example shows how to print GIF, JPEG, or TIFF data on an AFP printer that PSF controls. This example assumes that your administrator created a PSF printer definition that is named `myafpprinter` in the Infoprint Server Printer Inventory and that you are using InfoPrint Transform Manager for Linux (the administrator specified the remote transform filter **aoprxf.so** in the printer definition).

The Print Interface subsystem that is named AOP1 transforms the data to AFP format and writes the AFP data to an output data set on the JES spool. The subsystem uses options that are specified in printer definition `myafpprinter`. PSF then prints the data set on the AFP printer whose values match those values that are specified in `myafpprinter`. PSF uses form definition F1MYDEF, which is in library MYLIB, to format the AFP data.

```
//SSJOB7   JOB ...
//STEP2    EXEC PGM=USERA
//OUTDS1   OUTPUT FORMDEF=MYDEF,USERLIB=MYLIB
//DD1      DD SUBSYS=(AOP1,'myafpprinter'),
//         OUTPUT=(*.OUTDS1)
```

Chapter 5. Printing with the AOPPRINT JCL procedure

The AOPPRINT Job Control Language procedure, provided in SYS1.PROCLIB, is used to submit print requests from z/OS. You can use this procedure to take advantage of all the features of Infoprint Server:

- You can specify job attributes.
- If a transform product is installed, you can automatically transform jobs from one data format to another.
- Infoprint Server validates that data can print on the selected printer.

Tips:

1. Your administrator can customize the AOPPRINT procedure. For information, see *z/OS Infoprint Server Customization*.
2. For information about the JOB, EXEC, DD, and IF/THEN/ELSE/ENDIF JCL statements, see *z/OS MVS JCL Reference*.

Sending a file to an email destination

With the AOPPRINT procedure, you can send the file to an email destination instead of to a printer. You can specify the email addresses of the primary and secondary recipients in one of these ways:

- Your administrator can specify the email address list for the recipients in the printer definition in the Printer Inventory.
- You can specify the email addresses for the recipients with these job attributes:

  mail-bcc-addresses
  > Blind copy (bcc) recipients of an email. A *bcc* means that other recipients of the email do not see the bcc recipient listed.

  mail-cc-addresses
  > Copy (cc) recipients of an email. A *cc* means that other recipients of the email can see the cc recipient listed.

  mail-to-addresses
  > Primary recipients of an email.

- You can specify the email addresses for the recipients in an email header. For information, see Chapter 11, "Creating an email header," on page 165.

You can use an alias file that is defined to the sendmail bridge. The alias file lists one or more email addresses. For information, see "Using the email address list in an alias file" on page 88. Your administrator can specify the name of the alias file in the printer definition, or you can specify it in a job attribute.

The email has these characteristics:

- If the file contains text or line data, it can be included in an email attachment or inline in the body of the email. If the file contains data in another format (for example, PDF), the data is included in an attachment. To include text or line data inline, specify the **mail-inline-text** job attribute. Or, the administrator can select the **Inline text and line data** field in the printer definition.
- The name of the attachment is the name that is specified in one of these:

  IP PrintWay extended mode

  1. The **mail-file-name** job attribute
  2. DD:SYSIN

IP PrintWay basic mode

1. The **mail-file-name** job attribute
2. The **sysout-dataset-name** job attribute
3. DD:SYSIN

The attachment name contains a suffix that indicates the type of data in the file. For example, `txt` indicates text format and `pdf` indicates PDF format.

- The subject of the email is the subject in the email header, the value in the **title-text** job attribute, or the default title that your administrator specified in the Allocation section of the printer definition. If none is specified, the user ID of the user who ran the job is used.

- The sender is the user ID of the user who ran the job at the domain name of the z/OS system. You can add a descriptive name or other identifier of the sender in the **mail-from-name** job attribute.

- You can receive replies from the email unless you are a TSO or z/OS UNIX System Services user. You can specify the email address that recipients of an email can reply to in the **mail-reply-address** job attribute. If none is specified, the value in the printer definition is used.

AOPPRINT parameters

```
ERRCLASS=class
OPTIONS='attribute=value'...
OUTCLASS=class
PRINTER=printer_definition_name
```

Figure 12. AOPPRINT JCL parameters: format

ERRCLASS=*class*
Specifies the 1 character alphanumeric name of the system output data set (sysout) class for error messages. The name of the data set where error messages are written is specified by the STDERR data definition name (DDname).

Default: Infoprint Server uses the class that is specified by your administrator.

OPTIONS='*attribute=value* ...'
Specifies job attributes and values to use in processing the job. For descriptions of all job attributes, see "Job attribute listing" on page 48. Enter the attribute names in lowercase. Separate attributes with a space.

Using an attributes file: You can store attributes and values in a UNIX file (for example, a zFS file) or in an MVS data set. Use the attribute that is called **attributes** to specify the file or DD name from which attributes are to be read, as in this example:

```
OPTIONS='attributes=bigjob.att'
OPTIONS='attributes=//DD:MYATTR'
```

For information about how to create an attributes file, see "Creating an attributes file" on page 47.

OUTCLASS=*class*
Specifies the 1 character alphanumeric name of the sysout class for informational messages. The name of the data set where informational messages are written is specified by the STDOUT DDname.

Default: Infoprint Server uses the class that is specified by your administrator.

PRINTER=*printer_definition_name*
Specifies the name of a printer definition that is created by your administrator. The printer definition identifies a printer or an email destination and sets default values for transform options and for some

job attributes. The name of the printer definition is case-sensitive. Enter it exactly as your administrator tells you.

Default: Infoprint Server uses the default printer definition that is specified by your administrator.

AOPPRINT DD statements

The AOPPRINT JCL procedure is used to specify these DD statements (notice that you cannot specify an OUTPUT statement; if you specify one, it is ignored):

STDERR
Specifies the system output data set where error messages are to be written. The ERRCLASS parameter defines the class of this data set.

STDOUT
Specifies the system output data set where informational messages are to be written. The OUTCLASS parameter defines the class of this data set.

SYSIN
Specifies the data set to be printed. You can concatenate data sets that have the same data format; for example, line data or AFP data. However, you cannot concatenate data sets that contain PDF data.

AOPPRINT results

After Infoprint Server accepts the print job, AOPPRINT returns an Infoprint Server job ID, which you can use to query and cancel the job. The Infoprint Server job ID is returned in a message in the STDOUT data set. For example:

```
AOP007I Job 14584 successfully spooled to myprinter.
```

The SYSOUT data set that AOPPRINT procedure creates has the same job name and job ID as the job that ran the AOPPRINT procedure.

The Infoprint Server job ID is different from the z/OS job ID, which is a unique job ID that z/OS assigns to the data set. JES operator commands use the z/OS job ID.

AOPPRINT examples

These examples show how to use the AOPPRINT JCL procedure:

Print a file on the default printer

This example shows how to submit the data set `FILE1.LISTPS` to your default printer:

```
//JOB1   JOB  707,JONES
//PRINT  EXEC AOPPRINT
//SYSIN  DD   DSNAME=FILE1.LISTPS,DISP=SHR
```

Print a file on a specified printer

This example shows how to submit the data set `FILE1.LISTPS` to the printer `fred`:

```
//JOB2     JOB  D31,'H. EVANS'
//PRINTPS  EXEC AOPPRINT,PRINTER='fred'
//SYSIN    DD   DSNAME=FILE1.LISTPS,DISP=SHR
```

Print multiple copies of a data set

This example shows how to submit a data set to the default printer and specify two copies of the job:

```
//JOB3    JOB  ,'MARTHA'
//PRINT2  EXEC AOPPRINT,OPTIONS='copies=2'
//SYSIN   DD   DSNAME=MYJOB.PDF,DISP=SHR
```

Tip: Some IPP-enabled printers do not support printing more than one copy. In this case, only one copy prints.

Submit and hold a job

This example shows how to submit the data set FILE1.LISTPS to Printer1 and to hold it so that it does not print until the operator releases it:

```
//JOB5    JOB  (DIV1,GROUP7),OPERATOR
//PRHOLD  EXEC AOPPRINT,PRINTER='Printer1',OPTIONS='hold=true'
//SYSIN   DD   DSNAME=FILE1.LISTPS,DISP=SHR
```

Specify a code page for ASCII jobs

This example shows how to print the data sets JAN.REPORT and FEB.REPORT on the default printer and to specify the code page ISO8859-1:

```
//JOB6   JOB  (DIV1,GROUP7),'ANNE BROWN'
//PRINT  EXEC AOPPRINT,OPTIONS='document-codepage=ISO8859-1'
//SYSIN  DD   DSNAME=JAN.REPORT,DISP=SHR
//       DD   DSNAME=FEB.REPORT,DISP=SHR
```

Print with error processing

This example shows how to print the data set BIGJOB.PCL on Printer1, writing error messages to the data set BIGJOB.ERR. This example calls one program if the job succeeds, or a different program if it fails.

```
//JOB8      JOB  ,'MARTHA'
//PRINTERR  EXEC AOPPRINT,PRINTER='Printer1'
//SYSIN     DD   DSNAME=BIGJOB.PCL,DISP=SHR
//STDERR    DD   DSNAME=BIGJOB.ERR,DISP=(NEW,CATLG,DELETE)
//*
//          IF   PRINT.LP.RC ¬= 0 THEN
//FAIL      EXEC PGM=BADJOB
//          ELSE
//SUCCEED   EXEC PGM=GOODJOB
//          ENDIF
```

Print in-stream data

This example shows how to print data from the JCL input stream:

```
//JOB9   JOB  D10,CHARLIE
//HELLO  EXEC AOPPRINT
//SYSIN  DD   *
       Hello, world!
/*
```

Send a file to an email destination

This example shows how to send a file to an email destination and assumes that:

- The administrator set up a printer definition mail in the Printer Inventory.
- The email protocol is selected and an email address is specified in the printer definition mail for the primary recipient. However, the email address that you specify in the **mail-to-addresses** job attribute overrides the email address in the printer definition.

- A form definition is to be used when the AFP file is transformed to PDF format.
- The AFP to PDF transform is specified in printer definition `mail`.
- AFP resources libraries are specified either in the printer definition or in the transform configuration file, `aopxfd.conf`. If the AFP resource libraries are not specified elsewhere, specify the libraries in the **resource-library** job attribute.

```
//JOBA     JOB  D31,'H. EVANS'
//EMAIL    EXEC AOPPRINT,PRINTER='mail',
//    OPTIONS='attributes=//DD:MYATTR'
//SYSIN    DD   DSNAME=FILE1.AFP,DISP=SHR
//MYATTR   DD   *
mail-to-addresses={'user1@xyz.com'}
mail-cc-addresses={'user2@xyz.com'}
mail-bcc-addresses={'user3@xyz.com'}
mail-from-name="John Q. Sender"
mail-reply-address='secretary@xyz.com'
mail-file-name="January report"
title-text="Monthly Report"
form-definition=F1MYDEF
/*
```

Rules: In this example, the EXEC statement continues on a second line because a single line would be longer than 71 characters. When you continue a JCL statement, observe these rules:

1. Break after a complete parameter or subparameter, at or before column 71. A comma belongs with the preceding parameter or subparameter.
2. Code // in columns 1 and 2 of the continuation line.
3. Leave column 3 of the continuation line blank.
4. Continue the interrupted parameter or field, starting in any column 4 - 16.

Results:

1. The recipient of the email is `user1@xyz.com`.
2. The copy (cc) recipient of the email is `user2@xyz.com`. A *cc* means that other recipients of the email can see the cc recipient listed.
3. The blind copy (bcc) recipient of the email is `user3@xyz.com`. A *bcc* means that other recipients of the email do not see the bcc recipient listed.
4. The sender of the email is `John Q. Sender<JOHN@SYSTEM1>`. JOHN is the user ID of the user who ran the job, and SYSTEM1 is the system where the sendmail bridge is running.
5. The email address that recipients of an email can reply to is `secretary@xyz.com`.
6. File `FILE1.AFP` is attached to the email. The name of the attachment is `January report.pdf`. The file is in PDF format because the AFP to PDF transform is specified in the printer definition. The file can be viewed and printed with a PDF viewer such as Adobe Acrobat Reader.
7. The subject of the email is `Monthly Report`.

AOPPRINT exit values

0
    Infoprint Server accepted the request.

>0
    An error occurred.

Chapter 6. Transforming data with the AOPBATCH program

The AOPBATCH program is used to submit a batch job to transform data to and from the Advanced Function Presentation data format by using separate transform products. Infoprint Server provides the AOPBATCH program in SYS1.LINKLIB.

For information about the transform products that work with Infoprint Server, see *z/OS Infoprint Server Introduction*.

AOPBATCH parameters

The AOPBATCH parameters are the name of the transform command, followed by transform options and arguments, in this format:

```
EXEC PGM=AOPBATCH,PARM='/transform_name transform_options'
```

/
> The optional slash indicates that the PARM data that follows is input to AOPBATCH. If you omit the initial slash, your PARM data might be interpreted as C++ runtime options. You must include the initial slash if any of the PARM data itself includes a slash. For example, if the transform name is /mylib/ps2afp, specify: PARM='//mylib/ps2afp ...'.

transform_name
> The name of an executable transform program that is in a UNIX file. The name of the transform program is case-sensitive.
>
> For example: **afpxpcl, pdfxafp, remotexf**.
>
> If the transform program is not in one of the directories that are specified in the PATH environment variable, also specify the path name. You can use the STDENV DD statement to set the PATH environment variable if the default value set by AOPBATCH is not suitable. For information about the defaults set for environment variables, see <u>"AOPBATCH DD statements" on page 134</u>.

transform_options
> Options and arguments that are accepted by the transform.
>
> You must specify the transform input data set or file as a transform argument, and you must specify the **-o** transform option to identify where you want the transform to write its output. (This is because the transform cannot write its output to standard output and cannot read input from standard input.) To identify the transform input and output data set or file, you can specify either a DD statement name or a data set or file name. You must specify a DD statement name if you want to write the transform output to an MVS data set that does not exist.
>
> Specify the names of DD statements to the transform in this format:
>
> ```
>   //DD:DDname
> ```
>
> The name of the DD statement is *DDname*.
>
> When you specify an MVS data set name in the **-o** option, code two slashes before the data set name and enclose the data set name in two sets of single quotation marks if you specify a fully qualified data set name. If you do not enclose the data set name in quotation marks, a high-level qualifier is added to the name you specify:
>
> - If you are running under TSO (batch or interactive), the TSO user prefix is appended.
> - If you are running under MVS batch or IMS (batch or online), the RACF user ID is appended.
> - If your system does not use RACF, a high-level qualifier is not added.

For examples of different ways to specify transform input and output data sets and files, see .

AOPBATCH DD statements

The AOPBATCH JCL procedure accepts these standard DD statements:

STDENV
Specifies environment variables for use by the transform. You can specify the environment variables in-stream in the STDENV DD statement, in an MVS data set, or in a UNIX file. Specify the environment variables in the format *variable=value*, with one environment variable per line or record. Sequence numbers in columns 73 - 80 in data that is specified with the STDENV DD statement are ignored and not treated as part of the data.

If you omit the STDENV DD statement or do not specify one of the environment variables, AOPBATCH sets these default values, which are suitable for running Infoprint Server programs if your installation installed Infoprint Server files in the default directories:

```
PATH=/usr/lpp/Printsrv/bin:/bin:/usr/bin
LIBPATH=/usr/lpp/Printsrv/lib:/lib:/usr/lib
NLSPATH=/usr/lpp/Printsrv/%L/%N:/usr/lpp/Printsrv/En_US/%N:/usr/lib/nls/msg/%L/%N
```

AOPBATCH also sets the HOME environment variable to the user's home directory and sets the LOGIN variable to the user ID.

Tip: The **lp** command and some transform commands return MVS return codes (0, 4, 8) instead of UNIX exit values (0, 1) when you set the AOP_MVS_RETURN_CODES=YES environment variable.

Note: Do not specify the _BPX_SHAREAS environment variable. AOPBATCH sets it.

STDERR
Specifies the system output data set where error messages are to be written. The data set can be an MVS data set or a UNIX file. The transforms from AFP (AFP to PCL, AFP to PDF, and AFP to PostScript) do not write messages that are related to errors in the input data stream in this data set. Instead, the transforms write these messages at the end of the output document.

STDOUT
Specifies the system output data set where informational messages are to be written. The data set can be an MVS data set or a UNIX file.

You can also include DD statements to specify MVS data sets that contain input data to be transformed, the transformed output, or job attributes that are input to the transform. Do not use DD names STDIN, STDOUT, or STDERR to specify the transform input and output data sets. Instead, use other DD names, such as INPUT and OUTPUT, which are used in the examples.

Rules:

1. If the output data set is an MVS data set, these requirements apply:

   a. You must either allocate and catalog the data set before you run AOPBATCH, or include a DD statement in the AOPBATCH job to allocate the data set.

   b. The MVS output data set must be large enough to hold the output data stream. The size of the output data stream depends on the complexity of the document and the type of the image compression. Typically, an output AFP data stream is several times as large as the input data stream.

   c. If the output data set is to contain an AFP data stream, allocate a data set with these characteristics:

      • Record format: VBM

      • Record length: 8017 bytes or larger

      Notes:

1) For InfoPrint Transform Manager for Linux, if you do not use the **-pragma afpdsrecordlength** option, allocate the data set with a record length that is at least 32017 bytes. By default, the transforms to AFP create AFP records that are 32000 bytes. To request that the transforms create AFP records that are a smaller maximum length, you can use the **-pragma afpdsrecordlength** option. Valid values for the option are 8000 - 32000. The default is 32000. For example, to set the maximum number of bytes in a record to 8000, specify:

```
-j "filter-options='-pragma afpdsrecordlength=8000'"
```

2) For the Infoprint Transforms to AFP for z/OS, allocate the data set with a record length that is at least 17 bytes larger than the record length specified in the AOP_RECLEN environment variable. AOP_RECLEN is specified in units of kilobytes. Valid values are 8 - 32. The default is 8.

d. If the output data set is to contain a PCL, PDF, or PostScript data stream, allocate a data set with these characteristics:

- Record format: VB
- Record length: 1024 or larger is suggested

e. Specify a disposition of SHR or OLD if you want the transform to overwrite any existing data. Otherwise, specify a disposition of MOD to append the output to any existing data. If you do not specify any disposition, the transform overwrites any existing data.

2. If you did not add the Language Environment® runtime libraries (CEE.SCEERUN and CEE.SCEERUN2) and the C++ runtime library (CBC.SCLBDLL) to the system LNKLST, specify these data sets in a STEPLIB DD statement.

3. You can concatenate input data sets that have the same data format; for example, PostScript data or AFP data. However, you cannot concatenate data sets that contain PDF data.

AOPBATCH examples

These examples show how to use the AOPBATCH procedure to transform data.

Specify transform input and output in MVS data sets, and specify environment variables

This example shows how to transform data when the transform input is in an MVS data set and transform output is written to an MVS data set. The PostScript to AFP transform reads PostScript input from data set HLQ.INPUT.PS and writes AFP output to data set HLQ.OUTPUT.AFP. HLQ represents the high-level qualifier; for example, your TSO or RACF user ID.

This example also shows how to specify environment variables in-stream in the STDENV DD statement. If you installed Infoprint Server and created Infoprint Server configuration files in default directories, you do not need to specify these environment variables and you can omit the STDENV DD statement.

```
//AOPBATCH JOB  ...
//TRANSFRM EXEC PGM=AOPBATCH,PARM='/ps2afp -o //DD:OUTPUT //DD:INPUT'
//INPUT    DD   DSN=HLQ.INPUT.PS,DISP=SHR
//OUTPUT   DD   DSN=HLQ.OUTPUT.AFP,DISP=(NEW,CATLG,DELETE),
//              DCB=(RECFM=VBM,LRECL=32756,BLKSIZE=32760),
//              SPACE=(CYL,(1,1))
//STDOUT   DD   SYSOUT=*
//STDERR   DD   SYSOUT=*
//STDENV   DD   *
PATH=/usr/lpp/Printsrv/bin:/bin:/usr/bin
LIBPATH=/usr/lpp/Printsrv/lib:/lib:/usr/lib
NLSPATH=/usr/lpp/Printsrv/En_US/%N:/usr/lib/nls/msg/En_US/%N
AOPCONF=/etc/Printsrv/aopd.conf
/*
```

Specify transform input in a UNIX file and output in an MVS data set

This example shows how to transform data when the transform input is in a UNIX file and transform output is written to an MVS data set. The PDF to AFP transform reads the PDF input from file `/tmp/input.pdf` and writes AFP output to HLQ.OUTPUT.AFP.

```
//AOPBATCH JOB  ...
//TRANSFRM EXEC PGM=AOPBATCH,PARM='/pdf2afp -o //DD:OUTPUT /tmp/input.pdf'
//OUTPUT   DD   DSN=HLQ.OUTPUT.AFP,DISP=(NEW,CATLG,DELETE),
// DCB=(RECFM=VBM,LRECL=32756,BLKSIZE=32760),SPACE=(CYL,(1,1))
//STDOUT   DD   SYSOUT=*
//STDERR   DD   SYSOUT=*
```

Specify transform input in an MVS data set and output in a UNIX file

This example shows how to transform data when the transform input is in an MVS data set and transform output is written to a UNIX file. The AFP to PDF transform reads the AFP input from data set HLQ.INPUT.AFP and writes PDF output to file `/tmp/output.pdf`.

Note: This example uses the **afpxpdf** command, which IBM Print Transform from AFP to PDF for Infoprint Server for z/OS provides.

```
//AOPBATCH JOB  ...
//TRANSFRM EXEC PGM=AOPBATCH,
// PARM='/afpxpdf -o /tmp/output.pdf "//''HLQ.INPUT.AFP''"'
//STDOUT   DD   SYSOUT=*
//STDERR   DD   SYSOUT=*
```

Transform and print data sets

This example shows how to transform data and print the output from the transform in a subsequent step.

In the first step, the PostScript to AFP transform reads PostScript input from MVS data set HLQ.INPUT.PS and writes AFP output to MVS data set HLQ.OUTPUT.AFP, where HLQ represents the high-level qualifier; for example, your TSO or RACF user ID.

In the second step, the AOPPRINT JCL procedure is used to print the output from the transform to the printer named `myprinter`, which is defined in the Printer Inventory. For more information about AOPPRINT, see Chapter 5, "Printing with the AOPPRINT JCL procedure," on page 127.

```
//AOPBATCH JOB  ...
//TRANSFRM EXEC PGM=AOPBATCH,PARM='/ps2afp -o //DD:OUTPUT //DD:INPUT'
//INPUT    DD   DSN=HLQ.INPUT.PS,DISP=SHR
//OUTPUT   DD   DSN=HLQ.OUTPUT.AFP,DISP=(NEW,CATLG,DELETE),
//              DCB=(RECFM=VBM,LRECL=32756,BLKSIZE=32760),
//              SPACE=(CYL,(1,1))
//STDOUT   DD   SYSOUT=*
//STDERR   DD   SYSOUT=*
//PRINT    EXEC AOPPRINT,PRINTER='myprinter'
//SYSIN    DD   DSN=HLQ.OUTPUT.AFP,DISP=SHR
```

Transform data remotely with InfoPrint Transform Manager for Linux

This example shows how to transform data to AFP format remotely with an InfoPrint Transform Manager for Linux transform. The example specifies the **remotexf** command, which automatically detects the format of the input file and uses the appropriate transform for that data format. Infoprint Server reads the input from the specified file (`/tmp/input`) and writes AFP output to HLQ.OUTPUT.AFP.

This example also shows how to specify InfoPrint Transform Manager job attributes with the **-j** option, and transform attributes with the **xf-options** job attribute. The attributes specify:

- The input file is transformed into an AFP data stream in 300-pel resolution.
- Data stream error messages are not included on the trailer error page.
- The output is created only if it does not have data stream errors.

This example also shows how to specify environment variables in-stream in the STDENV DD statement. If you installed Infoprint Server and created Infoprint Server configuration files in default directories, you do not need to specify these environment variables and you can omit the STDENV DD statement.

```
//AOPBATCH JOB ...
//TRANSFRM EXEC PGM=AOPBATCH,
//         PARM='/remotexf -j attr=//DD:ATTRS -o //DD:OUTPUT /tmp/input
//         .pcl'
//OUTPUT   DD   DSN=HLQ.OUTPUT.AFP,DISP=(NEW,CATLG,DELETE),
//              DCB=(RECFM=VBM,LRECL=32756,BLKSIZE=32760),
//              SPACE=(CYL,(1,1))
//ATTRS    DD   *
filter-options="-r 300"
xf-options="trailer-error-page=no fail-on-datastream-error=yes"
/*
//STDOUT   DD   SYSOUT=*
//STDERR   DD   SYSOUT=*
//STDENV   DD   *
PATH=/usr/lpp/Printsrv/bin:/bin:/usr/local/bin
LIBPATH=/usr/lpp/Printsrv/lib:/lib:/usr/lib
NLSPATH=/usr/lpp/Printsrv/En_US/%N:/usr/lib/nls/msg/En_US/%N
AOPCONF=/etc/Printsrv/aopd.conf
AOPRXF_CONF=/etc/Printsrv/aoprxf.conf
/*
```

Transform and print data sets only if the transform is successful

This example shows how to transform data to AFP format and print the output only if no warnings or errors occur during the transform. IBM Infoprint Transforms to AFP is required.

In the first step, the PostScript to AFP transform reads PostScript input from data set HLQ.INPUT.PS and writes AFP output to data set HLQ.OUTPUT.AFP, where HLQ represents the high-level qualifier; for example, your TSO or RACF user ID.

The STDENV data set specifies the AOP_MVS_RETURN_CODES environment variable. Because this variable is set to YES, the transform returns MVS return codes: 0 (successful), 4 (warning), 8 (failure).

In the second step, the AOPPRINT JCL procedure prints the AFP output to the printer named `mypsfprinter`, which is defined in the Printer Inventory. This step runs only if the return code from the transform step is less than 4.

```
//AOPBATCH JOB  ...
//TRANSFRM EXEC PGM=AOPBATCH,PARM='/ps2afp -o //DD:OUTPUT //DD:INPUT'
//INPUT    DD   DSN=HLQ.INPUT.PS,DISP=SHR
//OUTPUT   DD   DSN=HLQ.OUTPUT.AFP,DISP=(NEW,CATLG,DELETE),
// DCB=(RECFM=VBM,LRECL=32756,BLKSIZE=32760),SPACE=(CYL,(1,1))
//STDOUT   DD   SYSOUT=*
//STDERR   DD   SYSOUT=*
//STDENV   DD   *
AOP_MVS_RETURN_CODES=YES
/*
//PRINT    EXEC AOPPRINT,PRINTER='mypsfprinter',
//  COND=(4,LT,TRANSFRM)
//SYSIN    DD   DSN=HLQ.OUTPUT.AFP,DISP=SHR
```

AOPBATCH exit values

AOPBATCH returns one of these values:

Value
> Meaning

1
> An error occurred while AOPBATCH was trying to write to the STDOUT DD.

2
> An error occurred while AOPBATCH was trying to write to the STDERR DD.

4

AOPBATCH cannot create the process.

nn

The exit value from the created process.

Some IBM transforms can return either MVS return codes (0, 4, 8) or UNIX exit values (0, 1) depending on the value of the AOP_MVS_RETURN_CODES environment variable.

Chapter 7. Printing from VTAM applications

The NetSpool component of Infoprint Server is used to print jobs from Virtual Telecommunications Access Method applications, such as Customer Information Control System (CICS) or Information Management System (IMS), without changing the applications. To use NetSpool effectively, you need to understand:

- The data streams that NetSpool supports, including transparent data
- Differences between printing with NetSpool and printing on Systems Network Architecture (SNA) printers
- End-of-file processing in NetSpool
- Page formatting in NetSpool
- Embedding job attributes in print data
- Email support

Data stream support

NetSpool accepts these types of VTAM data streams:

- SNA character string (SCS) data over a logical unit (LU) type 1 session.
- 3270 data over an LU type 3 or LU type 0 session.
- Any printable data. For this type of data, your administrator must select the NetSpool **None** formatting option in the Printer Inventory.

Table 16 on page 139 shows that NetSpool converts the input data stream into an output data stream, according to the type of NetSpool formatting and transform filter (optional) that the administrator selects in the printer definition in the Printer Inventory.

Table 16. NetSpool output data streams

If the administrator selects this formatting option:	With this transform filter (optional):	NetSpool creates:
Convert to line		EBCDIC variable-length records, each record starts with an American Standards Association (ASA) carriage-control character
Convert to line	AFP to PDF	A PDF data stream
Convert to line	AFP to PS	A PostScript data stream
Convert to PCL		An ASCII text data stream with embedded PCL commands
Convert to PCL	PCL to AFP	An AFP data stream
None		Variable-length records without converting or translating any controls or data

NetSpool uses default page-formatting values that are defined by the administrator if the SCS data stream does not contain Set Horizontal Format or Set Vertical Format commands.

The NetSpool Graphic Escape exit is used to replace Graphic Escape characters with other printable characters. For more information about the Graphic Escape exit (APIUGEX), see *z/OS Infoprint Server Customization*.

For more information about SCS and 3270 data streams, see:

- Appendix C, "NetSpool support for SCS code points," on page 177 describes the code points that NetSpool supports for the SCS data stream.
- Appendix D, "NetSpool support for 3270 data streams code points," on page 189 describes the code points that NetSpool supports for the 3270 data stream.
- *SNA--Sessions Between Logical Units* describes the SCS data stream.
- *3270 Information Display System Data Stream Programmer's Reference* describes the 3270 data stream.
- *IBM 3270 Kanji Data Streams* describes double-byte character set (DBCS) SCS and 3270 data streams.

Transparent data support (SCS data stream)

The Transparent (TRN) control in SCS data streams identifies the start of a transparent data stream. NetSpool supports transparent data by including TRN controls and transparent data in line data output. NetSpool increases the output column and line position by the number of bytes of transparent data, as specified in a TRN control.

NetSpool provides two installation exits that let the administrator customize the processing of transparent data for all or selected printer names:

- The Beginning of File exit (APIPPTD1) adds transparent data to the beginning of a data set.
- The Transparent Data Control exit (APIPPTD2) inspects, changes, or deletes transparent data whenever it occurs in the data stream.

Double-byte character set (DBCS) support

NetSpool supports DBCS data in both SCS and 3270 data streams when it converts data streams to line data. NetSpool does not support DBCS data when it converts data streams to PCL data.

In an SCS data stream, NetSpool supports these controls, which identify DBCS strings:

- Shift Out and Shift In controls
- Set Attribute controls, with the Character Set attribute

In a 3270 data stream, NetSpool supports these controls and orders, which identify DBCS strings:

- Shift Out and Shift In controls
- Set Attribute (SA) orders, with the Character Set attribute
- Start Field Extended (SFE) orders with the Character Set attribute
- Modify Field (MF) orders with the Character Set attribute

In place of these controls and orders, NetSpool inserts Shift Out and Shift In line-data controls where necessary in line data output.

Tip: To prevent unwanted blanks in DBCS output, specify the PRMODE=SOSI2 parameter on the OUTPUT JCL statement that NetSpool uses to allocate data sets for the printer name.

Binary data support

The administrator can create a printer definition that specifies that NetSpool treats input data as binary data. NetSpool writes binary data to the output data set, in variable length records, without examining or converting the data stream.

The administrator can specify the record size and record format (VB, VBA, or VBM) to use in outputting binary data to the spool.

NetSpool does not process TRN controls in binary data.

Data stream restrictions

For SCS data streams, NetSpool does not support these codes:

- Function Management (FM) headers

  NetSpool cannot handle FM headers because it does not expect FM data requests that it receives to be formatted. NetSpool rejects any request that contains an FM header with an SNA sense code of function error (X'10030000'), indicating an unsupported function.

- Some SCS commands.

  For more information, see Appendix C, "NetSpool support for SCS code points," on page 177.

For 3270 data streams, NetSpool supports only these codes:

- Orders in the basic function set, as described in *SNA--Sessions Between Logical Units*.
- Shift Out and Shift In controls.
- Set Attribute (SA), Set Field Extended (SFE), and Modify Field (MF) orders, with the Character Set attribute. NetSpool ignores other attributes of the SA, SFE, and MF orders. For more information, see Appendix D, "NetSpool support for 3270 data streams code points," on page 189.

NetSpool rejects other orders in a 3270 data stream with an SNA sense code of function error (X'10030000'), indicating an unsupported function. The Write Structured Fields (WSF) order is not included in the basic function set and therefore, is not supported.

NetSpool does not reject unsupported commands or orders in binary data.

Data encryption and compression

Encrypted or compressed data sent to NetSpool are decrypted and decompressed as they arrive at the z/OS system where NetSpool is running. The data remains decrypted and decompressed during processing and after placement on the job entry subsystem (JES) spool.

Differences from SNA network printing

You might notice differences in these areas when you are sending output from VTAM application programs to NetSpool instead of to an SNA network printer:

- Notification of printing

  When you send output to an SNA network printer, a positive response from the printer means that the data was printed successfully. However, when you send output to NetSpool, a positive response from NetSpool means only that NetSpool successfully created a JES output data set.

- Data set printing

  An SNA-network printer prints each VTAM print request separately. However, NetSpool combines several print requests into one output data set. In the printer definition for each printer in the Printer Inventory, the administrator can select the criteria that NetSpool uses when it combines print requests into one output data set.

- Deferred printing

  When you print output on an SNA network printer, each print request is printed immediately. However, JES or the system operator might defer the printing of data sets that NetSpool creates until system resources are available.

- Printer sharing

  Because an SNA network printer usually has a session limit of 1, your output is usually the only output that is printed on that printer. However, because JES supports printer sharing, data sets from other users might be printed on the same printer. An installation can print distribution information on the header pages to aid in distributing output.

End-of-file processing

Printing in a JES environment requires that NetSpool keep all related print data together in an output data set on the JES spool. This ensures that related print data is printed in the correct order and is not interleaved with other output.

For printing in the SNA network, the concept of a data set is not necessary. An application that starts a session with a printer gains exclusive control of that printer during the session. Therefore, data always prints in the correct order and is not interleaved with any other application's print output.

In contrast, when you print in a JES environment, the sending application is not guaranteed exclusive control of the printer. Between two successive data sets from one application, nothing prevents the printing of data sets from other applications. If the first attempt to print a data set fails, and a later retransmission succeeds, two successive data sets from the same application can be printed in reverse order. Therefore, to guarantee that data that belongs together gets printed in the correct order, without other data between sets, NetSpool batches that data into one data set.

Thus, for printing in a JES environment, NetSpool must determine where one data set ends and the next one begins. NetSpool receives print data from VTAM applications as a stream of request units (RUs). The SNA architecture defines two groupings of RUs that are of interest:

- A *chain* consists of one or more RUs.
- A *bracket* consists of all of the RUs in one or more related chains.

To help determine when end-of-file processing occurs, NetSpool provides these end-of-file rules for defining data sets:

- End-of-bracket (the default rule)
- End-of-session
- End-of-chain
- End-of-file indicated by a specified string of data in the file's last end-of-chain request
- End-of-file indicated by the expiration of a timer

The administrator can specify which end-of-file rule to use in the printer definition for each printer in the Printer Inventory. If NetSpool does not correctly determine the end of your data sets, ask the administrator to specify another end-of-file rule.

Page formatting for SCS data streams

In some cases, SCS data streams used in LU type 1 sessions depend on a page format that is preset for the SNA network printer. To simulate this page format, NetSpool lets the administrator specify page-formatting values in the Printer Inventory. The administrator can specify default values for line length, page length, margins, and tabs. If the administrator does not specify a default page-formatting value, NetSpool uses hardcoded default page-formatting values.

If the print data stream contains the SCS commands Set Horizontal Format (SHF) and Set Vertical Format (SVF), the page-formatting values in these commands take effect immediately and remain in effect for all subsequent print data sets on the same session. If no SHF or SVF command occurs in the print data stream, NetSpool uses the default page-formatting values. For more information about the SCS SHF and SVF commands, see Appendix C, "NetSpool support for SCS code points," on page 177.

The page-formatting values are:

MPP=_linelength_ **|** _80_
  Specifies the maximum presentation position, that is, the line length. Specify zero or any integer from 1 through 255, inclusive. Zero, the default, uses the device line length, which NetSpool implements as 80 columns.

LM=_leftmargin_ | **1**

Specifies where the left margin starts. Specify zero or any integer from 1 through MPP, inclusive. Zero, the default, uses the architectural default of column 1.

RM=_rightmargin_ | **0**

Specifies where the right margin starts. Specify zero or a number from the left margin (LM) to the line length (MPP), inclusive. Zero, the default, uses the architectural default of the MPP value.

HT=(_tab1,tab2 ... _**)** | **0**

Specifies positions of horizontal tabs. The first tab is always the same as the left margin (LM) value and does not need to be specified. Each tab can be zero or greater than or equal to LM, or less than RM. Zero, the default, is valid and ignored. The application data stream can add more tab stops but cannot remove default tab stops.

MPL=_pagelength_ | **1**

Specifies the number of the maximum presentation line, that is, the maximum number of lines to be printed on the page. Specify zero or any integer 1 - 255, inclusive. Zero, the default, uses the architectural default of 1 line.

TM=_topmargin_ | **1**

Specifies where the top margin (also channel 1) starts. The top margin is also used as the line number for Select Vertical Channel 1. Specify zero or any integer from 1 through the page length (MPL), inclusive. Zero, the default, uses the architectural default of line 1.

BM=_bottommargin_ | **0**

Specifies where the bottom margin starts. Specify zero or any integer from top margin (TM), which is also channel 1, to the page length (MPL), inclusive. Zero, the default, uses the architectural default of MPL. A bottom margin of 1 suppresses automatic form feed when the application spaces past the bottom margin.

VT=(_tab1,tab2, ..._**)** | **0**

Identifies the position of vertical tabs (also channels 2 - 12). The first tab is always the same as the top margin value (TM) and does not need to be specified. The first 11 vertical tabs are also used as the line numbers for Select Vertical Channel 2 - 12. Each tab must be either zero or greater than or equal to top margin (TM), which is also Channel 1, and less than or equal to the bottom margin (BM), inclusive. Zero, the default, is valid and ignored. The application data stream can add more tab stops but cannot remove default tab stops.

If the default page-formatting values are not appropriate for all target printers, the administrator must define appropriate values in one or more printer definitions in the Printer Inventory.

Tips:

1. In the ISPF panels that the administrator uses to create a printer definition, the fields for setting SCS page-formatting values are under the heading `SCS Conversion`.

2. The SCS page-formatting values in the printer definition do not apply when NetSpool formats 3270 input data. Instead, when NetSpool formats 3270 data, it uses page-formatting information that is specified in the 3270 data stream, in the Write Control Character (WCC).

3. When the administrator selects the NetSpool **Convert to PCL** formatting option, the administrator can also specify page orientation (portrait and landscape), page density, and line density values for both SCS and 3270 data streams in the Printer Inventory. For SCS data streams only, the administrator can also request that NetSpool automatically determine the appropriate page orientation on a page-by-page basis. In the ISPF panels, the fields for setting these page-formatting values are under the heading **NetSpool PCL Conversion**.

Embedding job attributes in print data

You can embed the **owner** job attribute and other job attributes for NetSpool jobs in print data. If you do not embed a job attribute in print data, your administrator can specify a default value for the attribute in the printer definition. If the owner is not embedded or specified in the printer definition, the default value is the ID of the user who started the Infoprint Server daemons.

You might want to embed:

- The **owner** job attribute for a print job to help you identify:
  - The owner of print jobs in Infoprint Central, or the owner of printed output. For example, the ID or name of the user who is printing a job, or the name of the workstation where the user submitted the print request. The identifying information can be printed on the print job's separator page and on a page header.
  - The user to charge in an accounting system for printing jobs. For information about SMF accounting records, see *z/OS Infoprint Server Operation and Administration*.
- Other job attributes to specify formatting attributes for an application. For example, the **forms**, **page-definition**, or **form-definition** job attributes. For the job attributes you can embed, see "Job attribute listing" on page 48.

To embed the **owner** job attribute or other job attributes in print data, you code a text string that contains the job attributes. Be sure to follow "Rules for coding text strings". NetSpool uses the embedded attributes, and then removes the text string from the data stream before it converts the data stream and puts it on the JES spool.

The text string contains a header and one or more job attributes. For example, this text string embeds the **owner** job attribute "MURPHY" before the print data "Murphy's print data":

```
<<ibmjobattr0012owner=MURPHYMurphy's print data
```

The syntax of the text string is:

Prefix
The part of the header that indicates that job attributes are embedded in the print data. The prefix must match the **embedded attributes prefix** field in the printer definition in the Printer Inventory.

- To enter character data, enter 1 - 12 letters, numbers, or special characters. Character data is case-sensitive.
- To enter hexadecimal data, enter 1 - 12 bytes of data.

Example: `<<ibmjobattr`

Continuation field
The part of the header that indicates whether another text string follows this text string. You might need to use two or more text strings if the text string would be longer than the line length that is specified in the print data.

0 or X'F0'
Another text string does not follow this text string.

1 or X'F1'
Another text string follows this text string.

Length field
The part of the header that indicates the total length of all the job attributes.

- To enter character data, enter 1 - 3 numbers, between 1 - 999.
- To enter hexadecimal data, enter 1 - 3 bytes of data between X'F0' and X'F9'.

Example: 012 or X'F0F1F2'

Job attributes
One or more job attributes, such as the **owner**, **forms**, **page-definition**, or **form-definition**. Separate more than one job attribute with a space. For the attribute names, values, and syntax, see "Job attribute listing" on page 48.

Examples:

```
owner=murphy
owner=smith copies=3
department-text=Purchasing
```

Rules for coding text strings:

1. Put the text string in the first request unit (RU) in the first chain at the start of a print request. For example, in a CICS application, include the text string in the data that is sent in the first SEND command of a chain. NetSpool determines the start of a print request by using the bracket and chaining of the data, and with the end-of-file rules that are specified for the LU in the printer definition.

2. In 3270 data streams, put the text string after the Command Code and the Write Control Character, but before any End Message Control Character (X'19').

3. Consider using a delimiter, such as a carriage return, between the text string and any print data to be sure that the data prints correctly on the page. In 3270 data streams, you can use a Set Buffer Address Control as the delimiter.

4. In data streams that contain double-byte character set (DBCS) data, code the text string as single-byte data.

5. IBM suggests that you do not use embedded job attributes if you specify the Timer end-of-file rule. Results can be unpredictable.

Sending output to an email destination

You can send VTAM application output to an email destination instead of to a printer. Or, you can send output to both an email destination and to a printer if your administrator creates a printer pool definition in the Printer Inventory.

You can use one or more of these methods to specify email addresses:

- Your administrator can specify the email addresses of the primary and secondary recipients in the printer definition for the email destination in the Printer Inventory.

- You can embed the **mail-to-addresses**, the **mail-cc-addresses**, and the **mail-bcc-addresses** job attributes in the print data. See "Embedding job attributes in print data" on page 143.

- You can specify the email addresses for the recipients in an email header. For information, see Chapter 11, "Creating an email header," on page 165.

The email has these characteristics:

- Data is sent inline in the body of the email or as an email attachment. The name of the attachment is the VTAM PLU name of the application that sent the data.

  To send data inline in the body of the email, the administrator can select the **Inline text and line data** field in the printer definition, or you can embed the **mail-inline-text** job attribute in the print data.

  To specify an attachment name, embed the **mail-file-name** job attribute in the print data. The job attribute overrides other values.

- The subject of the email is the member name of the NetSpool startup procedure.

  To specify a subject, the administrator can specify a title in the printer definition, you can embed the **title-text** job attribute in the print data, or you can specify the **subject** field in an email header.

- The sender is the ID of the user who started the Infoprint Server daemons.

  To specify a descriptive name for the sender, the administrator can specify the descriptive name in the printer definition, you can embed the **mail-from-name** job attribute in the print data, or you can specify the **from** field in an email header.

- The reply address is the sender of the email. However, email recipients should not reply to the sender because typically that user ID cannot receive mail.

  To specify a reply address, the administrator can specify a reply address in the printer definition, you can embed the **mail-reply-address** job attribute in the print data, or you can specify the **reply-to** field in an email header.

Chapter 8. Printing from Windows systems

With Infoprint Server, you can print from your Windows system to any printer defined in the Infoprint Server Printer Inventory.

You can use these methods to submit a print request:

- Any Windows application that supports printing, such as a word processor or a viewer application. To print from a Windows application, you can use the IBM Infoprint Port Monitor for Windows or the Internet Printing Protocol (IPP). See "Determining the print submission protocol" on page 147.
- Windows **print** command. See "Using the print command" on page 154.
- Windows LPR command. See "Using the LPR command" on page 155.
- IBM **lprafp** command. See Chapter 10, "Printing with the lprafp command," on page 163.

To use the LPR or **lprafp** command, you do not need to install the Infoprint Port Monitor or configure z/OS for IPP processing.

Table 17 on page 147 summarizes the tasks that are related to submitting a print request and refers you to the section that describes the task. Required tasks are required by all users. Optional tasks are required only if the listed condition applies.

Table 17. Printing from Windows systems

Task	Condition
"Determining the print submission protocol" on page 147	Optional: To print from a Windows application or with the **print** command
"Installing Infoprint Port Monitor for Windows" on page 148	Optional: To use the Infoprint Port Monitor
"Adding a z/OS printer to your Windows system" on page 149	Optional: To print from a Windows application or with the **print** command
"Customizing the AFP Printer Driver" on page 152	Optional: To use the AFP driver and change driver options
"Sending a file to an email destination" on page 153	Optional: To send files to an email destination instead of to a printer
"Printing files" on page 154	Required
"Uninstalling Infoprint Port Monitor for Windows" on page 155	Optional: To remove the Infoprint Port Monitor

Determining the print submission protocol

To print from a Windows application or with the **print** command, you must determine which protocol you want to use to submit your print request to Infoprint Server. Your administrator must customize Infoprint Server to use each of these protocols. Therefore, consult your administrator to determine which protocols you can use in your installation.

- IBM Infoprint Port Monitor for Windows:

  Software that runs on a Windows workstation. You 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.

Infoprint Port Monitor 3.2 runs on these systems:

32 bit
> Windows 7, Windows 8.1, and Windows 10

64 bit
> Windows 7, Windows 8.1, Windows 10, Windows Server 2012, and Windows Server 2016

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

- Internet Printing Protocol (IPP):

Used to print over the internet from a Windows IPP client.

These protocols support different print functions and have different limitations as summarized in Table 18 on page 148.

Table 18. Comparison of Windows printing protocols		
Function supported	**Infoprint Port Monitor**	**IPP**
Specify job attributes during printing.	Yes[1]	Yes[2]
Obtain print job status.	Yes[3]	Yes[4]
Define a Windows shared printer.	Yes	No

1. You can specify any job attributes described in Chapter 3, "Using job attributes," on page 45.
2. You can specify any IPP job attributes. However, Infoprint Server supports only the **copies**, **document-name**, and **job-priority** job attributes.
3. You can see the documents that are waiting to print (they are on the Windows print queue for the printer). If an error occurred, you can view the Windows Event Log.
4. You can see the documents that are waiting to print (they are on the Windows print queue for the printer). In addition, you can see the documents that are spooled for the printer definition on z/OS. They are visible while they remain in the Printer Inventory. For example, you can see held jobs (shown as "Paused" on the Windows job status window).

Installing Infoprint Port Monitor for Windows

These instructions for installing the Infoprint Port Monitor might change if the product files are updated. For the most recent installation instructions, see the website for the Infoprint Port Monitor (www.ibm.com/support/docview.wss?uid=psd1P1000597).

Before you begin: Make sure that these software requirements are met:

- Windows operating system is Windows 7, Windows 8.1, Windows 10, Windows Server 2012, or Windows Server 2016.

  Note: Infoprint Port Monitor can run on 32-bit Windows systems or on 64-bit Windows systems that are based on x64 architecture. However, it cannot run on 64-bit Windows systems that are based on Intel Itanium architecture.
- TCP/IP protocol is operational on your Windows system.
- InfoPrint Manager Select is not installed on the Windows system where you plan to install the Port Monitor.

To install Infoprint Port Monitor 3.2:

1. Be sure that you have Windows administrator authority on your Windows system.

2. If you are currently using an earlier version of the Infoprint Port Monitor, use the Windows uninstall function to remove it.
3. Download the Infoprint Port Monitor V3.2 from one of these locations:

   z/OS system
   > Use a file transfer program, such as **ftp**, to download one of these files in binary:
   >
   > • For 32-bit Windows systems:
   >
   > ```
   > /usr/lpp/Printsrv/win/En_US/aopwin32.exe
   > ```
   >
   > • For 64-bit Windows systems:
   >
   > ```
   > /usr/lpp/Printsrv/win/En_US/aopwin64.exe
   > ```
   >
   > To download from the z/OS system, you need an account on the z/OS system where Infoprint Server is installed.

   IBM website
   > Download the Infoprint Port Monitor (www.ibm.com/support/docview.wss?uid=psd1P1000597).
   >
   > If you use the Internet Explorer web browser, you can select the option to run or open the Infoprint Port Monitor from its current location so that the Infoprint Port Monitor is automatically installed.

4. If the Infoprint Port Monitor was not automatically installed in the previous step, go to to the Windows folder where you downloaded the Infoprint Port Monitor and double-click the file that you downloaded.
5. Add a Windows printer at a new "Infoprint Port Monitor" port. Configure it to connect to the z/OS printer that you want to print on. The z/OS printer must be defined in the Infoprint Server Printer Inventory.

   For detailed instructions, see the Infoprint Port Monitor online help. A shortcut to the help (in the "IBM Infoprint Port Monitor" folder) is put on your desktop during the installation of the Infoprint Port Monitor.

Note: Windows printers that you added for the earlier version of the Infoprint Port Monitor are still defined.

Adding a z/OS printer to your Windows system

Before you can print on a z/OS printer, you must add the printer to your Windows system. If you are using:

• Infoprint Port Monitor, see "Adding and configuring a local printer for Infoprint Port Monitor for Windows" on page 149, or, if your Windows administrator already defined the printer as a Windows shared printer, see "Adding a network printer" on page 151.
• Internet Printing Protocol (IPP), see "Adding an Internet printer" on page 151.

Adding and configuring a local printer for Infoprint Port Monitor for Windows

Before you begin

Ask your Infoprint Server administrator for this information:

• The host name or the IP address of the z/OS system where Infoprint Server is running.
• The port number on the z/OS system where the Infoprint Server line printer daemon (aoplpd) is listening. The port number is usually 515.
• The name of the printer. This is the name that your administrator used to define the printer in the Infoprint Server Printer Inventory. When you configure the Infoprint port, you can select this name from a list.

- The name of the printer driver. The printer driver converts your documents to a format that the printer understands. For example, to AFP format or to PostScript format.
- If you use the AFP Printer Driver for Windows, the model number and resolution of the AFP printer.

Steps for adding and configuring a printer

Use the Windows Add Printer wizard to add and configure a printer:

1. Select **Control Panel --> Printers** or **Control Panel --> Printers and Faxes**.
2. Select **Add Printer**, which starts the Add Printer wizard.
3. Select **Next**.
4. Select **Local printer** or **Local printer attached to this computer**. Then, select **Next**.
5. Select **Create a new port**. Then, select **Infoprint Port Monitor** and select **Next**.
6. In the Infoprint Port window, type a name for the new port. For example, `Infoprint-1`. Use a name that is not used for any other port. Then, select **OK**.
7. In the Infoprint Port Configuration window:
   a. Type values in the **Host Name** and **Host Port** fields.
   b. Select **Get Printer List**.
   c. Select the name of the printer from the list.
   d. Select **Options**. You see the Infoprint Port Monitor Options window. To specify information that can be printed on a printer's separator sheet, or to specify job attributes that apply to every job you send to this printer:
      1) In the **Separator Sheet** fields, type your name, department, room, building, and address.
      2) In the **Job Attributes** field, type Infoprint Server job attributes, which are separated with spaces. For valid job attributes, see Chapter 3, "Using job attributes," on page 45.

         Example:

         ```
         title-text="description of contents" copies=2
         ```

      3) If you want to change any fields in this window before printing, select **Prompt for attributes when printing**.

         Note: Do not select this option if this printer is a Windows shared printer and other users might print to this printer because this window is displayed only on the Windows system where the Infoprint Port Monitor is installed.

      4) Select **OK**.
   e. (Optional) If other users might print on this Windows shared printer, select **Unattended port**.
   f. Select **OK**.
8. Select a printer driver that is suitable for the printer. To select the AFP Printer Driver, download the driver and follow these steps:
   a. Select **Have Disk**.
   b. Type the path name of the Windows folder that contains the AFP driver files. Then, select **OK**.
   c. Select the type of printer. If the printer is not on this list, select **IBM AFP *nnn***, where *nnn* is the resolution of the printer. If you do not know the resolution, select **IBM AFP 240**.
   d. Select **Next** or **Continue Anyway**.
9. If the next window says that the printer driver exists, keep the existing driver, and then select **Next**.
10. Keep the default name for the printer or type a meaningful name. This is the name that is assigned to the Windows printer on the desktop. If you selected the AFP Printer Driver, keep the default name.
11. Select either **Yes** or **No** to make this printer your default printer. Then, select **Next**.

12. Select **Do not share this printer**, **Share as**, or **Share name**. If you chose to share the printer, enter information to describe it to other users. Then, select **Next**.

13. Print a test page.

> **Note:** If you see an error message on the screen that says an attribute you specified in the Infoprint Port Monitor Options window is not correct, reconfigure the port to specify the correct value. If you selected the Port Monitor "Unattended port" option, look for error messages in the Windows Event Log.

14. Review the printer settings. Select **Finish**.

Result: You see a new printer icon in the Printers or Printers and Faxes folder.

Steps for reconfiguring a port

You reconfigure an Infoprint port to change separator sheet information, change Infoprint Server job attributes, or print on a different printer:

1. Select **Control Panel --> Printers** or **Control Panel --> Printers and Faxes**.
2. In the Printer window, right-click the printer icon. Then, select **Properties**.
3. In the Properties notebook, select the **Ports** tab. Then, select **Configure Port**.
4. In the Infoprint Port Configuration window:

   a. To change separator sheet information or job attributes, select **Options**. Then, select **OK**.

   b. Verify that values in the **Host Name** and **Host Port** fields are correct.

   c. To select a different printer, select **Refresh Printer Selection List**. Then, select the name of the z/OS printer from the list.

   d. Select **OK**.

5. Close the Properties notebook.

Adding a network printer

If your Windows administrator defined the z/OS printer as a shared printer in your Windows network:

1. Ask your Windows administrator for the name that is assigned to the printer.
2. Use the standard Windows procedures to add the z/OS printer as a network printer.

Note: If the Windows administrator defines a printer as shared, individual users cannot be prompted for attributes when printing.

Adding an Internet printer

Before you begin

Ask your Infoprint Server administrator for this information:

- The Uniform Resource Identifier (URI) of the printer.

  The URI of a printer that is defined in the Printer Inventory has this format:

  ```
  http://host:port/printers/printername
  ```

  host
  : The host name or IP address of the z/OS system.

  port
  : The port number where the IPP server is listening. The default is that the IPP server listens at port 631. Ask your administrator the port number to use.

  printername
  : The name of the printer definition in the Printer Inventory.

For example:

```
http://myzoshost:631/printers/myprinter
```

Be careful to note the exact spelling of the URI. Uppercase and lowercase letters are not equivalent, except in the *host* part of the URI.

- The manufacturer and model number of the printer.
- The name of the printer driver to use.

  The printer driver converts your documents to a format that the printer understands. This driver might be available online, or your administrator might give it to you on a diskette or CD-ROM.

  The AFP Printer Driver for Windows converts your documents to AFP format so you can print on AFP printers. You can download the AFP Printer Driver from the Ricoh AFP Printer Driver website (support.rpp.ricoh-usa.com/internet/dcfdata.nsf/vwWeb/P4000384). If you use the AFP driver, you need to know the model number and resolution of the AFP printer.

  If either the PCL to AFP transform or the PostScript to AFP transform is installed on the z/OS system, you can use a PCL or PostScript driver instead of the AFP driver.

Steps for adding an Internet printer

Use the standard Windows procedure to add a printer, and do these special steps:

1. When the Add Printer wizard asks you whether to install the printer as a local printer or a network printer, select either **Network printer** or **A network printer, or a printer attached to another computer**.
2. When the Add Printer wizard asks you how to connect, select **Connect to a printer on the Internet**. Enter the URI of the printer in the **URL** field.
3. When the Add Printer wizard asks you whether to install the printer driver, select **OK**.

  While Windows is installing the printer driver, you see the screen where you entered the URI. For some time, it might seem that nothing is happening. Do not cancel the job. Wait for the Add Printer wizard to go on to the next window.

Customizing the AFP Printer Driver

The AFP Printer Driver for Windows creates AFP output for printing on AFP printers. You can download it from the Ricoh AFP Printer Driver website (support.rpp.ricoh-usa.com/internet/dcfdata.nsf/vwWeb/P4000384).

To customize the AFP Printer Driver:

1. In the Windows Printer directory, highlight the icon for the printer.
2. From the File menu, select **Document Defaults** and **Properties**.
3. Specify the default printing options and printer characteristics. To specify these printing options, select **Inline Form Definition** from the Document Defaults window:

   - Duplex printing (printing on two sides of the paper)
   - Printing of an overlay (electronic form)
   - Paper source on the printer (input tray)

   For faster printing of large files, consider turning off the **Print text as graphics** option. Turning off the option causes the driver to create a smaller output file. First, make sure that your printer can do font substitution. Also, if you use True-Type fonts, the document might not print with exact fidelity. For better resolution, you can try changing the **Output Fidelity** options on the driver.

   Usually, the printer characteristics, such as whether the printer can do font substitution and handle compressed images, and the supported clip limits, are already set correctly. However, if the name of the AFP Printer Driver is **IBM AFP*nnn***, where *nnn* is the resolution of your printer, you might need to

change the printer characteristics to match those of the printer. Ask your administrator for the needed information, or consult the printer documentation.

Sending a file to an email destination

When you submit a print request, you can send the file to an email destination instead of to a printer. You can specify the email addresses of the primary and secondary recipients in one of these ways:

- Your administrator can specify the email address list for the recipients in the printer definition in the Printer Inventory.
- You can specify the email addresses for the recipients by using these job attributes:

  mail-bcc-addresses
  Blind copy (bcc) recipients of an email. A *bcc* means that other recipients of the email do not see the bcc recipient listed.

  mail-cc-addresses
  Copy (cc) recipients of an email. A *cc* means that other recipients of the email can see the cc recipient listed.

  mail-to-addresses
  Primary recipients of an email.

You can use an alias file that is defined to the sendmail bridge. The alias file lists one or more email addresses. For information, see "Using the email address list in an alias file" on page 88. Your administrator can specify the name of the alias file in the printer definition, or you can specify it in a job attribute.

The email has these characteristics:

- If the file contains text data, it can be included in an email attachment or inline in the body of the email. If the file contains data in another format (for example, PDF), the data is included in an attachment. To include text data inline, specify the **mail-inline-text** job attribute. Or, the administrator can select the **Inline text and line data** field in the printer definition.

- The name of the attachment is the name that is specified in one of these:

  1. The **mail-file-name** job attribute
  2. The **sysout-dataset-name** job attribute
  3. The last 8 characters of the file name

     If the first character is not a letter, #, $, or @, it is converted to a #. If one of the remaining characters is not a letter, number, #, $, or @, it is converted to a #. Lowercase letters are converted to uppercase letters.

  The name of the attachment contains a suffix that indicates the type of data in the file. For example, txt indicates text data and pdf indicates PDF data.

  Tip: If you specify a file name (in the **mail-file-name** job attribute) with a suffix that indicates the type of data in the file, ask your administrator to request that Infoprint Server not add another suffix. For example, if the file name is myfile.doc, ask your administrator to request that Infoprint Server not add suffixes for file names that contain the .doc suffix. For information, see customizing IP PrintWay in *z/OS Infoprint Server Customization*.

- The subject of the email is the value that is specified to the Port Monitor in the **title-text** job attribute. If none is specified, the subject is the title that your administrator specifies in the Allocation section of the printer definition. If no title is specified in the printer definition, the subject is the job name. If you use the LPR command, you can specify the job name in **-J** option.

- The sender is the Windows user ID of the user who submitted the print request. You can add a descriptive name or other identifier of the sender in the **mail-from-name** job attribute.

- The reply address is the value that you specify in the **mail-reply-address** job attribute. To receive replies from the email, specify the **mail-reply-address** job attribute because the default is that most

mail programs reply to the sender, which is your Windows user ID concatenated with the system where the sendmail bridge is running.

Printing files

You can use these methods to print a file:

- Print function on any Windows application that supports printing. See "Using a Windows application" on page 154.
- Windows **print** command. See "Using the print command" on page 154.
- Windows LPR command. See "Using the LPR command" on page 155.
- **lprafp** command. See Chapter 10, "Printing with the lprafp command," on page 163.

Using a Windows application

To print from a Windows application, use the print function that the application provides and select the Windows printer that you defined in "Adding a z/OS printer to your Windows system" on page 149.

If you are using the Infoprint Port Monitor and selected **Prompt for attributes when printing** when you customized the Infoprint Port Monitor, you see the Infoprint Server Options window. (If the Infoprint Port Monitor is busy transmitting a file or if your Windows system is busy, you might not see this window immediately.) In the **Job Attributes** field, you can add any of the attributes that are described in Chapter 3, "Using job attributes," on page 45, or change any of the default attributes that you entered when you added the printer.

For example, if you want to print three copies of this file on one side of the paper, change the **Job Attributes** field to:

```
copies=3 duplex=no
```

Only AFP printers support the **duplex** attribute. Some IPP-enabled printers do not support the **copies** attribute. If you send the file to an email destination, only one copy is sent.

Note: If the Windows printer is defined as a shared printer, do not select the **Prompt for attributes when printing** option because the Infoprint Server Options window is displayed only on the Windows system where the Infoprint Port Monitor is installed.

Using the print command

Some Windows systems provide a **print** command, which you can use to print on a printer you defined in "Adding a z/OS printer to your Windows system" on page 149. To use the **print** command, you or your Windows administrator must define the z/OS printer as a Windows shared printer. The **print** command is used to print a file directly without using a Windows application that supports printing.

You can specify this command and these options when you print with Infoprint Server:

```
print  /d:\\servername\print_share file
```

servername
　　Specifies the name of the Windows server on which the z/OS printer was defined as a Windows shared printer. The Windows server can be your own Windows system or a different Windows system.

print_share
　　Specifies the name of the Windows printer.

file
　　Specifies the location and name of the file you want to print. You can include multiple files on one command line.

Using the LPR command

Some Windows systems provide an LPR command, which you can use to print on any printer that is defined to Infoprint Server in the Printer Inventory. The LPR command is used to print a file directly without using a Windows application that supports printing.

> ⚠️ **Attention:**
>
> - The LPR command has a limit of 2 GB for sending print jobs.
> - The LPR command might timeout and truncate the data when it is used to submit print jobs that take a long time to spool; for example, this might happen if a print job is large or the data stream is being transformed as it is being spooled. To avoid these problems, do not use the LPR command; instead, use one of the other printing methods, such as the Windows **print** command, the Infoprint Port Monitor for Windows or both. See "Using the print command" on page 154.
> - To use the LPR command, the administrator must configure the Infoprint Server LPD to listen at port 515. If the Infoprint Server LPD listens at a different port, use the **print** command instead. To use the **print** command, you must configure the Infoprint Port Monitor to submit print requests to the port at which the Infoprint Server LPD is listening.

You can specify this command and these options when you print with Infoprint Server:

```
LPR  -S server -P printer -J job file
```

server
Specifies the IP address or host name of the z/OS system on which Infoprint Server is running.

printer
Specifies the name of the printer definition in the Printer Inventory. This name is case-sensitive.

job
Specifies a job name that is printed as the title on a separator page. Whether the title is printed depends on how the administrator configured the printer's separator page. If the file is sent to an email destination, this job name is used as the subject of the email.

file
Specifies the name of the file you want to print or send to an email destination.

Infoprint Server does not support or require these LPR options:

-C *class*
Infoprint Server does not support this option. It is ignored if specified.

-d
The LPR sends the data file first. Infoprint Server supports this option. However, IBM suggests that you do not specify it for large files or files that need to be transformed to another data format because it can hurt system performance.

-o *option*
Indicates the type of print file. This option is not required because Infoprint Server automatically detects the type of file.

-x
Infoprint Server does not support this option.

Uninstalling Infoprint Port Monitor for Windows

To uninstall the Infoprint Port Monitor:

1. Select **Control Panel --> Programs and Features**.
2. Select **Infoprint Port Monitor**.
3. Select **Uninstall** to remove the Infoprint Port Monitor.

Chapter 9. Printing from remote non-Windows systems

The following information describes how to print from non-Windows workstations where TCP/IP is installed. For detailed information about the syntax of the commands, see the documentation for each remote system.

Tips:

1. Infoprint Server might ignore some command options. For example, it ignores command codes that contain information for printing on separator pages if your administrator did not configure the separator pages to show this information.

2. Infoprint Server accepts commands that are sent from any port on the sending host.

3. If a transform product is installed, your data streams can be automatically transformed into the format that the printer accepts. For example, PCL, PDF, PostScript, and SAP data streams can be transformed to AFP format.

4. To submit print requests from Windows systems and UNIX systems, see Chapter 10, "Printing with the lprafp command," on page 163.

Submitting a print request

You can use the LPR command to submit a print request. From an AIX system, you can also use the **enq** command.

Before you begin: Before you use an LPR or **enq** command, ask your administrator for:

- The host name or IP address of the z/OS system on which Infoprint Server is running.
- The name of the printer definition that is created for the printer. This name is case-sensitive. You must specify this name as the name of the printer or print queue.

The IBM i LPR command and the AIX **enq** command are used to specify Infoprint Server job attributes, which are described in Chapter 3, "Using job attributes," on page 45.

For more information about how to submit an LPR or **enq** command from a particular system, see:

- "Printing from an AIX workstation" on page 159
- "Printing from a remote z/OS system" on page 160
- "Printing from a VM or z/VM system" on page 160
- "Printing from an IBM i system" on page 160

After it receives a print request, Infoprint Server returns either an error message or a job identifier. The job identifier indicates that Infoprint Server accepted the print request. You can use the job identifier to query the status of the print request or to cancel the print request.

Sending a file to an email destination

When you use the LPR or **enq** command, you can send the file to an email destination instead of to a printer. You can specify the email addresses of the primary and secondary recipients in one of these ways:

- Your administrator can specify the email address list for the recipients in the printer definition in the Printer Inventory.
- You can specify the email addresses for the recipients by using these job attributes:

mail-bcc-addresses
    Blind copy (bcc) recipients of an email. A *bcc* means that other recipients of the email do not see the bcc recipient listed.

mail-cc-addresses
    Copy (cc) recipients of an email. A *cc* means that other recipients of the email can see the cc recipient listed.

mail-to-addresses
    Primary recipients of an email.

You can use an alias file that is defined to the sendmail bridge. The alias file lists one or more email addresses. For information, see "Using the email address list in an alias file" on page 88. Your administrator can specify the name of the alias file in the printer definition, or you can specify it in a job attribute.

The email has these characteristics:

- If the file contains text data, it can be included in an email attachment or inline in the body of the email. If the file contains data in another format (for example, PDF), the data is included in an attachment. To include text data inline, specify the **mail-inline-text** job attribute. Or, the administrator can select the **Inline text and line data** field in the printer definition.

- The name of the attachment is the name that is specified in one of these:

    1. The **mail-file-name** job attribute
    2. The **sysout-dataset-name** job attribute
    3. The last 8 characters of the file name

        If the first character is not a letter, #, $, or @, it is converted to a #. If one of the remaining characters is not a letter, number, #, $, or @, it is converted to a #. Lowercase letters are converted to uppercase letters.

    The name of the attachment contains a suffix that indicates the type of data in the file. For example, `txt` indicates text data and `pdf` indicates PDF data.

    Tip: If you specify a file name (in the **mail-file-name** job attribute) with a suffix that indicates the type of data in the file, ask your administrator to request that Infoprint Server not add another suffix. For example, if the file name is `myfile.doc`, ask your administrator to request that Infoprint Server not add suffixes for file names that contain the `.doc` suffix. For information, see customizing IP PrintWay in *z/OS Infoprint Server Customization*.

- The subject of the email is the title that is specified in the **title-text** job attribute, or in the title that is specified on the LPR command. If none is specified, the title is the value that your administrator specified in the Allocation section of the printer definition. If none is specified, the subject is the job name.

- The sender is the user who submitted the print request. You can add a descriptive name or other identifier of the sender in the **mail-from-name** job attribute.

- The reply address is the value that you specify in the **mail-reply-address** job attribute. To receive replies from the email, specify the **mail-reply-address** job attribute because the default is that most mail programs reply to the sender, which is your user ID on the remote system that is concatenated with the system where the sendmail bridge is running.

Querying a print request

You can use the **lpq** command to query the names, locations, and descriptions of printers and to query the status of a print request. From an AIX system, you can also use the **qstat** command.

When you query the status of a print request, Infoprint Server returns one of the states that is listed in "lpstat--Show printer names and locations and status of print jobs" on page 35.

Printing from an AIX workstation

To print from an AIX system, you must configure a remote queue. During configuration of the remote queue, do these steps:

1. Specify the host name or IP address of the z/OS system as the host name.
2. Specify the name of the printer definition as the queue name.
3. Specify **BSD** as the type of print spooler.
4. Specify the -X option for the remote queue in the **backend** option under the queue device name in the `/etc/qconfig` file. You use the -X option to specify Infoprint Server job attributes in the **-o** option on the **enq** command.

   If you print large files, especially files that are transformed from one format to another on the z/OS system, also specify the -T option to increase the timeout value. The default timeout value is 90 seconds. Depending on the size of your files, you might need to specify a timeout value of a few minutes. For large jobs, you might need to specify an hour or more.

   Also, specify the -C option, which sends the control file first. This can improve system performance, especially when you print large files.

   In this example, the **backend** option uses **rembak** and specifies a timeout value of 5 minutes in the -T option:

   ```
   backend=/usr/lib/lpd/rembak -X -T 5 -C
   ```

5. After you change the `/etc/qconfig` file, delete the `/etc/qconfig.bin` file. Then, use these commands to stop and restart the queue daemon:

   ```
   stopsrc -s qdaemon
   startsrc -s qdaemon
   ```

After you configure the remote queue, specify the name of the remote queue on the **enq**, **lpr**, or **lp** command.

For example:

```
enq -P remotequeue -o "XAOPattribute=value..." file
```

```
lpr -P remotequeue file
```

```
lp -d remotequeue file
```

-d *remotequeue*
Specifies the name of the remote queue.

-P *remotequeue*
Specifies the name of the remote queue.

-o "XAOP*attribute=value*..." | -o 'X *attribute=value*...'
Specifies any job attributes you want to use to print the job. If there are any spaces or special characters in the list of job attributes, surround the string with single or double quotation marks.

For a list of job attributes that you can specify, see Chapter 3, "Using job attributes," on page 45. However, you cannot use the **document-type=file-reference** job attribute.

If there are errors in the list of attributes and you use the XAOP form of the prefix, the job is rejected. If you use the X form of the prefix, the job is processed without the attributes.

Limitation: The **lpr** and **lp** commands do not support the **-o** option.

file
Specifies the name of the file you want to print.

Note: Infoprint Server might not support all command options.

Printing from a remote z/OS system

To print from a remote z/OS system, use the LPR command from a TSO session:

```
LPR 'filename' (P printername AT hostaddress TITLE title
```

filename
    Specifies the name of the MVS data set you want to print. This cannot be the name of a UNIX file.

P *printername*
    Specifies the name of the printer definition in the Printer Inventory. This name is case-sensitive.

AT *hostaddress*
    Specifies the IP address or host name of the z/OS host on which Infoprint Server is running.

TITLE *title*
    Specifies a title that can be printed on a separator page if your administrator configured the separator page to do so. If the file is sent to an email destination, the title becomes the subject of the email.

Note: Infoprint Server might not support all command options.

Printing from a VM or z/VM system

To print from a VM or z/VM system, use the LPR command.

For example:

```
LPR filename (PRINTER printername HOST host_address
```

filename
    Specifies the file name, file type, and file mode of the file you want to print.

PRINTER *printername*
    Specifies the name of the printer definition in the Printer Inventory. This name is case-sensitive.

HOST *hostaddress*
    Specifies the IP address or host name of the z/OS host on which Infoprint Server is running.

Note: Infoprint Server might not support all command options.

Printing from an IBM i system

The most convenient way to print from an IBM i system is to do these steps:

1. Define a remote print queue for a printer that your administrator defined to Infoprint Server, if the administrator did not already do so. To do this:

    a. Enter the CRTOUTQ command on the IBM i command line.

    b. Complete the panels:

        Output queue
            The name that you want to give to the remote output queue.

        Remote system
            The host name or IP address of the z/OS system on which Infoprint Server is running.

        Remote print queue
            The name of a printer definition that your administrator created.

        Writers to autostart
            1

Connection type
  *IP

Destination type
  *OTHER

Host print transform
  Specify *NO to print the AFP data stream. Specify *YES to print the Systems Network Architecture (SNA) character string (SCS) data stream.

Manufacturer type and model
  *WSCST

Workstation customizing object
  QSYS/QWPDEFAULT

Destination options
  Specify any job attributes you want to use to print the job. Use one of these two formats:

```
'XAOPattribute=value...'
'Xattribute=value...'
```

  Surround the entire value, including the X or XAOP prefix and the list of attributes, in single quotation marks, as shown. If any of the attribute values contains special characters, surround the value in double quotation marks.

  For a list of job attributes that you can specify, see Chapter 3, "Using job attributes," on page 45. However, you cannot use the **document-type=file-reference** job attribute.

  If there are errors in the list of attributes and you use the XAOP form of the prefix, the job is rejected. If you use the X form of the prefix, the job is processed without the attributes.

2. Submit the file that you want to print on the remote print queue exactly as you would submit it on a local print queue.

3. To start a remote printer writer, enter:

```
STRRMTWTR outputqueuename
```

The name of the remote output queue is *outputqueuename*. The remote printer writer takes files from the output queue and sends them to the printer.

4. To end the remote printer writer, enter:

```
ENDWTR outputqueuename
```

You can also use the LPR command to send files to z/OS. The files must already be on the spool, in a queue that does not have a printer writer started against it. You do not define a remote output queue, but you specify many of the same options for the LPR command as you would for a remote output queue. You can also specify job attributes on the LPR command.

For example:

```
LPR RMTSYS(hostname) PRTQ('printqueue') FILE(filename)
   JOB(jobid/userid/jobname) SPLNBR(n) MFRTYPMDL(*WSCST)
   WSCST(QSYS/QWPDEFAULT) TRANSFORM(*NO)
   DESTOPT('XAOPattribute=value...')
```

RMTSYS(*hostname*)
  Specifies the host name of the z/OS host on which Infoprint Server is running.

PRTQ('*printqueue*')
  Specifies a print queue that is defined in a printer definition. If the print queue name contains lowercase characters, you must surround it in single or double quotation marks.

FILE(*filename*)
  Specifies the file name of the file you want to print.

JOB(*jobid/userid/jobname*)
> Identifies the job by number, user ID of the job owner, and name. You can determine this information by entering the WRKOUTP command to view a list of spooled files.

SPLNBR(*n*)
> Specifies the spool file number of the file you want to print. You can determine the spool file number by viewing a list of spooled files.

MFRTYPMDL(*WSCST)
> Specifies that the manufacturer, type, and model of the printer are as defined in the workstation customizing object.

WSCST(QSYS/QWPDEFAULT)
> Specifies the workstation customizing object as QSYS/QWPDEFAULT.

TRANSFORM({*YES|*NO})
> Specifies whether to transform the data to ASCII format. Specify *YES for SCS data. Specify *NO for AFP data.

DESTOPT('XAOP*attribute=value*...')
DESTOPT('X*attribute=value*...')
> Specifies any job attributes you want to use to print the job. Surround the entire value, including the X or XAOP prefix and the list of attributes, in single quotation marks, as shown. If any of the attribute values contains special characters, surround the value in double quotation marks.
>
> For a list of job attributes that you can specify, see Chapter 3, "Using job attributes," on page 45. However, you cannot use the **document-type=file-reference** job attribute.
>
> If there are errors in the list of attributes and you use the XAOP form of the prefix, the job is rejected. If you use the X form of the prefix, the job is processed without the attributes.

Note: Infoprint Server might not support all command options.

When you print a text document from an IBM i system by using a workstation customization object of QSYS/QWPDEFAULT, Infoprint Server might not recognize the data format as text. Either Infoprint Server rejects the job or data does not print as expected.

This problem occurs because the host print transform and workstation customization object QSYS/QWPDEFAULT on the IBM i system inserts an initial null byte into the print file before it sends it to Infoprint Server. The null byte prevents Infoprint Server from recognizing the data format as text.

To correct this problem, you can use the following source statements to create a workstation customization object that does not insert an initial null byte. These statements are the same as for the QSYS/QWPDEFAULT object, but with :INITPRT DATA='00'X. removed. For information about how to create a customization object, see *Workstation Customization Programming V4R3*.

```
:WSCST DEVCLASS=TRANSFORM.
  :TRNSFRMTBL.
  :SPACE
    DATA ='20'X.
  :CARRTN
    DATA ='0D'X.
  :FORMFEED
    DATA ='0C'X.
  :LINEFEED
    DATA ='0A'X.
  :EWSCST.
```

Printing from a Novell NetWare client

You can use standard printing procedures to submit jobs to Infoprint Server from clients connected to a Novell NetWare 3.x, 4.x, or 5.x server. Your Novell administrator must create a NetWare print queue on the NetWare server and configure the queue to use the LPD protocol to send print jobs to the Infoprint Server LPD on the z/OS system. You must know the name of the NetWare print queue to submit jobs.

Chapter 10. Printing with the lprafp command

The **lprafp** command submits print requests from Windows systems and UNIX systems (such as HP-UX and SunOS) and specifies Infoprint Server job attributes. For example, when you use the **lprafp** command, you can specify the name of a form definition in the **form-definition** attribute and the number of copies in the **copies** attribute. However:

- You might use some Windows and UNIX print commands to specify Infoprint Server job attributes. If so, you do not need to use the **lprafp** command.
- On AIX systems, you can use the AIX **enq** command instead of the **lprafp** command. The AIX **enq** command specifies Infoprint Server job attributes. IBM supports the **enq** command. For information about the **enq** command, see "Printing from an AIX workstation" on page 159.

You can download the **lprafp** command from My Downloads: LPRAFP (dl.ricohsoftware.com/downloads/375bc3fe-3080-401f-91c4-2b8adb607f89).

Format

lprafp [-n] [-o "XAOP*attribute=value*..." | -o "X*attribute=value*..."] ... [-p *printer*] [-q *delay*] [-r *retries*] [-s *server*] *filename* ...

Options

-n
Specifies that the **lprafp** command displays only error messages, not informational messages.

-o "XAOP*attribute=value*..." | -o "X*attribute=value*..."
Specifies the Infoprint Server job attributes that you want to use to print the files. For a list of job attributes, see Chapter 3, "Using job attributes," on page 45.

Prefix the list of attributes with either XAOP or X. The "X" must be in uppercase.

If you use the:

- XAOP prefix and there are errors in the attributes or values, Infoprint Server rejects the print request. You see a server error message and Infoprint Server writes an error message in the z/OS system console log.
- X prefix and there are errors in the attributes or values, Infoprint Server accepts the print request but does not use the attributes. You do not see a server error message.

Tip: Use the XAOP prefix so you know whether Infoprint Server accepted the print request.

To specify more than one attribute, you can repeat the **-o** option or you can specify more than one attribute that is separated with spaces. If a space or special character exists anywhere after the XAOP prefix, enclose the entire **-o** argument in single or double quotation marks.

For example:

```
-o XAOPattribute1=value
-o "XAOP attribute1=value"
-o "XAOPattribute1=value with spaces"
-o "XAOPattribute1=value attribute2=value"
-o XAOPattribute1=value -o XAOPattribute2=value
```

If an attribute value contains spaces, do not enclose the value itself in quotation marks. For example, this does not work:

```
-o XAOPattribute="value with spaces"
```

-p *printer*
>   Specifies the name of the printer definition that your administrator created in the Printer Inventory. The default is the value of the LPR_PRINTER environment variable.

-q *delay*
>   Specifies the number of seconds between **lprafp** command retransmissions. The default is 10 seconds.

-r *retries*
>   Specifies the number of times the **lprafp** command tries the retransmission to the server. The default is 3 times.

-s *server*
>   Specifies the host name or IP address of the z/OS system where Infoprint Server is running. The default is the value of the LPR_SERVER environment variable.

Operand

filename
>   Specifies the name of the file to print. You can specify more than one file name.

>   **Rule:** If you specify more than one file with the same **lprafp** command, all files must have the same data format. For example, all files must be PostScript files or text files.

lprafp example

To print two copies of `file1` and two copies of `file2` on printer `myprinter` with form definition F1FORM, enter:

```
lprafp -o"XAOP form-definition=f1form copies = 2" -p myprinter -s systema.xyz.com file1 file2
```

Usage notes

- The **lprafp** command is not supported.
- The LPRAFP Readme file describes how to use the **lprafp** command to send print requests to InfoPrint Manager, not to z/OS Infoprint Server.

Chapter 11. Creating an email header

You can include an email header in line-data documents to specify the addresses of the email recipients and the subject of the email. Infoprint Server supports a subset of the fields that are defined in the RFC 2822 Internet Message Format standard. Other fields are ignored.

Table 19 on page 165 shows the supported fields and values in an email header.

Table 19. Supported email header fields	
Field name	**Value**
to	A list of 1 - 32 email addresses for the recipients of the email. Each email address can be 1 - 60 characters but cannot include blanks. Separate email addresses with one or more blanks, a comma, or both. **Example:** `to: user1@xyz.com, user2@xyz.com, dept01list`
cc	A list of 1 - 32 email addresses of the copy (cc) recipients of the email. A *cc* means that other recipients of the email can see the cc recipient listed. Each email address can be 1 - 60 characters but cannot include blanks. Separate email addresses with one or more blanks, a comma, or both. **Example:** `cc: user3@xyz.com, user4@xyz.com`
bcc	A list of 1 - 32 email addresses of the blind copy (bcc) recipients of an email. A *bcc* means that other recipients of the email do not see the bcc recipient listed. Each email address can be 1 - 60 characters but cannot include blanks. Separate email addresses with one or more blanks, a comma, or both. **Example:** `bcc: user5@xyz.com, user6@xyz.com`

from	The descriptive name of the sender of the email. The name can be 1 - 60 characters and can include blanks. Infoprint Server includes the descriptive name before the sender's actual email address: *userid*@*domainname*. The *userid* is the user ID of the job submitter, and *domainname* is the domain name where Infoprint Server is running. **Example:** This specification in the **from** field in the header:
	 ``` from: John Q. Sender ```
	 Puts this information in the email:
	 ``` From: John Q. Sender <JOHN@SYSTEM1> ```

reply-to	The email address that recipients of the email can reply to. The email address can be 1 - 60 characters but cannot include blanks. If none is specified, the reply address is *userid*@*domainname*. The *userid* is the user ID of the job submitter, and *domainname* is the domain name where Infoprint Server is running. **Example:** `reply-to: sender@xyz.com`
subject	The subject of the email. The subject can be 1 - 60 characters and can include blanks. **Example:** `subject: Annual Report`

The email header fields must be in this format:

```
field name : value
```

field name
> Table 19 on page 165 shows the supported field names. Other fields are allowed but ignored. The field names can include lowercase or uppercase characters. If a field name occurs more than one time, the last one is used.

:
> The colon separates the field name from the value. Blanks are allowed before and after the colon.

value
> Table 19 on page 165 shows the allowed values. Infoprint Server uses the sendmail bridge, so the email addresses must be in a format that the sendmail bridge supports. An email address can be an alias name that is defined to the sendmail bridge. The email address cannot contain blanks.

Requirements:

1. The output data set on the spool must contain line data in EBCDIC representation, with or without carriage controls.
2. The **Embedded headers** field in the printer definition must be selected, or you must specify the **mail-embedded-headers=yes** job attribute.

Limitations: Email headers are not supported in these situations:

1. Your installation runs IP PrintWay basic mode instead of extended mode.
2. You submit the print request with the z/OS UNIX **lp** command, the Print Interface subsystem, the Infoprint Port Monitor, or another remote print submission method.

In these situations, the header is included as text in the email or in an attachment. Email addresses in the headers are not used.

Syntax rules:

1. Include an email header field name and colon in the first record.
2. Include at least one of the fields that Infoprint Server supports in the header.
3. Begin each field in data column 1 of the record after the carriage control (if any).
4. To continue a field on the next record, continue the value in column 2 or after.
5. Do not split an email address across records.
6. End the header in the first 32 records. A blank record indicates the end of the header.
7. To include comments, use the **comment** field. Comments in parentheses are considered text.

Tips:

1. If no text exists after the email header, specify the **mail-inline-text** job attribute to avoid an empty email attachment. Or, the administrator can select the **Inline text and line data** field in the printer definition.
2. To send multiple documents in the same print job to different email addresses, the administrator must specify the AOP_MAIL_USE_FIRST_ADDRESS = NO environment variable or the **mail-use-first-address=no** configuration attribute.
3. You can include email headers in VTAM application data that you send to the NetSpool component of Infoprint Server. Specify each email header field on a new line in the VTAM application data and end the header with a blank line.

The email header fields override the corresponding Infoprint Server job attributes, JCL parameters, and printer definition fields that are shown in Table 20 on page 167. If a field is not specified in the email header, Infoprint Server uses the value in the corresponding job attribute, JCL parameter, or printer definition (in that order).

Table 20. Email header fields and corresponding job attributes, JCL parameters, and printer definition fields

Email header field	Job attribute	Parameter on OUTPUT JCL statement	Printer definition field
to	mail-to-addresses	MAILTO	To addresses
cc	mail-cc-addresses	MAILCC	CC addresses
bcc	mail-bcc-addresses	MAILBCC	BCC addresses
from	mail-from-name	MAILFROM	From name
reply-to	mail-reply-name	REPLYTO	Reply address
subject	title-text	TITLE	Title

Appendix A. Job attributes and JCL parameters

shows Infoprint Server job attributes and corresponding JCL parameters. It shows which job attributes and JCL parameters Infoprint Server can validate for the selected printer. Infoprint Server checks the value that you specify in the job attribute or JCL parameter against the supported values that the administrator specifies in the printer definition.

If the same value is specified in more than one way, values are used in this order:

1. The job attribute specified by the SUBSYS JCL parameter. If the same job attribute is specified more than once, the first value is used.

2. The job attribute specified by the PRTATTRS JCL parameter. If the same job attribute is specified more than once, the first value is used.

3. The JCL parameter that corresponds to the job attribute (for example, the FORMDEF JCL parameter corresponds to the **form-definition** job attribute), specified on the DD JCL statement.

4. The JCL parameter that corresponds to the job attribute, specified on the OUTPUT JCL statement.

5. If the Print Interface subsystem is used, the printer attribute in the printer definition that corresponds to the job attribute (for example, the **form-definition** printer attribute corresponds to the **form-definition** job attribute).

Table 21. Job attributes, corresponding JCL parameters, and whether they are validated for the printer

Job attribute	JCL parameter	Value validated for printer
address-text	ADDRESS	No
afp-parameters	AFPPARMS	No
backup-printer-definition-name	none	No
building-text	BUILDING	No
carriage-control-type	RECFM	No
chars	CHARS	No
copies	COPIES	Yes
department-text	DEPT	No
document-codepage	none	No
document-format	none	Yes
document-type	none	No
duplex	DUPLEX	Yes
fail-on-transform-error	none	No
filter-options	none	No
form-definition	FORMDEF	No
forms	FORMS	Yes
hold	HOLD OUTDISP (JES2 only)	No
input-tray	none	Yes

Table 21. Job attributes, corresponding JCL parameters, and whether they are validated for the printer (continued)

Job attribute	JCL parameter	Value validated for printer
input-tray-number	INTRAY	No
jes-form-length	FORMLEN	No
jes-priority	PRTY	No
mail-bcc-addresses	MAILBCC	No
mail-cc-addresses	MAILCC	No
mail-embedded-headers	none	No
mail-file-name	MAILFILE	No
mail-from-name	MAILFROM	No
mail-inline-message	none	No
mail-inline-text	none	No
mail-inline-text-attribute	none	No
mail-reply-address	REPLYTO	No
mail-to-addresses	MAILTO	No
name-text	NAME	No
output-bin	none	Yes
output-bin-number	OUTBIN	No
overlay-back	OVERLAYB	No
overlay-front	OVERLAYF	No
owner	USER	No
page-definition	PAGEDEF	No
pdf-author	none	No
pdf-digital-certificate-name	none	No
pdf-encryption-level	none	No
pdf-keywords	none	No
pdf-owner-identifier	none	No
pdf-protect	none	No
pdf-signature-contact	none	No
pdf-signature-location	none	No
pdf-signature-name	none	No
pdf-signature-reason	none	No
pdf-subject	none	No
pdf-title	none	No
pdf-user-accessibility-control-file	none	No

Table 21. Job attributes, corresponding JCL parameters, and whether they are validated for the printer (continued)

Job attribute	JCL parameter	Value validated for printer
pdf-user-identifier	none	No
print-error-reporting	DATACK	Yes
print-queue-name	PRTQUEUE	No
printer-ip-address	DEST=IP:	No
resource-directories	USERPATH	No
resource-library	USERLIB	No
restrict-printable-area	SYSAREA	No
room-text	ROOM	No
save-afp-statistics	AFPSTATS	No
shift-out-shift-in	PRMODE	No
sysout-dataset-name	DSNAME	No
sysout-job-id	none	No
sysout-job-name	job name	No
table-reference-characters	DCB OPTCD=J TRC	No
title-text	TITLE	No
trailer-transform-error-page	none	No
x-image-shift-back	OFFSETXB	No
x-image-shift-front	OFFSETXF	No
xf-options	none	No
y-image-shift-back	OFFSETYB	No
y-image-shift-front	OFFSETYF	No

Appendix B. JCL parameters and corresponding job attributes

lists parameters of the OUTPUT and DD JCL statements and the Infoprint Server job attributes that correspond to them.

Some job attributes, such as **document-format**, do not have corresponding JCL parameters (these attributes are listed at the end of). However, if you use IP PrintWay extended mode, you can specify the job attributes with the PRTATTRS JCL parameter. You can also specify job attributes in a batch application when you use the AOPPRINT JCL procedure and when you use the Print Interface subsystem.

If the same value is specified in more than one way, values are used in this order:

1. The job attribute specified by the SUBSYS JCL parameter. If the same job attribute is specified more than once, the first value is used.

2. The job attribute specified by the PRTATTRS JCL parameter. If the same job attribute is specified more than once, the first value is used.

3. The JCL parameter that corresponds to the job attribute (for example, the FORMDEF JCL parameter corresponds to the **form-definition** job attribute), specified on the DD JCL statement.

4. The JCL parameter that corresponds to the job attribute, specified on the OUTPUT JCL statement.

5. If the Print Interface subsystem is used, the printer attribute in the printer definition that corresponds to the job attribute (for example, the **form-definition** printer attribute corresponds to the **form-definition** job attribute).

Table 22. JCL parameters and corresponding job attributes

JCL parameter	Job attribute	Information about job attribute
ADDRESS	address-text	"address-text" on page 48
AFPPARMS	afp-parameters	"afp-parameters" on page 48
AFPSTATS	save-afp-statistics	"save-afp-statistics" on page 76
BUILDING	building-text	"building-text" on page 49
CHARS	chars	"chars" on page 50
COPIES	copies	"copies" on page 51
DATACK	print-error-reporting	"print-error-reporting" on page 72
DCB OPTCD=J	table-reference-characters	"table-reference-characters" on page 79
DEPT	department-text	"department-text" on page 51
DEST=IP:	printer-ip-address	"printer-ip-address" on page 73
DSNAME	sysout-dataset-name	"sysout-dataset-name" on page 77
DUPLEX	duplex	"duplex" on page 54
FORMDEF	form-definition	"form-definition" on page 56
FORMLEN	jes-form-length	"jes-form-length" on page 59
FORMS	forms	"forms" on page 57

Table 22. JCL parameters and corresponding job attributes (continued)

JCL parameter	Job attribute	Information about job attribute
HOLD[1] OUTDISP (JES2 only)	hold	"hold" on page 57
INTRAY	input-tray input-tray-number	"input-tray" on page 57
job name (on JOB statement)	sysout-job-name	"sysout-job-name" on page 78
MAILBCC	mail-bcc-addresses	"mail-bcc-addresses" on page 60
MAILCC	mail-cc-addresses	"mail-cc-addresses" on page 60
MAILFILE	mail-file-name	"mail-file-name" on page 61
MAILFROM	mail-from-name	"mail-from-name" on page 62
MAILTO	mail-to-addresses	"mail-to-addresses" on page 64
NAME	name-text	"name-text" on page 64
OFFSETXB	x-image-shift-back	"x-image-shift-back" on page 80
OFFSETXF	x-image-shift-front	"x-image-shift-front" on page 81
OFFSETYB	y-image-shift-back	"y-image-shift-back" on page 83
OFFSETYF	y-image-shift-front	"y-image-shift-front" on page 83
OUTBIN	output-bin output-bin-number	"output-bin" on page 65
OVERLAYB	overlay-back	"overlay-back" on page 66
OVERLAYF	overlay-front	"overlay-front" on page 66
PAGEDEF	page-definition	"page-definition" on page 67
PRMODE	shift-out-shift-in	"shift-out-shift-in" on page 76
PRTATTRS	none You can specify any job attribute, but IP PrintWay ignores **sysout-job-id** and **sysout-job-name**	"PRTATTRS='attribute=value ...' " on page 104
PRTQUEUE	print-queue-name	"print-queue-name" on page 73
PRTY	jes-priority	"jes-priority" on page 60
RECFM	carriage-control-type	"carriage-control-type" on page 49
REPLYTO	mail-reply-address	"mail-reply-address" on page 63
ROOM	room-text	"room-text" on page 76
SEGMENT	none	
SYSAREA	restrict-printable-area	"restrict-printable-area" on page 75
TITLE	title-text	"title-text" on page 79
TRC	table-reference-characters	"table-reference-characters" on page 79

Table 22. JCL parameters and corresponding job attributes (continued)

JCL parameter	Job attribute	Information about job attribute
USER	owner	"owner" on page 67
USERLIB	resource-library	"resource-library" on page 75
none	document-codepage[2]	"document-codepage" on page 52
none	document-format[2]	"document-format" on page 52
none	document-type[2]	"document-type" on page 53
none	fail-on-transform-error[2]	"fail-on-transform-error" on page 54
none	filter-options[2]	"filter-options" on page 55
none	mail-embedded-headers[2]	"mail-embedded-headers" on page 61
none	mail-inline-text[2]	"mail-inline-text" on page 63
none	pdf-author	"pdf-author" on page 67
none	pdf-digital-certificate-name	"pdf-digital-certificate-name" on page 68
none	pdf-encryption-level[2]	"pdf-encryption-level" on page 68
none	pdf-keywords	"pdf-keywords" on page 69
none	pdf-owner-identifier[2]	"pdf-owner-identifier" on page 69
none	pdf-protect[2]	"pdf-protect" on page 69
none	pdf-signature-contact	"pdf-signature-contact" on page 70
none	pdf-signature-location	"pdf-signature-location" on page 70
none	pdf-signature-name	"pdf-signature-name" on page 71
none	pdf-signature-reason	"pdf-signature-reason" on page 71
none	pdf-subject	"pdf-subject" on page 71
none	pdf-title	"pdf-title" on page 71
none	pdf-user-accessibility-control-file	"pdf-user-accessibility-control-file" on page 72
none	pdf-user-identifier[2]	"pdf-user-identifier" on page 72
none	sysout-job-id	"sysout-job-id" on page 77
none	sysout-job-name	"sysout-job-name" on page 78
none	trailer-transform-error-page[2]	
none	xf-options[2]	"xf-options" on page 82

1. When you use the Print Interface subsystem, you cannot specify the HOLD parameter on the DD JCL statement. However, you can specify the OUTDISP parameter on the OUTPUT JCL statement.
2. If you use IP PrintWay extended mode, you can specify this job attribute with the PRTATTRS JCL parameter.

Appendix C. NetSpool support for SCS code points

The NetSpool component of Infoprint Server converts the Systems Network Architecture character stream (SCS) for a logical unit (LU) type 1 printer into one of these data streams:

- Line data stream: If the administrator selects the **Convert to line** formatting option, NetSpool creates EBCDIC variable-length records, each record starts with an American Standards Association (ASA) carriage-control character.
- PCL data stream: If the administrator selects the **Convert to PCL** formatting option, NetSpool creates an ASCII text data stream with embedded PCL commands.

NetSpool returns these SNA sense codes for errors that are found in the SCS data stream:

- SNA sense code of function error (X'10030000') for undefined and unsupported code points.
- SNA sense code of parameter error (X'10050000') for supported code points with invalid parameters or without all parameters available in the same chain.
- SNA sense code of data error (X'10010000') for invalid characters in a DBCS string.

NetSpool passes all other unspecified code points to JES as text data to be printed.

For information about SCS data streams, see:

- *SNA - Sessions Between Logical Units*
- *IPDS and SCS Technical Reference*

Table 23 on page 177 describes the SCS code points that are supported and unsupported when NetSpool creates line data or PCL data streams.

Table 23. SCS code points. Yes=Supported; Ignore=NetSpool removes the control code from the data stream and does not report an error; Error=Undefined or unsupported code point-function or parameter error				
Control code	**EBCDIC**	**Name**	**Line support**	**PCL support**
BEL	X'2F'	Bell function	Ignore	Ignore
BS	X'16'	Back space	Yes	Yes
CR	X'0D'	Carriage return	Yes	Yes
EBS	X'36'	Expanded back space	Yes	Yes
ENP	X'14'	Enable presentation	Ignore	Ignore
ESP	X'E1'	Expanded space	Yes	Yes
FF	X'0C'	Form feed	Yes	Yes
GE	X'08'	Graphic escape[1]	Yes	Yes
HT	X'05'	Horizontal tab	Yes	Yes
IT	X'39'	Indent tab	Ignore	Ignore
IR	X'33'	Index return	Yes	Yes
INP	X'24'	Inhibit presentation	Ignore	Ignore
IFS	X'1C'	Interchange file separator	Yes	Yes
IGS	X'1D'	Interchange group separator	Yes	Yes

Control code	EBCDIC	Name	Line support	PCL support
IRS	X'1E'	Interchange record separator	Yes	Yes
IUS	X'1F'	Interchange unit separator	Yes	Yes
LF	X'25'	Line feed	Yes	Yes
NL	X'15'	New line	Yes	Yes
NULL	X'00'	Null	Ignore	Ignore
PP	X'34xxnn'	Presentation position (see Table 24 on page 181)	Yes	Yes
PPM	X'2BD2...'	Page presentation media (see "Presentation Page Media control" on page 181)	Ignore	Yes
RFF	X'3A'	Required form feed	Yes	Yes
RNL	X'06'	Required new line	Yes	Yes
RSP	X'41'	Required space	Yes	Yes
SA	X'28xxxx'	Set attribute (see Table 31 on page 184)	Yes	Ignore/Error
SBS	X'38'	Subscript	Ignore	Yes
SCI	X'2BDx'	Set chain image	Ignore	Ignore
SGEA	X'2BC8'	Set graphic error action	Ignore	Ignore
SHF	X'2BC1xx'	Set horizontal format (see Table 32 on page 184 and Table 33 on page 185)	Yes	Yes
SHY	X'CA'	Syllable hyphen	Yes	Yes
SI	X'0F'	Shift in[2]	Yes	Error
SLD	X'2BC602xx' or X'2BC601'	Set line density	Ignore	Yes
SLP	X'04C1'	Select left platen	Ignore	Ignore
SME	X'046x'	Select magnetic encoder	Error	Error
SO	X'0E'	Shift out[2]	Yes	Error
SOF	X'2BC3'	Start of format	Yes	Yes

Table 23. SCS code points. Yes=Supported; Ignore=NetSpool removes the control code from the data stream and does not report an error; Error=Undefined or unsupported code point-function or parameter error *(continued)*

Table 23. SCS code points. Yes=Supported; Ignore=NetSpool removes the control code from the data stream and does not report an error; Error=Undefined or unsupported code point-function or parameter error *(continued)*

Control code	EBCDIC	Name	Line support	PCL support
SPD	X'2BD20229' or X'2BD20429xxxx' **Tip:** X'2BD20229' indicates to set the print density to the default setting. **'xxxx'** specifies the number of characters per inch. This is a 2-byte binary number. The first byte is X'00' and the second byte is the print density hex value.	Set print density	Ignore	Yes
SPS	X'09'	Superscript	Ignore	Yes
SRP	X'04C2'	Select right platen	Ignore	Ignore
SSR	X'0450'	Secure string ID reader	Error	Error
STT	X'2BD1xx'	Set translate table	Ignore	Ignore
SUB	X'3F'	Substitute	Yes	Yes
SVF	X'2BC2'	Set vertical format (see Table 34 on page 186 and Table 35 on page 186)	Yes	Yes
TRN	X'35'	Transparent	Yes	Yes
UBS	X'1A'	Unit backspace	Ignore	Ignore
VCS	X'04xx' **Tip: 'xx'** is a 2-byte order. Byte 2 defines the function: • 50 Magnetic stripe reader - error • 60, 61 Magnetic stripe writer - error • 7A-7C Vertical channels 10 through 12 - skip to channel • 81-89 Vertical channels 01 through 09 - skip to channel • C1, C2 Select Left/Right Platten - ignore • Other - error	Vertical channel select	Yes	Yes
VT	X'0B'	Vertical tab	Yes	Yes
WUS	X'23'	Word underscore	Yes	Yes

Table 23. SCS code points. Yes=Supported; Ignore=NetSpool removes the control code from the data stream and does not report an error; Error=Undefined or unsupported code point-function or parameter error *(continued)*				
Control code	**EBCDIC**	**Name**	**Line support**	**PCL support**
1. The NetSpool Graphic Escape exit replaces Graphic Escape characters with other printable characters. 2. Shift Out (SO) indicates the start of a string of double-byte character set (DBCS) data. Shift In (SI) indicates the end. Valid characters in the DBCS string are X'4040' and any pair of bytes, each in the range X'41' to X'FE'. NetSpool rejects invalid characters and DBCS strings that do not complete in the same chain with an SNA sense code of data error (X'10010000').				

Presentation Position command

The Presentation Position command (X'34xxnn') is a 3-byte command that moves the print head to a new horizontal or vertical position. The movement can be absolute or relative to the current column or line. Byte 2 is the function code. Byte 3 is a relative or absolute line or column number. NetSpool supports this command when it converts the input data stream to either a line data or a PCL data stream.

The movement can be absolute or relative to the current column or line. There are variations of movement with or without erase that are intended for display devices only. "Erase to new position and return to former position" commands are ignored. "Move with erase" creates the same output as "move without erase". Movement to the right inserts blank columns in the line. Movement to the left causes the current line to be written and a new blank line set up for overstrike starting at the specified column. Movement to a higher line number causes the current line and some blank lines to be written. Movement to a lower line number causes the current line, a form feed, and some number of blank lines to be written.

Byte 1	Byte 2 (xx) function code	Function parameter	Function parameter action (line data and PCL)	Byte 3 (nn) value parameter
X'34'	X'C0'	Absolute, Horizontal (no erase)	Move Presentation Position and do not erase	1-byte binary number that denotes either absolute or relative column number
	X'C1'	Absolute, Horizontal (erase, return)	NetSpool ignores this function code	
	X'C2'	Absolute, Horizontal (erase, move)	Erase line to and move to new Presentation Position	
	X'C4'	Absolute, Horizontal (no erase)	Move Presentation Position and do not erase	
	X'C5'	Absolute, Horizontal (erase, return)	NetSpool ignores this function code	
	X'C6'	Absolute, Horizontal (erase, move)	Erase Column to new Presentation Position and move to new Presentation Position	
	X'C8'	Absolute, Horizontal (no erase, move)	Move Presentation Position and do not erase	
	X'C9'	Absolute, Horizontal (erase, return)	NetSpool ignores this function	
	X'4A'	Absolute, Horizontal (erase, move)	Erase line through, and move to new Presentation Position	
	X'4C'	Absolute, Horizontal (erase, move)	Move Presentation Position and do not erase	
	X'4D'	Absolute, Horizontal (erase, return)	NetSpool ignores this function	
	X'4E'	Absolute, Horizontal (erase, move)	Erase column through new Presentation Position and move to new Presentation Position	

Table 24. Presentation Position X'34xxnn'

Presentation Page Media control

The Presentation Page Media control (X'2BD2') selects paper sources and specifies simplex or duplex printing. NetSpool supports this control only when it converts the input data stream to a PCL data stream.

Byte 1
> X'2B'

Byte 2
> X'D2'

Byte 3
> *nn* count (see Table 25 on page 182)

Byte 4
> X'48'

Byte 5
> X'00'

Byte 6
> X'00'

Byte 7
> FC forms control (see Table 26 on page 182)

Byte 8
> SD source drawer (see Table 27 on page 183)

Byte 9
> DDO destination drawer offset (see Table 28 on page 183)

Byte 10
> DD destination drawer (see Table 29 on page 183)

Byte 11
> X'00'

Byte 12
> DX simplex or duplex (see Table 30 on page 183)

Tip: The "l" in the PCL commands in the following tables is a lowercase "L".

Table 25. Presentation Page Media (2BD2) nn (count byte)

nn (count byte)	Description	PCL command
X'02'	Select tray 1	<ESC>&l1H
X'05'	Use FC byte to select paper menu/source	
X'06'	Use FC byte to select source drawer	
X'0A'	Use FC, SD, and DX bytes	

Table 26. Presentation Page Media (2BD2) FC (forms control byte)

FC (forms control byte)	Description	PCL command
X'00'	Ignore	
X'01'	Use SD byte	
X'02'	Select auxiliary tray	<ESC>&l4H
X'03' X'04'	Select auxiliary tray - manual feed	<ESC>&l2H
X'FF'	Select tray 1	<ESC>&l1H
other values	Use SD byte	

Table 27. Presentation Page Media (2BD2) SD (source drawer byte)

SD (source drawer byte)	Description	PCL command
X'00'	Ignore	
X'01' X'FF'	Select tray 1	<ESC>&l1H
X'02'	Select tray 2	<ESC>&l5H
X'03'	Select tray 3	<ESC>&l7H
X'04'	Select auxiliary feeder	<ESC>&l2H
X'05'	Select tray 4	<ESC>&l8H
X'06'	Select tray 5	<ESC>&l9H
other values	Use tray 1	<ESC>&l1H

Table 28. Presentation Page Media (2BD2) DDO (destination drawer offset)

DDO (destination drawer offset)	Description	PCL command
X'00'	Ignore	
other values	Offset	<ESC>&l1T

Table 29. Presentation Page Media (2BD2) DD (destination drawer byte)

DD (destination drawer byte)	Description	PCL command
X'00'	Ignore	
X'01'	Select default output bin	<ESC>&l1G
X'02'	Select output bin 2	<ESC>&l2G
X'03'	Select output bin 3	<ESC>&l3G
X'04'	Select output bin 4	<ESC>&l4G
other values	Select default output bin	<ESC>&l1G

Table 30. Presentation Page Media (2BD2) DX (duplex or simplex byte)

DX (duplex or simplex byte)	Description	PCL command
X'00'	Ignore	
X'01'	Simplex	<ESC>&l0S
X'02'	Duplex	<ESC>&l1S
X'03'	Tumble duplex	<ESC>&l2S

SCS Set Attribute control

Byte 1	Byte 2 function parameter	Function description	Byte 3 value	Line data support	PCL support
X'28'	X'00'	Reset characteristics	X'00'	Reset to single-byte character set	NetSpool ignores this function
	X'41'	Highlighting	Any value	NetSpool ignores this function	NetSpool ignores this function
	X'42'	Color	Any value	NetSpool ignores this function	NetSpool ignores this function
	X'43'	Character Set	• X'00' • X'F8' • Other values	• Reset character set to single-byte character set. • Start of double-byte character set data. • Error	• Error • Error • Error
	X'C2'	Field Outlining	Any value	NetSpool ignores this function	NetSpool ignores this function

Table 31. SCS Set Attribute (X'28xxyy')

Note: Set Attribute X'2843F8' indicates the start of double-byte character set (DBCS) data. Set Attribute X'284300', X'280000', or end-of-chain indicates the end. Valid characters in the DBCS string are X'4040' and any pair of bytes, each in the range X'41' to X'FE'. NetSpool rejects invalid characters with an SNA sense code of data error (X'10010000').

NetSpool converts SA code points that indicate the start and end of a DBCS string into Shift Out (SO) and Shift In (SI) line-data controls. NetSpool converts valid SCS code points in the DBCS string to the appropriate line-data controls, delimited by SI and SO line-data controls.

Set Horizontal Format (SHF)

describes the parameters that can be used with the SHF code point.

SHF parameter	Name	Range	NetSpool default
MPP	Maximum line length	1 - 255	80 (The administrator can change the default in the printer definition in the Printer inventory.)

Table 32. Set Horizontal Format parameters

Table 32. Set Horizontal Format parameters (continued)			
SHF parameter	**Name**	**Range**	**NetSpool default**
LM	SCS left margin (position of first column)	1 - MPP	1 (The administrator can change the default in the printer definition in the Printer inventory.)
RM	SCS right margin (position of last column)	LM - MPP	MPP (The administrator can change the default in the printer definition in the Printer inventory.)
HT	SCS horizontal tab settings		

SHF can be converted to a sequence of PCL Left Margin and PCL Right Margin commands. The horizontal tab settings, if specified, are saved for use with the SCS Horizontal Tab control.

The definition in the Content column of explains what values you can use in the corresponding column positions.

Table 33. Set Horizontal Format	
Bytes	**Content**
1 - 2	X'2BC1'
3	Count of bytes after byte 2. It must be in the range 1 - 255 (count includes itself).
4 (optional)	MPP • 0 means to leave the hardware default • 1 - 255 are valid line lengths in the columns
5 (optional)	LM • 0 means to leave the hardware default • 1 - MPP are valid column positions
6 (optional)	RM • 0 means to leave the current MPP (hardware default or this command) • LM - MPP are valid column positions
7 - 257 (optional)	HT • 0 is ignored • LM-RM are valid column positions

Set Vertical Format (SVF)

describes the parameters that can be used with the SVF code point.

Table 34. Set Vertical Format parameters

SVF parameter	Name	Range	NetSpool default
MPL	Maximum number of lines per page	1 - 255	1 (The administrator can change the default in the printer definition in the Printer inventory.)
TM	SCS top margin (position of first line)	1 - MPL	1 (The administrator can change the default in the printer definition in the Printer inventory.)
BM	SCS bottom margin	MPL (If not specified the current MPL is used. The default of 1 indicates that the page length is controlled by form feeds placed in the data stream.)	MPL (The administrator can change the default in the printer definition in the Printer inventory.)
VT	SCS vertical tab settings		

SVF can be converted to a sequence of PCL Top Margin and PCL Page Length commands. The vertical tab settings, if specified, are saved for use with the SCS Vertical Tab or Vertical Channel Select control.

The definition in the Content column of explains what values you can use in the corresponding column positions.

Table 35. Set Vertical Format convert to PCL

Bytes	Content
1 - 2	X'2BC2'
3	Count of bytes after byte 2. It must be in the range 1 - 255 (count includes itself).
4 (optional)	MPL or page length • 0 means to leave the hardware default • 1 - 255 are valid page lengths in lines
5 (optional)	TM and Channel 01 • 0 means to leave the hardware default • 1 - MPL are valid line numbers
6 (optional)	BM • 0 means to leave the current MPL (hardware default or this command) • TM - MPL are valid line numbers

Table 35. Set Vertical Format convert to PCL (continued)	
Bytes	**Content**
7 - 257 (optional)	VT (7 - 18 are also channels 02 - 12) • 0 is ignored • TM+1-BM are valid line numbers

Appendix D. NetSpool support for 3270 data streams code points

The NetSpool component of Infoprint Server converts 3270 data streams for logical unit (LU) type 0 and type 3 into one of these data streams:

- Line data stream: If the administrator selects the **Convert to line** formatting option, NetSpool creates EBCDIC variable-length records, with each record starting with an American Standards Association (ASA) carriage-control character.
- PCL data stream: If the administrator selects the **Convert to PCL** formatting option, NetSpool creates an ASCII text data stream with embedded PCL commands.

Table 36 on page 189, Table 37 on page 190, and Table 38 on page 191 describe the code points that are supported for 3270 data streams.

For information about 3270 data streams, see:

- *IBM 3270 Information Display System Reference Summary*
- *IBM 3270 Information Display System 3274 Control Unit Description*
- *IBM 3270 Information Display System Data Stream Programmer's Reference*
- *IBM 3270 Kanji Data Streams*

Command codes

Only one command is allowed in each RU chain. The command must be the first byte of the RU chain.

Table 36 on page 189 describes the code points that are supported for 3270 data streams.

Table 36. 3270 data stream command codes		
Command code	**EBCDIC**	**Name**
W	X'F1'	Write
EW	X'F5'	Erase/Write
EWA	X'7E'	Erase/Write Alternate
EAU	X'6F'	Erase All Unprotected
Other command codes		Function not supported—returns SNA sense code X'1003000'

Control codes

The control codes have an EBCDIC value in the range of X'00' through X'3F'. Table 37 on page 190 describes the code points that are supported for 3270 data streams and also explains if it is fully supported.

Control code	EBCDIC	Name	Line support	PCL support
Table 37. 3270 data stream control codes. Yes=The control code is supported; Ignore=NetSpool removes the control code from the data stream and does not report an error; Error=NetSpool returns an SNA sense code X'1003000'.				
CR	X'0D'	Carriage Return	Yes	Yes
EM	X'19'	End of Message	Yes	Yes
EUA	X'12'	Erase Unprotected to Address	Yes	Yes
FF	X'0C'	Form Feed	Yes[1]	Yes[1]
GE	X'08'	Graphic Escape[2]	Yes	Yes
IC	X'13'	Insert Cursor	Yes	Yes
MF	X'2C'	Modify Field (see Table 38 on page 191)	Yes	Yes
NL	X'15'	New Line	Yes	Yes
PT	X'05'	Program Tab	Yes	Yes
RA	X'3C'	Repeat to Address	Yes	Yes
SA	X'28'	Set Attribute (see Table 38 on page 191)	Yes	Yes
SBA	X'11'	Set Buffer Address	Yes	Yes
SF	X'1D'	Start Field	Yes	Yes
SFE	X'29'	Start Field Extended (see Table 38 on page 191)	Yes	Yes
SI	X'0F'	Shift in	Yes	Error
SO	X'0E'	Shift out	Yes	Error
SYN	X'32'	SYN Character	Ignore	Ignore
Other control codes			Error	Error

1. The form feed (FF) control must occupy the first print position on a line. To put the FF control in the first position, place X'0C' after a Write Control Character, an NL control, or a CR control. The FF is printed as a space character.
2. The NetSpool Graphic Escape exit replaces Graphic Escape characters with other printable characters.

Attribute types

describes the attribute types that are supported for 3270 data streams.

Table 38. 3270 data stream attribute types. N/A=The attribute type does not apply to the order; X=The attribute type does apply to the order.

Attribute type	EBCDIC	SFE, MF orders	SA order	Comments
Character Attribute Reset	X'00'	N/A	X	Sets character set attribute to single-byte character set (default).
Character Set	X'43'	X	X	When attribute value is X'00' - X'7F', character set attribute is set to single-byte. When attribute value is X'F8' - X'FE', character set attribute is set to double-byte. However, a value in this range is an error when converting to PCL.

3270 Field Attribute	X'C0'	X	N/A	Field attribute bit definitions supported:
				
				• Bit 2 = B'0'
				
				  Field is unprotected.
				
				• Bit 2 = B'1'
				
				  Field is protected.
				
				• Bits 4,5 = B'11'
				
				  Field is nonprintable.
				
				• Bits 4,5
				
				  Other settings are ignored.
				
				All other bit definitions are ignored.

Other Valid Attributes	X'41', X'42', X'45', X'46', X'C2'	X	X	Ignored. The default is no operation. Attributes are ignored.
Invalid Attributes		X	X	Function not supported. Returns SNA sense code X'1003000'.

Appendix E. 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 z/OS web page (www.ibm.com/systems/z/os/zos/webqs.html) 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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