z/OS

Infoprint Server User's Guide

z/OS

Infoprint Server User's Guide

> **Note:**
>
> Before using this information and the product it supports, read the information in "Notices" on page 243.

Eighth Edition (July 2005)

This edition applies to these IBM products:
- Version 1, Release 5 of z/OS (program number 5694-A01)
- Version 1, Release 5 of z/OS.e (program number 5655-G52)
- Version 1, Release 1, Modification Level 1 of Infoprint Server Transforms (program number 5697-F51)

This edition applies to all subsequent releases and modifications until otherwise indicated in new editions.

This edition replaces S544-5746-06.

> **Internet**
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> - www.ibm.com/printers
> - www.ibm.com/servers/eserver/zseries/zos/

A form for comments is provided at the back of this book. If the form has been removed, you can send comments by fax to 1-800-524-1519 (USA only) or 1-303-924-6873; by e-mail to `printpub@us.ibm.com`; or by mail to:

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Contents

Figures

Tables

About this book

This book describes how to print jobs using these products:
- Infoprint® Server, an element of z/OS® Version 1 Release 5 (5694-A01) and higher, and an element of z/OS.e Version 1 Release 5 (5655-G52) and higher
- Infoprint Server Transforms Version 1 Release 1 (V1.1), a separate IBM® program product (5697-F51)

  Note: IBM Infoprint Transforms Version 2 Release 1 (V2.1) replace the equivalent features of Infoprint Server Transforms V1.1. For information about the V2.1 transforms, see these books instead:
  – *Infoprint Transforms to AFP for z/OS*, G550-0443
  – *Infoprint Transforms from AFP for z/OS*, G550-0444

You can do these tasks:
- Submit jobs to Infoprint Server from these operating systems:
  – z/OS UNIX® System Services
  – z/OS, using Job Control Language (JCL)
  – z/OS, using 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®
    - OS/400®
    - Novell NetWare
- Query printer names, printer locations, or print job status
- Cancel print jobs
- Transform print jobs to the Advanced Function Presentation™ (AFP™) data stream using z/OS UNIX System Services commands
- Transform print jobs from the AFP data stream using z/OS UNIX System Services commands

Who should read this book

This book is for anyone who prints or transforms jobs using Infoprint Server.

How this book is organized

This book is divided into these chapters:
- Chapter 1, "Introducing Infoprint Server," on page 1 is an overview of Infoprint Server.
- Chapter 2, "Printing from z/OS UNIX System Services using Infoprint Server commands," on page 27 describes the commands that are used to do these tasks:
  – Submit jobs to Infoprint Server from z/OS UNIX System Services

- Query jobs and printer definitions
- Cancel jobs
- Chapter 3, "Transforming files using transform commands," on page 49 describes the commands for converting files from one format to another using Infoprint Server Transforms V1.1.
- Chapter 4, "Using job attributes," on page 97 lists the Infoprint Server attributes that describe jobs and the documents in them and explains how to use these attributes.
- Chapter 5, "Printing from batch applications using DD and OUTPUT JCL statements," on page 129 describes how to use standard JCL to submit batch jobs to Infoprint Server from z/OS.
- Chapter 6, "Printing using the AOPPRINT JCL procedure," on page 181 describes a JCL procedure for submitting batch print jobs to Infoprint Server from z/OS.
- Chapter 7, "Transforming data with the AOPBATCH program," on page 187 describes how to use standard JCL to submit batch transform jobs to Infoprint Server.
- Chapter 8, "Printing from VTAM applications," on page 193 describes concepts that users of VTAM applications, such as Customer Information Control System (CICS®) or Information Management System (IMS™), must understand to use Infoprint Server.
- Chapter 9, "Printing from Windows systems," on page 201 describes how to submit jobs to Infoprint Server from a Windows workstation and how to install the Infoprint Port Monitor for Windows.
- Chapter 10, "Printing from remote non-Windows systems," on page 213 describes how to submit and query jobs from non-Windows workstations where TCP/IP is installed.
- Chapter 11, "Printing using the lprafp command," on page 221 describes how to submit print requests from Windows systems and UNIX systems.
- Appendix A, "Job attributes and JCL parameters valid for different printer types," on page 223 shows whether job attributes and JCL parameters are validated for individual printers.
- Appendix B, "JCL parameters and corresponding job attributes," on page 225 lists parameters of the OUTPUT and DD JCL statements and the Infoprint Server job attributes that correspond to them.
- Appendix C, "NetSpool support for SCS code points," on page 227 and Appendix D, "NetSpool support for 3270 data streams code points," on page 237 list the code points in VTAM data streams that Infoprint Server supports.
- Appendix E describes accessibility features of Infoprint Server and Infoprint Server Transforms.

This book also contains a bibliography and an index.

The Infoprint Server glossary is located in *z/OS Infoprint Server Customization.*

How to read syntax diagrams

This section explains the general notations that this book uses in syntax diagrams. For ease of reading, this book breaks some examples into several lines. However, when you enter a command, enter it all on one line. Do not press Enter until you have typed the entire command.

This notation:	Means:	You enter:	For example:	
			This book 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`
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 REF`	`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

This section describes where to find information related to z/OS, Infoprint Server, and Infoprint Server Transforms V1.1.

Web sites

These Web sites contain related information:

This site:	Contains:
www.ibm.com/printers	Information about IBM printers and printing software

This site:	Contains:
http://www.ibm.com/printers/download.html	Downloads, including: • Infoprint Port Monitor • AFP Viewer plug-in • AFP Printer Driver • **lprafp** command • Network Printer Manager (NPM) for the Web
www.ibm.com/servers/eserver/zseries/zos/	Information about z/OS
www.ibm.com/servers/eserver/zseries/zos/bkserv/	z/OS documentation, including: • All z/OS books • Updates from APARs and PTFs
www.ibm.com/redbooks	IBM redbooks, including a redbook for Infoprint Server
www.ibm.com/servers/eserver/zseries/zos/unix/	Information about z/OS UNIX System Services

Using LookAt to look up message explanations

LookAt is an online facility that lets you look up explanations for most of the IBM messages you encounter, as well as for some system abends and codes. Using LookAt to find information is faster than a conventional search because in most cases LookAt goes directly to the message explanation.

You can use LookAt from these locations to find IBM message explanations for z/OS elements and features, z/VM, VSE/ESA™, and Clusters for AIX and Linux™:

- The Internet. You can access IBM message explanations directly from the LookAt Web site at http://www.ibm.com/eserver/zseries/zos/bkserv/lookat/.
- Your z/OS TSO/E host system. You can install code on your z/OS or z/OS.e systems to access IBM message explanations using LookAt from a TSO/E command line (for example: TSO/E prompt, ISPF, or z/OS UNIX System Services).
- Your Microsoft® Windows workstation. You can install code to access IBM message explanations on the *z/OS Collection* (SK3T-4269) using LookAt from a Microsoft Windows command prompt (also known as the DOS command line).
- Your wireless handheld device. You can use the LookAt Mobile Edition with a handheld device that has wireless access and an Internet browser (for example: Internet Explorer for Pocket PCs, Blazer, or Eudora for Palm OS, or Opera for Linux handheld devices). Link to the LookAt Mobile Edition from the LookAt Web site.

You can obtain code to install LookAt on your host system or Microsoft Windows workstation from a disk on your *z/OS Collection* (SK3T-4269), or from the LookAt Web site (select **Download** and then select the platform, release, collection, and location that suit your needs). More information is available in the LOOKAT.ME files available during the download process.

Preventive Service Planning information

Before installing Infoprint Server, you should review the current Preventive Service Planning (PSP) information, also called the *PSP bucket*. You should also periodically review the current PSP information. The PSP upgrade ID is: ZOSV1R5. 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 shipped several weeks prior to installation.

Infoprint Server migration information

For information about the tasks required to migrate from z/OS V1R2, V1R3, or V1R4 to z/OS V1R5, see:

- *z/OS Migration*: This book describes the tasks required to migrate to z/OS V1R5, including the migration tasks for Infoprint Server.
- *z/OS V1R2.0 Infoprint Server Migration*, G544-5743-04: This book describes how to use the Infoprint Server migration program (**aopmig**). This migration program can help you migrate from the IP PrintWay and NetSpool features of PSF V3R2 and earlier releases. Notice that this book is in the z/OS V1R2 – V1R4 libraries.

For information about new functions in z/OS V1R5, see:

- *z/OS Introduction and Release Guide*: This book describes the new functions available in z/OS V1R5, including the new functions in Infoprint Server.
- *z/OS Infoprint Server Introduction*: This book describes the new functions in Infoprint Server for z/OS V1R5.

For information about new and changed messages and interfaces in z/OS V1R5, see *z/OS Summary of Message and Interface Changes*.

Books

This section lists related books that can help you use Infoprint Server, Infoprint Server Transforms V1.1, Infoprint Transforms V2.1, and other IBM transform products. For a list of the books referred to in this book, and for books that contain additional information about related products, see "Bibliography" on page 247. For books for all z/OS products, see *z/OS Information Roadmap*.

Table 1. Books for Infoprint Server and Infoprint Server Transforms V1.1

Book	Form number
z/OS Infoprint Server Introduction Introduces Infoprint Server and Infoprint Server Transforms V1.1. This book contains printing scenarios that show how you can use Infoprint Server in your installation.	S544-5742
z/OS Infoprint Server Customization Describes customization tasks for Infoprint Server and Infoprint Server Transforms V1.1. This book 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.	S544-5744
z/OS Infoprint Server Operation and Administration Describes operator procedures and administrative tasks for Infoprint Server and Infoprint Server Transforms V1.1. This book describes how to start and stop Infoprint Server and how the operator can use Infoprint Central. It describes how the administrator can create entries in the Printer Inventory using either ISPF panels or the Printer Inventory Definition Utility (PIDU) program and define NetSpool printer LUs to VTAM.	S544-5745

Table 1. Books for Infoprint Server and Infoprint Server Transforms V1.1 (continued)

Book	Form number
z/OS Infoprint Server User's Guide Describes user tasks for Infoprint Server and Infoprint Server Transforms V1.1. This book 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 supported by Infoprint Server; and how to download and install the Infoprint Port Monitor for Windows.	S544-5746
z/OS Infoprint Server Messages and Diagnosis Describes messages from Infoprint Server and Infoprint Server Transforms V1.1. It also describes how to use Infoprint Server tracing facilities to diagnose and report errors.	G544-5747

Table 2. Books for Infoprint Transforms V2.1 and other IBM transform products

Book	Form number
Infoprint Transforms to AFP for z/OS Describes IBM Infoprint Transforms to AFP V2.1 for z/OS (5655-N60). This book describes using transforms, customizing transforms, administering transforms, diagnosing errors, messages, and migrating from Infoprint Server Transforms V1.1.	G550-0443
Infoprint Transforms from AFP for z/OS Describes V2.1 of these IBM products: • Infoprint Transform for AFP to HP PCL for z/OS (5655-P19) • Infoprint Transform for AFP to Adobe PDF for z/OS (5655-P20) • Infoprint Transform for AFP to Adobe PostScript for z/OS (5655-P21) This book describes using transforms, customizing transforms, administering transforms, diagnosing errors, messages, and migrating from Infoprint Server Transforms V1.1.	G550-0444
Infoprint XML Extender for z/OS Describes how to plan for, configure, and submit jobs with Infoprint XML Extender for z/OS.	S544-5855
Infoprint XT Extender for z/OS: Customization and Usage Describes how to customize and use Infoprint XT™ Extender for z/OS.	S544-5879

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 help system, select the question mark (?) in the left navigation bar. To view the help for a particular Web page, select the question marks (?) or the **Help** buttons on the Web page.

Summary of changes

This book contains information previously presented in S544-5746-06, which supports z/OS Version 1 Release 5.

This book contains information about functions that have been added in these PTFs:

- Infoprint Server PTFs and documentation APARs:
  - PTF UA10508
  - PTF UA10629
  - PTF UA10894
  - PTF UA11455
  - PTF UA12485
  - PTF UA13169
  - PTF UA13310
  - PTF UA14959
  - PTF UA15124
  - PTF UA15768
  - PTF UA16412
  - PTF UA16523
  - PTF UA18196
  - PTF UA18366
  - PTF UA18719
  - PTF UA19484
  - PTF UA19544
  - APAR OA12047
- Infoprint Server Transforms V1.1 PTFs and documentation APARs:
  - PTFs UA12816 and UW79806 for the AFP to PCL transform
  - PTFs UA12817 and UW79807 for the AFP to PostScript transform
  - PTFs UA12818 and UW79808 for the AFP to PDF transform
  - PTF UA15500 for the Coax Printer Support feature
  - APAR OA12003 for the PDF to AFP transform
  - APAR OA12465 for the AFP to PCL, PDF, and PostScript AFP transforms

New information

- Infoprint Server now also works with Infoprint Transforms V2.1.

- IP PrintWay™ extended mode can now print on VTAM-controlled printers, so the restriction that you must use IP PrintWay basic mode to print on VTAM-controlled printers has been removed. In addition, when you use IP PrintWay extended mode, you can now use the **copies** job attribute (see "copies" on page 102) and the **COPIES** JCL parameter (see page 141).

- The list of the fonts that are built in to the **pcl2afp** transform has been added. See "Limitations" on page 76.

- Information has been added about these new job attributes for encrypting PDF documents:
  - "pdf-encryption-level" on page 117
  - "pdf-owner-identifier" on page 117
  - "pdf-protect" on page 118
  - "pdf-user-identifier" on page 118

- Information has been clarified about the **USERLIB** JCL parameter. See page 164.
- The Infoprint Port Monitor now runs on Windows Server 2003 in addition to Windows 2000 and Windows XP.
- Information has been added about the **lprafp** command. See Chapter 11, "Printing using the lprafp command," on page 221.

Deleted information
- Support for Windows Millennium Edition (Me) has been removed because Microsoft no longer supports it.

This book contains terminology, maintenance, and editorial changes, including changes to improve consistency and retrievability. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

This book has been enabled for these types of advanced searches in the online z/OS LibraryCenter: *commands* and *examples*.

**Summary of changes
for S544-5746-06
z/OS Version 1 Release 5**

This book contains information previously presented in S544-5746-05, which supports z/OS Version 1 Release 5.

This book contains information about functions that have been added in these PTFs:
- UA08503
- UA09632
- UA09853
- UA09984
- PTF for APAR OA07179
- PTF for APAR OA07389
- PTF for APAR OA07390
- PTF for APAR OA07399
- PTF for APAR OW55583
- PTF UA08986 (for PSF V3R3) or PTF UA08987 (for PSF V3R4)

New information
- Information has been added about the **resource-directories** job attribute. See "resource-directories" on page 120.
- Information has been added about the **save-afp-statistics** job attribute. See "save-afp-statistics" on page 122.

This book contains terminology, maintenance, and editorial changes, including changes to improve consistency and retrievability. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

**Summary of changes
for S544-5746-05
z/OS Version 1 Release 5**

This book contains information previously presented in S544-5746-04, which supports z/OS Version 1 Release 2 – Version 1 Release 4.

New information

- Information has been added about Infoprint Central, a Web-based print management system. If you are authorized, you can use Infoprint Central to work with print jobs, printers, and NetSpool™ logical units; to display printer definitions; and to check system status. See "Infoprint Central" on page 23.
- The limitation that the transforms from AFP do not support TrueType and OpenType fonts in AFP documents has been added. See "afp2pcl—Transform AFP data to PCL data" on page 52, "afp2pdf—Transform AFP data to PDF data" on page 59, and "afp2ps—Transform AFP data to PostScript data" on page 67.
- Information has been added about the **xml2pdf** command, which works with IBM Infoprint XML Extender for z/OS. See "xml2pdf—Transform XML to PDF data" on page 95.
- Information has been added about the **x2afp** command, which works with IBM Infoprint XT Extender for z/OS. See "x2afp—Transform Xerox files to AFP data" on page 96.
- Information has been added about these new job attributes for e-mail:
  - "mail-bcc-addresses" on page 110
  - "mail-cc-addresses" on page 111
  - "mail-file-name" on page 111
  - "mail-from-name" on page 112
  - "mail-reply-address" on page 112
  - "mail-to-addresses" on page 113
- Information has been added about the new **owner** job attribute for NetSpool. See "owner" on page 116. Information has also been added about embedding the **owner** job attribute and other job attributes for NetSpool jobs in print data. See "Embedding job attributes in print data" on page 198.
- The descriptions of the **printer-ip-address** job attribute and the **DEST=IP:** JCL parameter state that if a printer has an IPv6 address, you must specify the host name of the printer instead of the colon-hexadecimal format.
- Information has been added about the **restrict-printable-area** job attribute. See "restrict-printable-area" on page 122.
- Information has been added in "JCL parameters for printing with IP PrintWay" on page 139 about these new JCL parameters for e-mail:
  - **MAILBCC** parameter
  - **MAILCC** parameter
  - **MAILFILE** parameter
  - **MAILFROM** parameter
  - **MAILTO** parameter
  - **REPLYTO** parameter
- Information has been added about JCL parameters for IP PrintWay extended mode. See "JCL considerations for IP PrintWay extended mode" on page 155.

Deleted information

- Support for Windows 98 and Windows NT® has been removed because Microsoft no longer supports them.

This book contains terminology, maintenance, and editorial changes, including changes to improve consistency and retrievability. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

This book has been enabled for these types of advanced searches in the online z/OS LibraryCenter: *commands*.

**Summary of changes
for S544-5746-04
z/OS Version 1 Release 2**

This book contains information previously presented in S544-5746-03, which supports z/OS Version 1 Release 2.

New information

- Information has been added about Infoprint XML Extender for z/OS.
- The description of the **printer-ip-address** job attribute and the **DEST=IP:** JCL parameter state that Infoprint Server does not currently support the colon-hexadecimal format of an IP address introduced in z/OS Communications Server Version 1 Release 4.

Deleted information

- Support for Windows 95 has been removed because Microsoft no longer supports Windows 95.

This book contains terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

You might notice changes in the style and structure of some content in this book–for example, headings that use uppercase for the first letter of initial words only, and procedures that have a different look and format. The changes are ongoing improvements to the consistency and retrievability of information in our books.

**Summary of changes
for S544-5746-03
z/OS Version 1 Release 2**

This book contains information previously presented in S544-5746-02, which supports z/OS Version 1 Release 2.

This book describes functions that have been added in PTFs after the initial release of z/OS V1R2. Make sure that your installation has applied these Infoprint Server PTFs; otherwise, some information in this book might not be accurate for your system:

- PTF UW85178
- PTF UW87698
- PTF UW88108
- PTF UW88209

New information

- Batch applications can now use the new Print Interface subsystem. The Print Interface subsystem can automatically transform data from one data format to another before writing the output to the JES spool. These sections describe this support:
  - "Transforming output data" on page 133 compares the different methods you can use to transform data, including the Print Interface subsystem.

- – "Transforming data using the Print Interface subsystem" on page 136 describes how to use the Print Interface subsystem.
- – "JCL parameters for the Print Interface subsystem" on page 165 describes how to code the required SUBSYS parameter on the DD JCL statement.
- – These JCL examples show how to use the Print Interface subsystem:
  - - "Print line or AFP data on a PostScript printer using the Print Interface subsystem" on page 178
  - - "Print PostScript, PCL, or PDF data on an IBM AFP printer using the Print Interface subsystem" on page 179
- – Appendix A, "Job attributes and JCL parameters valid for different printer types," on page 223 lists the JCL parameters for which the administrator can specify supported values. Before the Print Interface subsystem accepts data sets to print, it validates that the values specified in these JCL parameters are supported values.
- – Appendix B, "JCL parameters and corresponding job attributes," on page 225 lists all Infoprint Server job attributes that you can specify when you use the Print Interface subsystem, including those that do not have corresponding JCL parameters.
- These sections describe Infoprint Port Monitor Version 2.0.0:
  - – "Installing Infoprint Port Monitor" on page 202 describes how to install the Infoprint Port Monitor.
  - – "Adding and configuring a local printer for Infoprint Port Monitor" on page 204 describes how to add a Windows printer and configure an Infoprint Port, including how to select the new **Unattended port** option.
  - – "Uninstalling Infoprint Port Monitor" on page 211 describes how to uninstall the Infoprint Port Monitor.
- Chapter 4, "Using job attributes," on page 97 describes three new Infoprint Server job attributes that let you specify the data set name, job ID, and job name for data sets that Infoprint Server creates to print your documents. The data set name is used as the name of an the e-mail attachment when you send a document to an e-mail destination instead of to a printer.
  - – **sysout-dataset-name**
  - – **sysout-job-id**
  - – **sysout-job-name**

Deleted information
- Infoprint Port Monitor Version 2.0 no longer writes temporary files. Therefore, information about how to specify a directory for Port Monitor temporary files has been removed.

This book contains terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

Summary of changes
for S544-5746-02
z/OS Version 1 Release 2

This book contains information previously presented in S544-5746-01, which supports z/OS Version 1 Release 2.

New information
- Information is added to indicate this book supports z/OS.e.

- IP PrintWay now lets you send print output to an e-mail destination instead of to a printer. These sections describe how to send print output to an e-mail destination using different print submission methods:
  - **lp** command:
    - "Sending a file to an e-mail destination" on page 36
    - "Send multiple files to an e-mail destination specified in the printer definition" on page 40
  - DD and OUTPUT JCL statements:
    - "Sending output to an e-mail destination" on page 130
    - "Send two data sets to an e-mail destination as text data" on page 175
    - "Send line or AFP data to an e-mail destination as PDF data and print the AFP data on an AFP printer" on page 176
    - "Send line or AFP data to an e-mail destination as AFP data" on page 176
  - AOPPRINT JCL procedure:
    - "Sending a file to an e-mail destination" on page 181
    - "Send a file to an e-mail destination" on page 185
  - VTAM applications: "Sending output to an e-mail destination" on page 200
  - Windows systems: "Sending a file to an e-mail destination" on page 208
  - Non-Windows remote systems: "Sending a file to an e-mail destination" on page 214
- "title-text" on page 126 describes the **title-text** job attribute, which you can now use to specify a title for an e-mail and a title that a printer's LPD can print on a separator page.
- "JCL parameters for printing with IP PrintWay" on page 139 describes the TITLE JCL parameter, which you can now use to specify a title for an e-mail and a title that a printer's LPD can print on a separator page.
- A new appendix describes accessibility features of Infoprint Server and Infoprint Server Transforms.

Changed information
- "Printing from a Novell NetWare client" on page 219 describes how to print from Novell NetWare without using LANRES. z/OS no longer supports LANRES.
- The term *UNIX files* is now used instead of *HFS files* to refer to files that are in any type of hierarchical file system. For example, UNIX files can include files in a Hierarchical File System (HFS), a Network File System (NFS), a temporary file system (tfs), or the zSeries® File System (zFS).
- This book is no longer divided into parts.

Deleted information
- The glossary has been removed and is now located in *z/OS Infoprint Server Customization*.

This book contains terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

**Summary of changes
for S544-5746-01
z/OS Version 1 Release 2**

This book contains information previously presented in S544-5746-00, which supports z/OS Version 1 Release 1.

New information

- NetSpool now can convert VTAM application print data to PCL format for printing on PCL printers. These sections describe this new support:
  - Chapter 8, "Printing from VTAM applications," on page 193
  - Appendix C, "NetSpool support for SCS code points," on page 227 describes which SCS code points NetSpool supports when it converts SCS data streams to PCL data streams.
  - Appendix D, "NetSpool support for 3270 data streams code points," on page 237 describes which 3270 code points NetSpool supports when it converts 3270 data streams to PCL data streams.
- Print Interface and IP PrintWay now provide enhanced copy support:
  - The **copies** job attribute now lets you specify more than 255 copies, as described in "copies" on page 102.
  - IP PrintWay now can print multiple copies on remote printers that either contain an LPD or support the direct sockets printing protocol. Restrictions about printing copies on these types of printers have been removed.
- "Transform and print data sets" on page 190 shows the JCL required to transform data, save the transformed output to a file, and print the file in the same job.
- The SAP to AFP transform now supports SAP R/3 Release 4.6C, as well as earlier SAP R/3 releases. The SAP to AFP transform produces monochrome output only.
- The AFP to PCL, AFP to PDF, and AFP to PostScript transforms do not support IOCA Color Plus image objects (IOCA FS45), which was recently added to the AFP architecture. Also, the AFP to PCL transform does not support scaling of fonts.

  These sections describe these limitations:
  - "afp2pcl—Transform AFP data to PCL data" on page 52
  - "afp2pdf—Transform AFP data to PDF data" on page 59
  - "afp2ps—Transform AFP data to PostScript data" on page 67
- "Using the print command" on page 210 describes how to use the Windows **print** command to print a file to Infoprint Server.
- Chapter 5, "Printing from batch applications using DD and OUTPUT JCL statements," on page 129 describes how to specify the DSNAME parameter on the DD JCL statement. The DSNAME parameter can help you to identify your printed output and locate your output data sets on the JES spool.

Changed information

- The **lp** command lets you print only one file at a time if the data must be transformed from one format to another before printing or if files have different data formats. "lp—Print a file" on page 33 describes these limitations.
- The **lpstat** command lets you specify the **-a**, **-o**, **-p**, and **-u** options multiple times. Also, to specify more than one value in these options, you must enclose the values in quotation marks. "lpstat—Show printer names and locations and status of print jobs" on page 43 describes these considerations.
- When you use a z/OS UNIX command to transform data to or from the AFP data stream format and you want to write the output to an MVS™ data set, you must allocate and catalog the data set prior to running the transform command. If you use the AOPBATCH procedure to run the transform command, you can allocate the output MVS data set in the AOPBATCH job. These sections describe this requirement:
  - "afp2pcl—Transform AFP data to PCL data" on page 52
  - "afp2pdf—Transform AFP data to PDF data" on page 59

- – "afp2ps—Transform AFP data to PostScript data" on page 67
- – "pcl2afp—Transform PCL data to AFP data" on page 74
- – "pdf2afp and ps2afp—Transform PDF or PostScript data to AFP data" on page 79
- – "sap2afp—Transform SAP OTF or ABAP data to AFP data" on page 89
- – "AOPBATCH DD statements" on page 188

Deleted information

- The AFP Printer Driver and AFP Viewer are no longer shipped with Infoprint Server. Therefore, information about how to install them has been removed. However, you can continue to download these programs from the Web at:

  `http://www.ibm.com/printers/download.html`

- You can no longer view **man** pages or receive messages in Spanish. Therefore, information about Spanish **man** pages and messages has been removed.

This book contains terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

Chapter 1. Introducing Infoprint Server

Infoprint Server provides support for LAN and host printing on your z/OS system. It works together with data stream transforms that other IBM products provide. Figure 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. If you are viewing the PDF file, components of Infoprint Server are displayed in yellow, while Infoprint Server Transforms is displayed in blue. Following the figure is a description of each component.
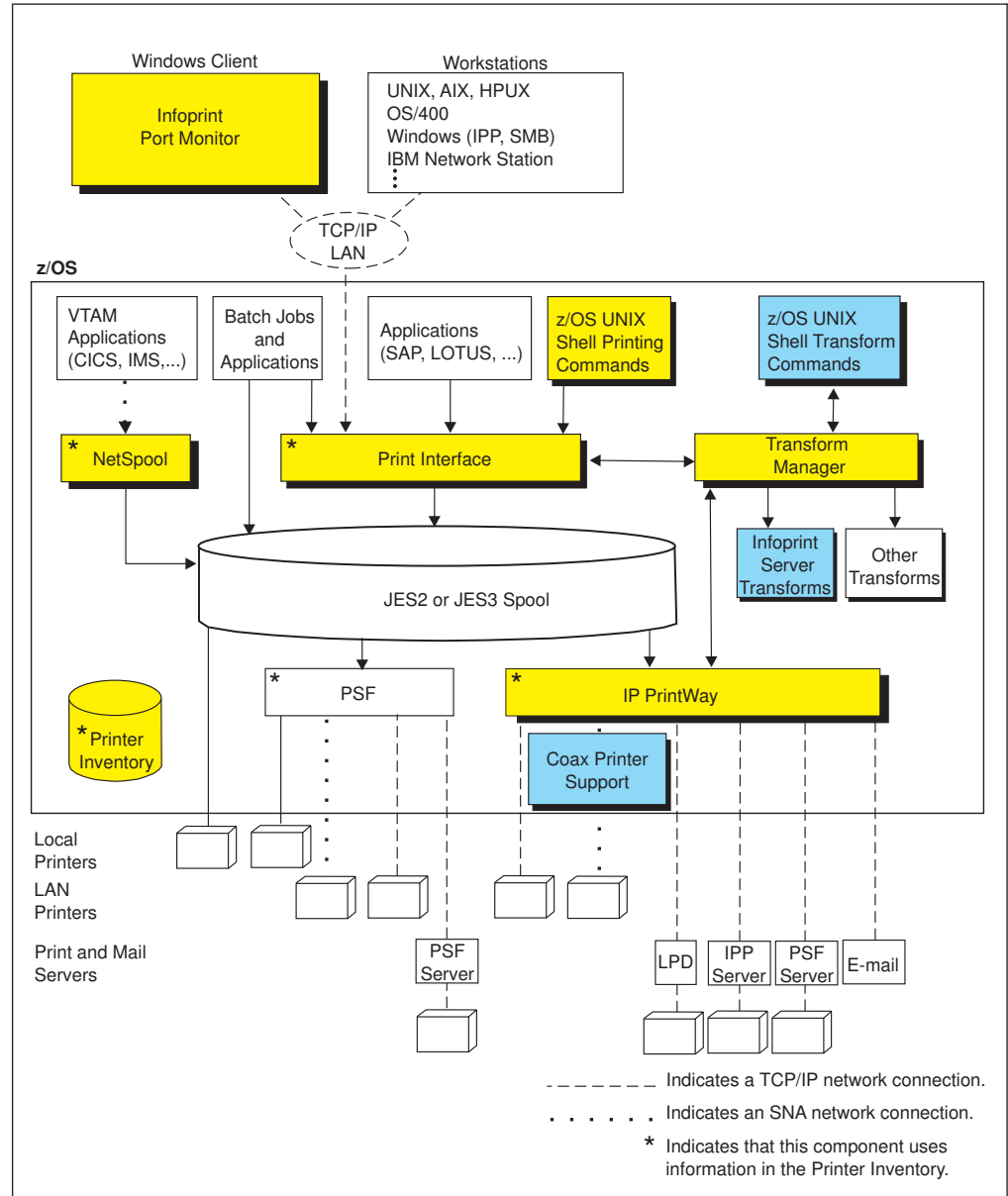
Figure 1. Infoprint Server system diagram

Printer Inventory and Printer Inventory Manager
>The Printer Inventory Manager controls the Printer Inventory. The Printer Inventory consists of files in the z/OS UNIX file system (HFS or zFS) that contain information about each printer and e-mail destination. The Printer Inventory also contains system configuration information for IP PrintWay and Print Services Facility (PSF) for z/OS.

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 or SNA network and to e-mail 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 Manager
>The Infoprint Server Transform Manager manages transforms that Infoprint Server Transforms and other IBM transform products provide.

Infoprint Central (not shown in figure)
>Infoprint Central is a Web-based application that lets help desk operators work with print jobs (output data sets) on the JES spool, printers controlled by IP PrintWay extended mode or PSF, and NetSpool logical units. It also lets operators see system status and printer definitions.

Simple Network Management Protocol (SNMP) subagent (not shown in figure)
>The SNMP subagent lets you use an SNMP manager to view printer characteristics and printer status for printers that PSF controls and that do not have internal SNMP agents or that are not TCP/IP-attached to PSF.

Infoprint Server Transforms and other transforms (separate products)
>IBM provides products that transform data streams from one format to another. These products are separate from Infoprint Server.

PSF for z/OS (separate product)
>Print Services Facility (PSF) (5655–B17) prints output on IBM AFP printers. The PSF system programmer can specify printer configuration information in the Printer Inventory for PSF to use when it starts a printer.

Printer Inventory Manager

The Printer Inventory Manager component of Infoprint Server controls the Printer Inventory. The Printer Inventory consists of HFS or 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 at the same or different levels on other systems.

The administrator can create these types of objects in the Printer Inventory:

Printer definitions
Contain information about printers and e-mail 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 for PSF FSSs.

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

Figure 2 shows how the administrator can create objects in the Printer Inventory and which components of Infoprint Server use the Printer Inventory.
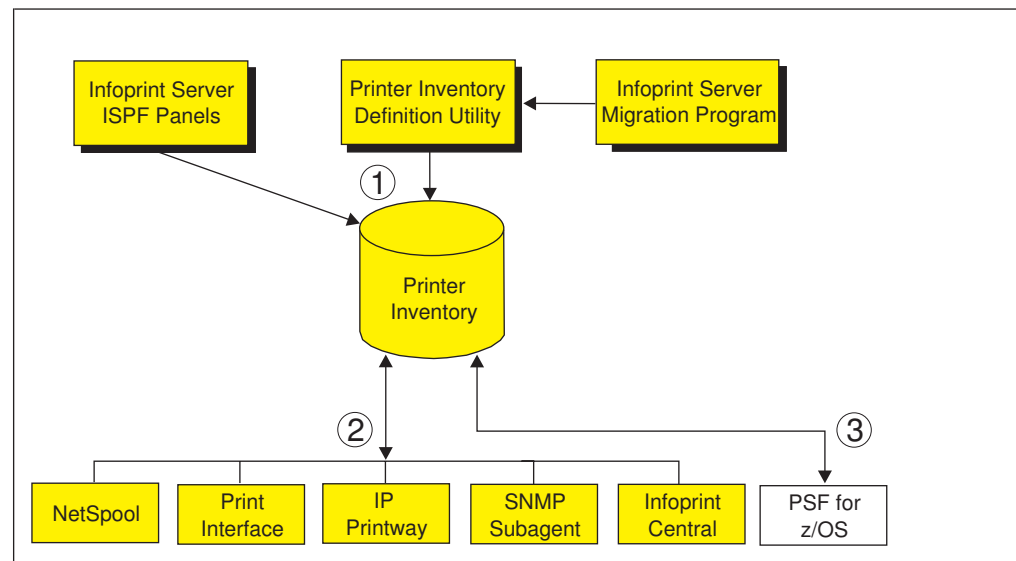
Figure 2. Printer Inventory Manager system diagram

1. The administrator can use Infoprint Server ISPF panels and the Printer Inventory Definition Utility (PIDU) to create and maintain the Printer Inventory. The 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.
   - The SNMP subagent uses printer information that PSF stores in the Printer Inventory about PSF printers.
   - Infoprint Central displays Printer Inventory information.

3. PSF, a separate product, can, as an option, use printer configuration information that the PSF system programmer specifies in FSS and FSA definitions in the Printer Inventory. The printer configuration information in the FSS and FSA definitions is the same as the configuration information that the system programmer can alternatively specify in PSF startup procedures and PSF exits.

   When the printer configuration information is specified in the Printer Inventory:
   - The PSF system programmer can change the information without restarting all PSF printers in the PSF functional subsystem (FSS). Only the PSF printers with changed configuration information need to be restarted.
   - Authorized operators can use Infoprint Central to work with PSF-controlled printers. For example, operators can start and stop (that is, drain) printers, change JES work-selection criteria, pause, and interrupt printers.

   For information about how the PSF system programmer can customize PSF to use the Printer Inventory, see *PSF for z/OS: Customization*.

Additional functions that the Printer Inventory Manager provides are:
- **Common message log**

  The common message log lets you see messages from most Infoprint Server components in one place. The log contains messages from all components of Infoprint Server except for IP PrintWay basic mode. Also, it does not contain messages from transform products.

  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 Infoprint Central users can view messages for selected print jobs and IP PrintWay printers.
  - 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.
  - Infoprint Server administrators can send all or selected messages to the z/OS system log (SYSLOG) or operations log (OPERLOG) for message automation.

- **Historical Inventory**

  The Historical Inventory contains information about data sets that Infoprint Server has processed but that are no longer on the JES spool because they finished processing or were deleted. Infoprint Central lets authorized users display information about data sets (called *print jobs*) in the Historical Inventory.

- **Migration program**

  The Infoprint Server migration program helps the administrator move printer information located in PSF startup procedures to the Printer Inventory. It automatically creates PSF FSS and FSA definitions in the Printer Inventory.

The migration program can also help the administrator migrate from the IP PrintWay and NetSpool features of PSF V3R2 and earlier releases. The migration program merges printer information in NetSpool print characteristics data sets, NetSpool tables, NetSpool startup procedures, and IP PrintWay routing and options data sets to create objects (such as printer definitions and printer pool definitions) in the Infoprint Server Printer Inventory.

- **Security**

  You can use RACF® to restrict access to the Printer Inventory, the common message log, and operator commands that start and stop Infoprint Server daemons.

Windows client

The Infoprint Server Windows client consists of this program:

Infoprint Port Monitor
Software that runs on a Windows workstation. It lets you 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.

Notes:

1. The Infoprint Port Monitor runs on Windows 2000, Windows Server 2003, and Windows XP. The Infoprint Port Monitor also runs on Windows 98, NT, and Millennium Edition (Me), although IBM no longer supports it on these systems. This is because Microsoft no longer supports these operating systems.

2. Infoprint Server also supports printing from a Windows system with the Server Message Block (SMB) protocol and the Internet Printing Protocol (IPP). To use these protocols, Windows users do not need to install the Infoprint Port Monitor.

These related products also run on Windows systems. Although they are not part of the Infoprint Server Windows client, you might want to use them if your installation has IBM AFP printers or AFP documents:

- **AFP Printer Driver for Windows**

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

  Lets you view documents in AFP format. For example, documents downloaded from the z/OS system or documents on the Web. The viewer also lets you print AFP documents on IBM AFP printers and on non-AFP printers.

The Infoprint Port Monitor is shipped with Infoprint Server. You can also download it, the AFP Printer Driver for Windows, or the AFP Viewer Plug-in for Windows directly to your Windows system from the IBM Printing Systems Web site:
`http://www.ibm.com/printers/download.html`

Print Interface

The Print Interface component of Infoprint Server processes print requests received from both remote clients and local users. Figure 3 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.
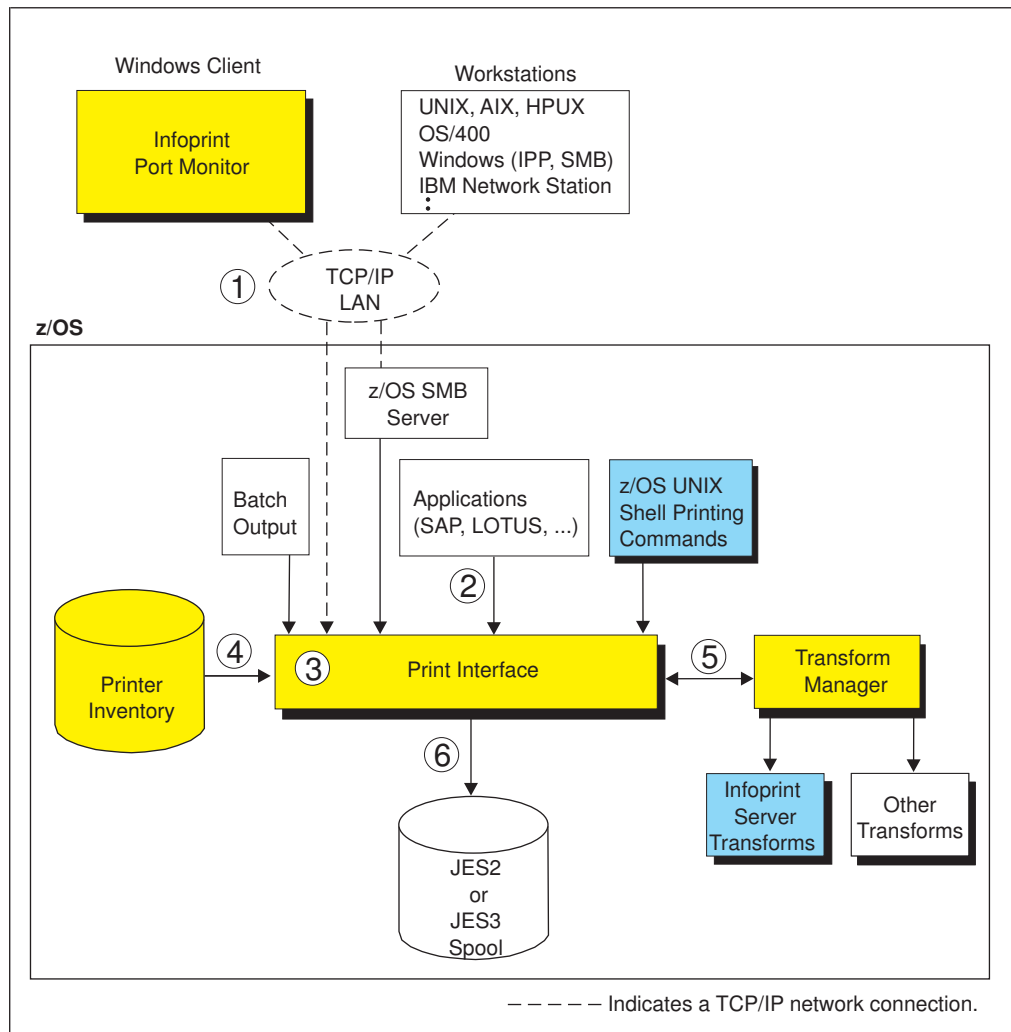
Figure 3. Print Interface system diagram

1. Users can submit print requests and query job status from remote clients in the TCP/IP network, using 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. Infoprint Server provides this client (see "Windows client" on page 5).
     - The **lprafp** command for Windows and UNIX systems. This command lets you specify Infoprint Server job attributes. You can download this command from `http://www.ibm.com/printers/download.html`.
     - 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.

- Server Message Block (SMB) printing protocol: SMB is the standard printing protocol that Windows systems use. The z/OS SMB server must be installed on the z/OS system to receive print requests. The z/OS SMB server uses Print Interface callable services to allocate output data sets on the JES spool and return print job status to the client.

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

   - Print Interface subsystem: Using the Print Interface subsystem, you can transform and print output data created by a batch application with minimal changes to your JCL.
   - AOPPRINT: 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: 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.
   - Infoprint Server SAP Output Management System (OMS): 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 e-mail 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 IBM transform products to transform data into other formats for printing or e-mailing.

6. For each print request, Print Interface dynamically allocates an output data set on the JES2 or JES3 spool using JES allocation parameters 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 IBM 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 IBM 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 e-mailing.

  Print Interface can transform data to AFP format for printing on IBM AFP printers using any of these IBM transform products:

- Infoprint Transforms to AFP V2.1 for z/OS (5655-N60). It provides PCL to AFP, PDF to AFP, PostScript to AFP, and SAP R/3 SAPGOF to AFP transforms.
- Infoprint XML Extender for z/OS (5655-J66). It provides an XML to AFP transform.
- Infoprint XT Extender for z/OS (5655-J65). It provides an XT (Xerox) to AFP transform.
- Infoprint Manager for AIX (5785–E42) or Infoprint Manager for Windows (5639–I27). They provide PCL to AFP, PDF to AFP, and PostScript to AFP transforms.
- Infoprint Server Transforms V1.1 (5697-F51). It provides PCL to AFP, PDF to AFP, PostScript to AFP, and SAP R/3 SAPGOF to AFP transforms. (This product is no longer marketed.)

Print Interface can transform data to PCL, PostScript, or PDF format for printing or e-mailing using any of these IBM transform products:

- Infoprint Transform for AFP to HP PCL V2.1 for z/OS (5655-P19). It provides an AFP to PCL transform.
- Infoprint Transform for AFP to Adobe PDF V2.1 for z/OS (5655-P20). It provides an AFP to PDF transform.
- Infoprint Transform for AFP to Adobe PostScript V2.1 for z/OS (5655-P21). It provides an AFP to PostScript transform.
- Infoprint XML Extender for z/OS (5655-J66). It provides an XML to PDF transform.
- Infoprint Server Transforms V1.1 (5697-F51). It provides AFP to PCL, AFP to PostScript, and AFP to PDF transforms. (This product is no longer marketed.)

- **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 processing of a document is complete and the data set has been 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*) have completed successfully, have been retained due to failed transmission to LAN printers, or were 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 writing 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. The OMS and Callback daemon let SAP users 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, visit the SAP Web site at `www.sap.com/solutions/compsoft/cspdirectory`. "Print Interface with an SAP R/3 application server on the z/OS system" describes this support.

  The Print Interface LPD can print documents received from an SAP R/3 application server running on another system, such as an AIX or Windows system. "Print Interface with an SAP R/3 application server on a remote system" on page 11 describes this support.

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

Figure 4 on page 10 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 running on other SAP R/3 systems, provided that the SAP spool work process runs on the z/OS system.
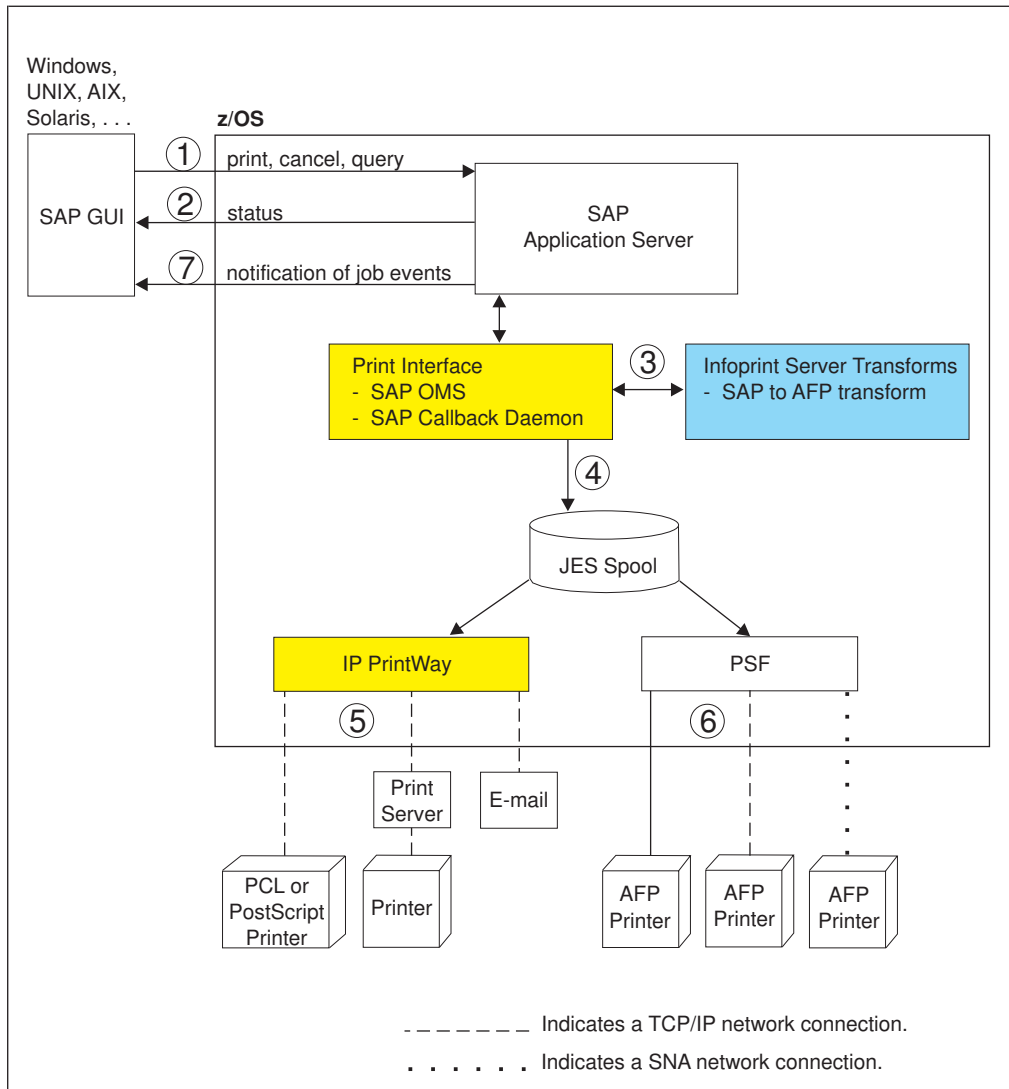
Figure 4. Printing SAP R/3 documents with an SAP R/3 application server running on a z/OS system

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 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 detects the data format of the input document and does different processing depending on the type of data:

   - If SAP OTF or ABAP data is to be printed on an AFP printer, Print Interface calls the SAP to AFP transform to transform the data to AFP format. The administrator must specify the SAP to AFP transform filter in the printer definition.

   - If PCL or PostScript data is to be printed on an IP PrintWay-controlled printer, Print Interface typically does not modify the data. However, the administrator can specify a filter that modifies data in the printer definition.

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 e-mail destinations.

6. PSF selects data sets from the JES spool and prints them on IBM 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 shows how the Print Interface LPD and an SAP R/3 application server running 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.
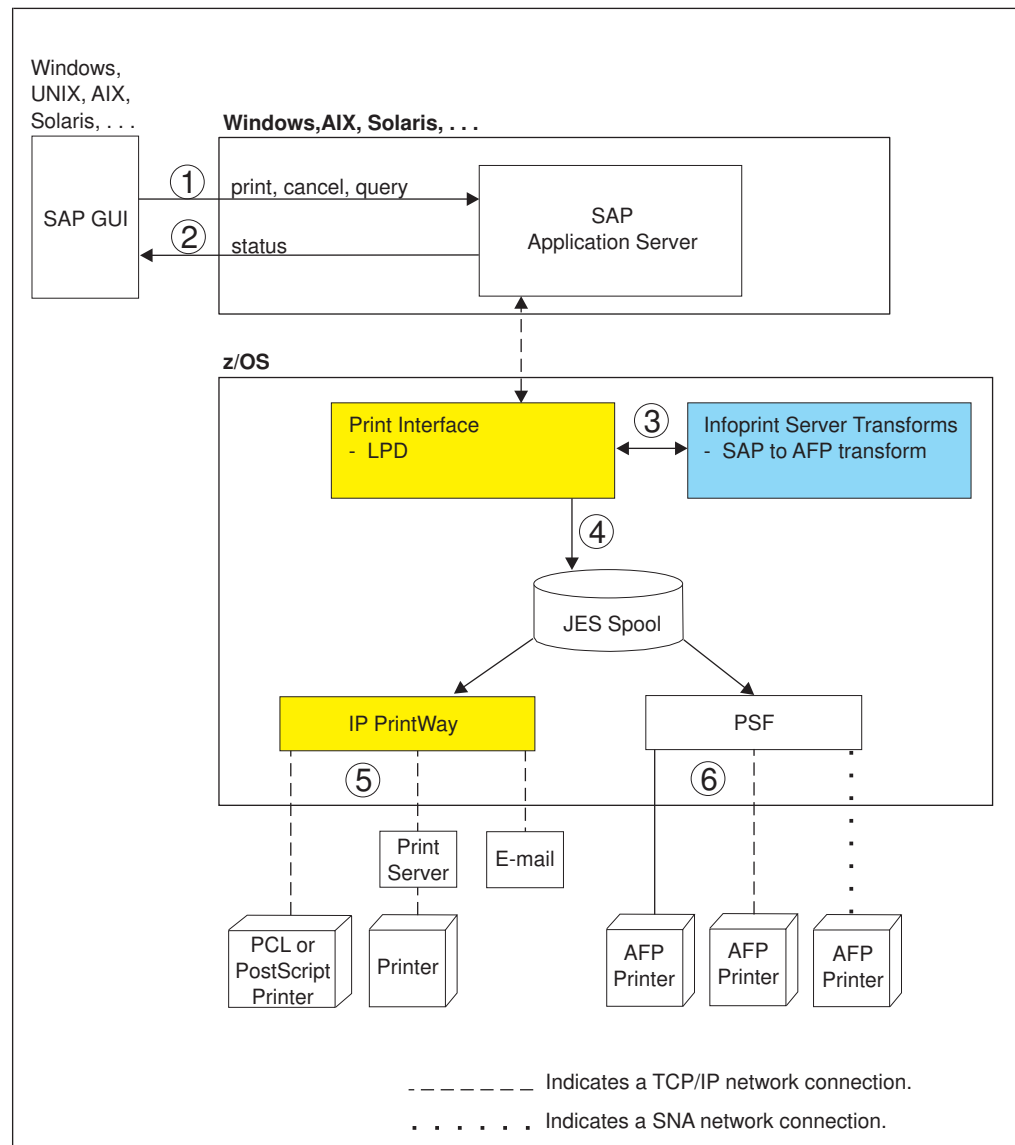
Figure 5. Printing SAP R/3 documents with an SAP R/3 application server running on a non-z/OS system

1. From an SAP R/3 GUI, users make print, cancel, job query, and device query requests to an SAP R/3 application server running 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, the Print Interface LPD detects the data format of the input document and does different processing depending on the type of data:
   - If SAP OTF or ABAP data is to be printed on an AFP printer, Print Interface calls the SAP to AFP transform to transform the data to AFP format. The administrator must specify the SAP to AFP transform filter in the printer definition.
   - If PCL or PostScript data is to be printed on an IP PrintWay-controlled printer, Print Interface typically does not modify the data. However, the administrator can specify a filter that modifies data in the printer definition.

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 e-mail destination.

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

6. PSF selects data sets from the JES spool and prints them on IBM 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 13 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.
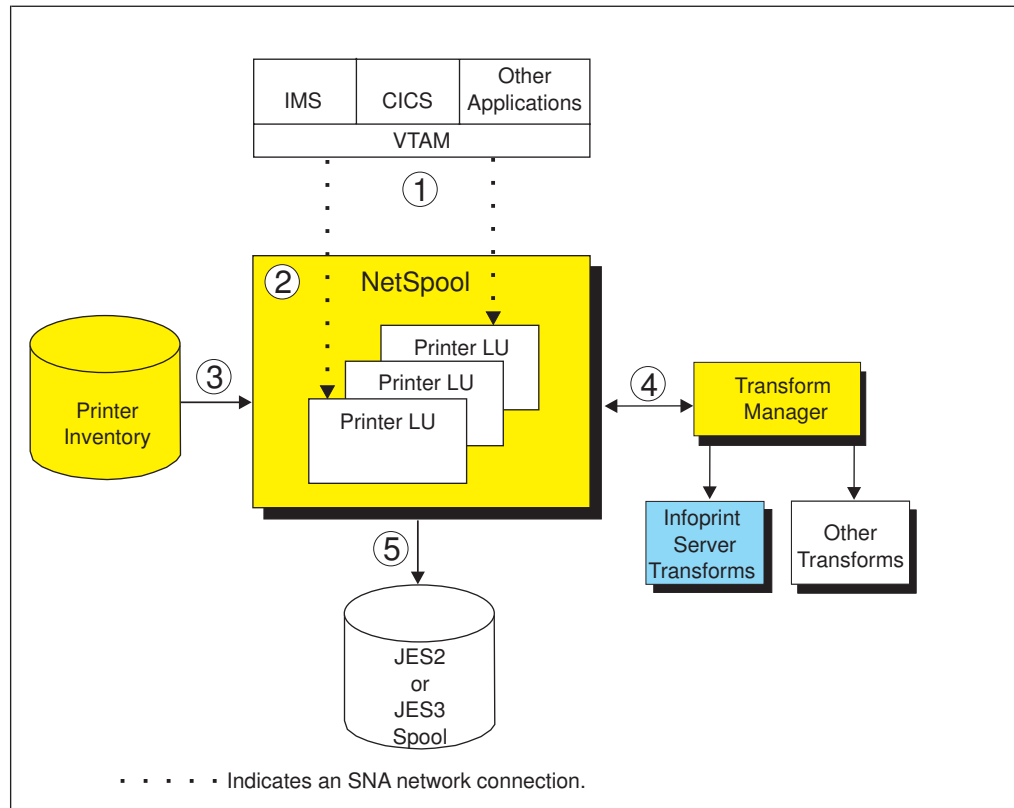
Figure 6. NetSpool system diagram

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 IBM transform products to convert line data to other formats for printing or e-mailing.

5. NetSpool dynamically allocates output data sets on the JES2 or JES3 spool using JES allocation parameters 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 uses these parameters when printing data on IBM AFP printers.

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

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

  NetSpool can transform data to PDF or PostScript format using any of these IBM transform products. (NetSpool first transforms SCS and 3270 data to line data, and then uses the transform):

  - Infoprint Transform for AFP to Adobe PDF V2.1 for z/OS (5655-P20). It provides an AFP to PDF transform.
  - Infoprint Transform for AFP to Adobe PostScript V2.1 for z/OS (5655-P21). It provides an AFP to PostScript transform.
  - Infoprint Server Transforms V1.1 (5697-F51). It provides AFP to PDF and AFP to PostScript transforms. (This product is no longer marketed.)

  For information about how NetSpool transforms SCS and 3270 data streams to line data or PCL format, see Appendix C, "NetSpool support for SCS code points," on page 227 and Appendix D, "NetSpool support for 3270 data streams code points," on page 237.

- **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 due to 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 e-mail 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 e-mail 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 additional enhancements to IP PrintWay basic mode.
- IP PrintWay extended mode, new in z/OS V1R5, 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 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.
- **Virtual Telecommunications Access Method (VTAM):** IP PrintWay can print on printers that are defined to VTAM as LU type 0, LU type 1, or LU type 3. Supported output data streams are SNA character string (SCS) and Data Stream Compatible/Data Stream Extended (DSC/DSE).

  IP PrintWay uses one of these products to convert line data streams to SCS or DSC/DSE data streams and transmit the data to printers:

  – Infoprint Coaxial Printer Support V2.1 for z/OS (5655-N62)
  – Coax Printer Support feature of Infoprint Server Transforms V1.1 (5697-F51) (This product is no longer marketed)
- **E-mail:** IP PrintWay can use the z/OS UNIX sendmail function to send print output to one or more e-mail addresses. IP PrintWay sends the output, which can be in any data format, as an e-mail attachment.

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 e-mail destinations. This restriction does not apply to IP PrintWay extended mode.

Figure 7 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 e-mail destination and then deletes them from the JES spool. An explanation of each step follows.
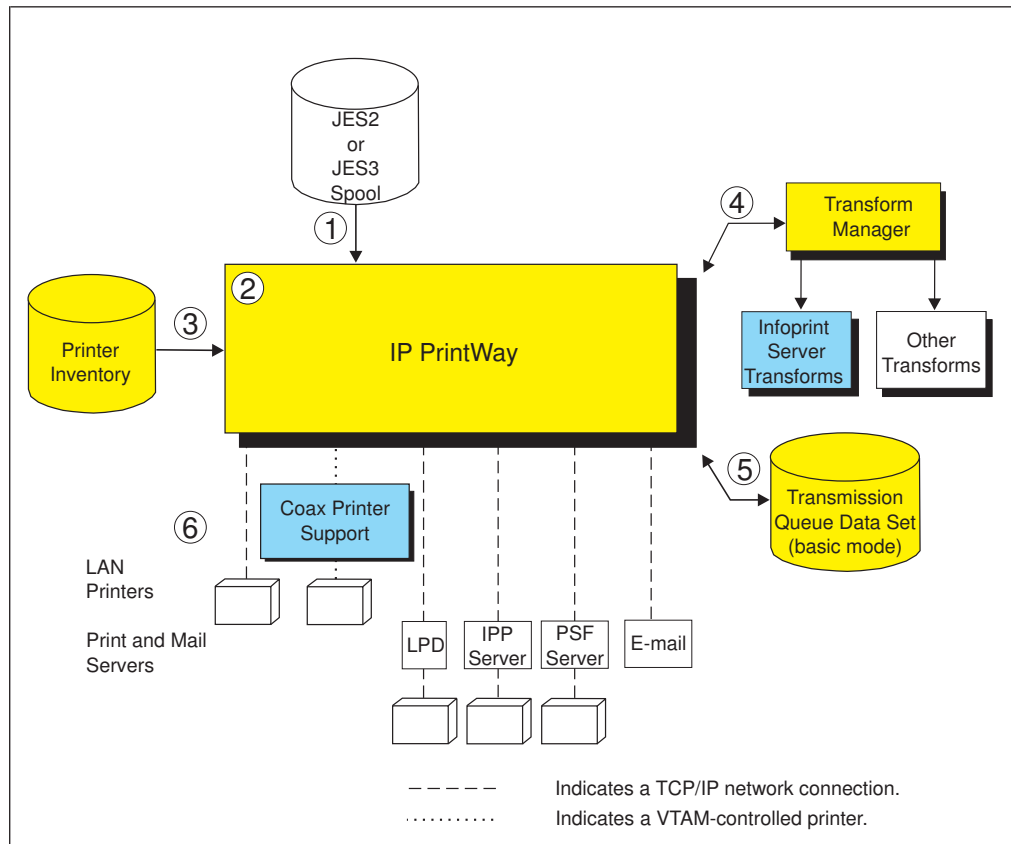
Figure 7. IP PrintWay system diagram

1. IP PrintWay selects output data sets from the JES spool. IP PrintWay can select data sets that were allocated on the JES spool by NetSpool or Print Interface, or data sets submitted from z/OS batch jobs using 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 JES 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.

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 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 has 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 using the carriage-control characters in line data, an FCB, or pagination attributes specified in the printer definition.

4. IP PrintWay extended mode can, in most cases, automatically detect the input data format and transform data into the format required by the printer or e-mail destination. IP PrintWay basic mode can transform data by resubmitting the data stream to Print Interface. To do some transforms, IP PrintWay uses transforms that other IBM 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 has retained on the JES spool. In addition, Infoprint Central lets you 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 has 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 e-mail destination using the protocol selected in the printer definition: LPR, direct sockets, IPP, e-mail, or VTAM. 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.

Additional functions that IP PrintWay provides include:

- **Retry**

  IP PrintWay can retry 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 retries, IP PrintWay retries an unsuccessful transmission automatically for a short period of time right after transmission.

- **Retention of jobs on the JES spool**

  After successfully transmitting each data set, or after completing the requested number of transmission attempts, IP PrintWay can retain the data set on the JES spool forever or for a period of 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 e-mailing without using a separate transform product.

  IP PrintWay can transform data to PCL, PostScript, or PDF format for printing or e-mailing using any of these IBM transform products:

  – Infoprint Transform for AFP to HP PCL V2.1 for z/OS (5655-P19). It provides an AFP to PCL transform.

  – Infoprint Transform for AFP to Adobe PDF V2.1 for z/OS (5655-P20). It provides an AFP to PDF transform.

  – Infoprint Transform for AFP to Adobe PostScript V2.1 for z/OS (5655-P21). It provides an AFP to PostScript transform.

  – Infoprint XML Extender for z/OS (5655-J66). It provides an XML to PDF transform.

- Infoprint Server Transforms V1.1 (5697-F51). It provides AFP to PCL, AFP to PostScript, and AFP to PDF transforms. (This product is no longer marketed.)

- **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 has retained. In addition, Infoprint Central lets you 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 have completed successfully, were retained due to 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 has 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 (1) the name of the printer definition in the FSSDATA parameter or (2) 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 Facility (SMF) type 6 record. The SMF type 6 record includes the number of bytes transmitted and identifies the printer.

- **Exits and filters**

  IP PrintWay lets you write exits to customize IP PrintWay processing. For example, exits can change the IP address of the remote printer, add separator pages, 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 transmitting data sets. IP PrintWay retains this order even if the transmission of the data sets must be retried. 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 transmitting 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 in the printer definition 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.

Transform Manager

The Transform Manager component of Infoprint Server controls the transform daemons provided with Infoprint Server Transforms and other optional transform products. The Transform Manager starts and stops the transform daemons using configuration information specified by the administrator. For example, the administrator can limit the number of transform daemons that are active at a time.

Figure 8 shows how the Transform Manager and Infoprint Server Transforms and other transform products fit into your system. An explanation of each step follows.
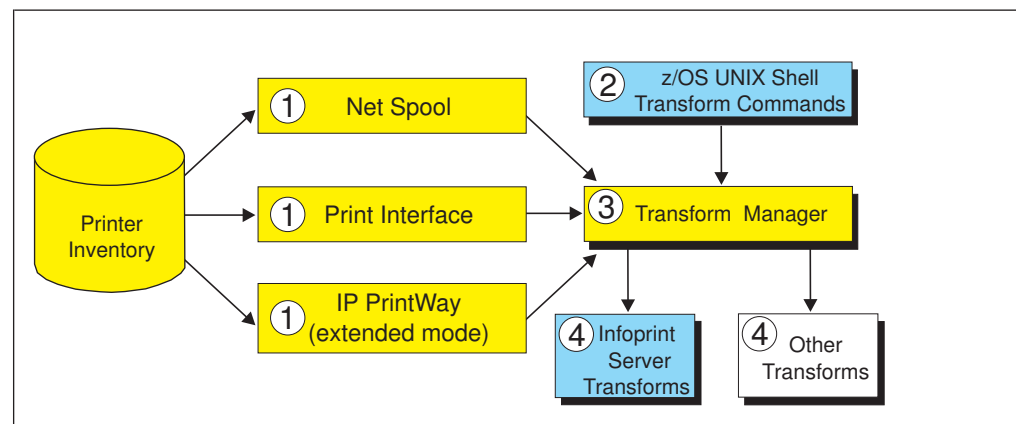
Figure 8. Transform Manager and Infoprint Server Transforms system diagram

1. Print Interface, NetSpool, and IP PrintWay extended mode can use transform filters that Infoprint Server Transforms and other transform products provide to transform data from one format to another. To use transforms, the administrator must specify the transform filter for each data format in the printer definition. Administrators and job submitters can specify transform filter options to customize the transforms.
2. z/OS UNIX transform commands provided with Infoprint Server Transforms and other transform products let users transform data from one format to another without printing it.
3. The Transform Manager manages the transform daemons and controls how many transform daemons are active at one time. The Transform Manager does not manage the SAP to AFP transform because this transform is not implemented as a daemon.
4. The Transform Manager can manage transforms that these IBM products provide:
   * Infoprint Transforms to AFP V2.1 for z/OS (5655-N60)
   * Infoprint Transform for AFP to HP PCL V2.1 for z/OS (5655-P19)
   * Infoprint Transform for AFP to Adobe PDF V2.1 for z/OS (5655-P20)
   * Infoprint Transform for AFP to Adobe PostScript V2.1 for z/OS (5655-P21)
   * IBM Infoprint XML Extender for z/OS (5655-J66)
   * IBM Infoprint XT Extender for z/OS (5655-J65)

- Infoprint Server Transforms V1.1 (5697-F51) (This product is no longer marketed.)

For information about these transform products, see "Infoprint transforms" and "Other Infoprint transforms" on page 22.

Infoprint transforms

IBM provides separate transform products that convert data on the z/OS system from one format to another.

These transform products work only with Infoprint Server:
- Infoprint Server Transforms V1.1 (5697-F51) (no longer marketed)
- Infoprint Transforms V2.1, which replace the equivalent features of Infoprint Server Transforms V1.1:
  - Infoprint Transforms to AFP V2.1 for z/OS (5655-N60)
  - Infoprint Transform for AFP to HP PCL V2.1 for z/OS (5655-P19)
  - Infoprint Transform for AFP to Adobe PDF V2.1 for z/OS (5655-P20)
  - Infoprint Transform for AFP to Adobe PostScript V2.1 for z/OS (5655-P21)
  - Infoprint Coaxial Printer Support V2.1 for z/OS (5655-N62)

These transform products work with Infoprint Server. However, you can also run them as stand-alone transforms:
- IBM Infoprint XML Extender for z/OS (5655-J66)
- IBM Infoprint XT Extender for z/OS (5655-J65)

Infoprint Server Transforms V1.1

Infoprint Server Transforms V1.1 consists of these features:
- **Transforms to AFP**

  This feature consists of these transforms that convert data streams to monochrome Mixed Object Document Content Architecture for Presentation (MO:DCA-P) data streams, which can be printed on IBM AFP printers:
  - PCL to AFP Transform

    This transform converts Printer Control Language (PCL) 5 or 5e data streams to MO:DCA-P data streams.
  - PDF to AFP Transform

    This transform converts Adobe Portable Data Format (PDF) 1.2 data streams to MO:DCA-P data streams. (The PDF to AFP transform supports PDF 1.3 except for Compact Font Format support.)
  - PostScript to AFP Transform

    This transform converts PostScript Language Level 3 data streams to MO:DCA-P data streams.
  - SAP to AFP Transform

    This transform converts SAP R/3 SAPGOF Release 4.6C (and lower releases) data streams. It converts Output Text Format (OTF) data streams to MO:DCA-P data streams and Advanced Business Application Programming (ABAP) data streams to line data streams.

- **Kanji AFP Print**

  This feature can be used with the PDF to AFP and PostScript to AFP transforms. It lets you print Japanese data streams that use Heisei Kaku Gothic W5 and Heisei Mincho W3 fonts, as well as embedded fonts. These two Heisei fonts, which are provided with this feature, must be installed on the z/OS system. The transform can map some other commonly used Japanese fonts, including Ryumin-Light and Gothic BBB-Medium, to these two Heisei fonts.

- **AFP to PCL Transform**

  This transform converts MO:DCA-P and line data streams to PCL 5, 5e, or 5c (color) data streams.

- **AFP to PDF Transform**

  This transform converts MO:DCA-P and line data streams to PDF 1.2 (monochrome or color) data streams.

- **AFP to PostScript Transform**

  This transform converts MO:DCA-P and line data streams to PostScript Language Level 3 (monochrome or color) data streams.

- **Coax Printer Support**

  This feature converts line data streams to Data Stream Compatibility/Data Stream Extended (DSC/DSE) and SNA Character String (SCS) data streams and, with IP PrintWay, transmits the data to VTAM-controlled printers defined as VTAM LU0, LU1, or LU3 printers.

The Transforms to AFP feature and the Kanji AFP Print feature are available at no additional charge to customers who have purchased Infoprint Server. The other features are separately priced features.

Each transform provides:

- A z/OS UNIX command which you can use to transform data in a z/OS UNIX file or MVS data set without printing it. The z/OS UNIX transform command creates an output file, which you can later print or transmit to another system for viewing or printing. The z/OS UNIX commands are: **afp2pcl**, **afp2pdf**, **afp2ps**, **pcl2afp**, **ps2afp**, **pdf2afp**, and **sap2afp**.
- A filter that lets Infoprint Server automatically transform data before sending it to the printer or e-mail destination.

For more information about each transform, including its limitations, see Chapter 3, "Transforming files using transform commands," on page 49.

Infoprint Transforms V2.1

Infoprint Transforms V2.1 consists of these separately priced products:

- Infoprint Transforms to AFP V2.1 for z/OS (5655-N60). It provides these transforms:
  - PCL to AFP transform

    This transform converts Printer Control Language (PCL) 6 (XL, 5, 5c, 5e) data streams to AFP (MO:DCA-P) data streams.
  - PDF to AFP transform

    This transform converts PDF 1.4 data streams to AFP (MO:DCA-P) data streams.
  - PostScript to AFP transform

    This transform converts PostScript Language Level 3 to AFP (MO:DCA-P) data streams.

– SAP to AFP transform

This transform converts SAP R/3 SAPGOF Release 4.6C to AFP data streams. It converts Output Text Format (OTF) data streams to MO:DCA-P data streams and Advanced Business Application Programming (ABAP) data streams to line data streams.

- Infoprint Transform for AFP to HP PCL V2.1 for z/OS (5655-P19)

  This transform converts AFP data streams to PCL 5, 5e, or 5c data streams.

- Infoprint Transform for AFP to Adobe PDF V2.1 for z/OS (5655-P20)

  This transform converts AFP data streams to PDF 1.4 data streams.

- Infoprint Transform for AFP Adobe PostScript V2.1 for z/OS (5655-P21)

  This transform converts AFP data streams to PostScript Language Level 3 data streams.

- Infoprint Coaxial Printer Support V2.1 for z/OS (5655-N62)

  This product converts line data streams to Data Stream Compatibility/Data Stream Extended (DSC/DSE) and SNA Character String (SCS) data streams and, with IP PrintWay, transmits the data to VTAM-controlled printers defined as VTAM LU0, LU1, or LU3 printers.

Enhancements in the V2.1 transforms include:

- Some of the transforms support higher levels of PCL, PDF, or PostScript.
- The transforms from AFP support some of the later AFP functions, such as enhanced N_UP formatting, FS45 images, and two-dimensional (2D) bar codes. They can also transform record-format line data and XML data.
- The AFP to PDF transform can:
  - Encrypt PDF documents and restrict user actions for increased security.
  - Create bookmarks and links in PDF documents.
  - Optimize PDF documents for fast viewing from the Web.
  - Rotate PDF documents for optimal viewing.

Each transform provides:

- A z/OS UNIX command which you can use to transform data in a z/OS UNIX file or MVS data set without printing it. The z/OS UNIX transform command creates an output file, which you can later print or transmit to another system for viewing or printing. The z/OS UNIX commands are: **afp2pcl**, **afp2pdf**, **afp2ps**, **pcl2afp**, **ps2afp**, **pdf2afp**, and **sap2afp**.
- A filter that lets Infoprint Server automatically transform data before sending it to the printer or e-mail destination.

For information about Infoprint Transforms V2.1, see these books:

- *Infoprint Transforms to AFP for z/OS*, G550-0443
- *Infoprint Transforms from AFP for z/OS*, G550-0444

Other Infoprint transforms

IBM provides other Infoprint transform products that can work with Infoprint Server but can also work as stand-alone products. These separately priced transform products are:

- Infoprint XML Extender for z/OS (5655-J66).

  These transforms convert XML data streams to AFP or PDF data streams. For information, see *Infoprint XML Extender for z/OS*.

- Infoprint XT Extender for z/OS (5655-J65).

This transform converts Xerox files to AFP data streams. For information, see *Infoprint XT Extender for z/OS: Customization and Usage*.

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 z/OS HTTP Server and a Web browser. No applications other than a Web browser need to be installed on users' workstations. Supported browsers include Microsoft Internet Explorer 5.5 (and higher), Netscape Navigator 7.0 (and higher), and IBM Home Page Reader 4.0 (and higher).

With Infoprint Central you can:

- **Work with print jobs:** You can find and work with print jobs on the JES spool. Plus, you can see more information about print jobs that Infoprint Server processes. For example, you can see whether an Infoprint Server print job completed successfully and where it printed – even if the print job is no longer on the JES spool.

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

  Tip: A print job is typically one output data set. However, a print job can consist of several 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 find and work with printers that are defined in the Printer Inventory – including IBM AFP printers that PSF controls (called *PSF printers*), and TCP/IP-attached and SNA-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 use a variety of search criteria to find printers. After you find a printer, you can:

  - Start, stop, redirect, restore, and ping IP PrintWay printers. You can also see messages in the common message log for printers.
  - Start, stop, space, interrupt, pause (JES2 only), and ping PSF printers. You can also change forms and other job-selection criteria for PSF printers.

  Also, you can see the Web page for some TCP/IP-connected printers. Often, the Web page can tell you if the printer has a paper jam or is out of toner.

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

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

- **Check system status:** You can see the status of all Infoprint Server daemons and tasks. This can help you determine the cause of a printing problem. You can also start and stop IP PrintWay job selection rules to change which print jobs IP PrintWay extended mode processes.

You can use the HTTP Server protection facility to restrict access to Infoprint Central. In addition, you can use RACF to restrict access to print jobs, IP PrintWay printers, PSF printers, NetSpool logical units, and Infoprint Server daemons.

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.

SNMP subagent

The Infoprint Server SNMP subagent, with support that PSF and the z/OS SNMP agent provide, lets administrators monitor printer characteristics (such as the printer resolution) and printer status (such as paper jams) for any printer that PSF controls. Also, administrators can be notified as soon as an intervention situation (such as a paper jam) occurs on the printer. This support does not let administrators change any printer characteristics.

To monitor PSF printers, the z/OS SNMP agent must be configured and an SNMP manager, such as IBM Network Printer Manager (NPM) for the Web, must be installed.

You can monitor PSF printers that do not contain internal SNMP agents, such as the IBM 3900 printer, and also PSF printers that have internal SNMP agents but are not TCP/IP-attached to PSF. You can also monitor PSF TCP/IP-attached printers that contain internal SNMP agents. However, consider defining PSF printers that have internal SNMP agents directly to the SNMP manager. When you define a printer directly to the SNMP manager, you can also monitor printer statistics and change some printer characteristics. See the documentation for your printers to determine if they have internal SNMP agents.

Figure 9 on page 25 shows how the SNMP subagent fits into your system. An explanation of each step follows.
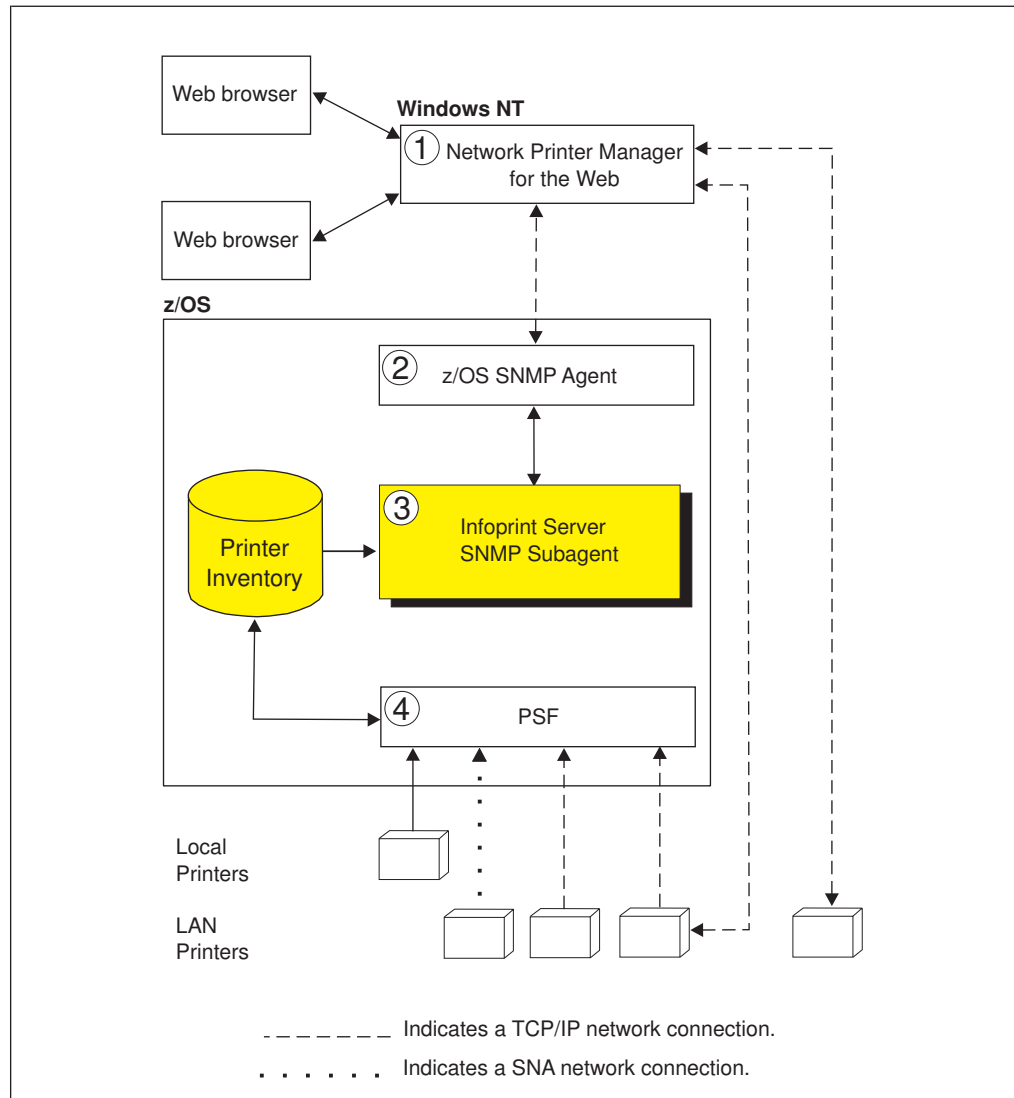
Figure 9. SNMP subagent system diagram

1. To monitor PSF printers, you must install an SNMP manager. You can install any SNMP manager that communicates with an SNMP agent that supports the general printer MIB (defined in RFC 1759) and has implemented support for multiple printers defined with one IP address.

   One SNMP manager that provides the required support is IBM Network Printer Manager (NPM) for the Web, which is shown in Figure 9. You can download NPM from the IBM Printing Systems Division Web site. Administrators can use a Java®-enabled version of Netscape Navigator or Microsoft Internet Explorer to monitor PSF printers, while the NPM server runs on a Windows system. Note that NPM limits the number of PSF printers an administrator can monitor at the same time. See the NPM online help for the maximum number of printers NPM lets you monitor.

   As shown in the figure, the SNMP manager (NPM) can also communicate directly with any TCP/IP-attached printer that contains an internal SNMP agent. PSF can control this printer, but it is not necessary.

2. The SNMP agent, part of the z/OS Communications Server, communicates with the SNMP manager and with the Infoprint Server SNMP subagent.

3. The Infoprint Server SNMP subagent communicates with PSF through the Printer Inventory. PSF stores printer characteristics and printer status in the Printer Inventory for any printer that has SNMP-reporting enabled. (The administrator enables SNMP reporting in the FSA definition for the PSF printer).

   The SNMP subagent transmits the information stored by PSF to the SNMP manager through the z/OS SNMP agent. The SNMP subagent also notifies the SNMP manager immediately when PSF detects a change to printer characteristics or printer status.

4. PSF obtains printer characteristics and printer status from any PSF-controlled printer. The PSF printer can be channel-attached, TCP/IP-attached, or SNA-attached. However, the PSF printer cannot be attached using the Download for z/OS feature of PSF.

   If a PSF-controlled printer is shared with another printing application, and is not connected to PSF when an intervention required situation occurs, PSF cannot report the change in printer status.

Chapter 2. Printing from z/OS UNIX System Services using Infoprint Server commands

This chapter describes the z/OS UNIX printing commands of Infoprint Server.

The printing commands let you print, query, and cancel the printing of files, and let you send files to an e-mail destination instead of to a printer:

Printing commands	See page
cancel—Cancel a print job	31
lp—Print a file	33
lpstat—Show printer names and locations and status of print jobs	43

Using the printing commands, you can print UNIX files and MVS data sets on any printer that your administrator has defined in a printer definition in the Infoprint Server Printer Inventory. You can print on local printers that are attached directly to z/OS, or on remote printers in a TCP/IP or SNA network. Instead of printing, you can use the same printing commands to send the data to any e-mail destination that your administrator has defined in a printer definition.

The printing commands provide enhanced function over the commands of the same name that are described in *z/OS UNIX System Services Command Reference*. For example, when you print on IBM Advanced Function Presentation printers, you can specify options such as duplexing or a special overlay. You can also display the status of your print request, and you can 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 printing commands conform to the UNIX standards. The **lp** command conforms to the Single UNIX Specification Version 3 standard, and 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 desire, 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`

Transforming jobs to AFP format

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

You can submit non-AFP data streams to AFP printers using these optional products, which convert jobs to AFP format:

- **Infoprint transform products** transform data streams such as PCL, PDF, PostScript, and SAP to AFP format. The transform products are:
  - Infoprint Server Transforms V1.1 (5697-F51)
  - Infoprint Transforms to AFP V2.1 for z/OS (5655-N60)
- **IBM Infoprint XML Extender for z/OS** (5655-J66) transforms Extensible Markup Language (XML) files to AFP and PDF format. For more information, see "xml2afp—Transform XML to AFP data" on page 94, "xml2pdf—Transform XML to PDF data" on page 95, and *Infoprint XML Extender for z/OS*.
- **IBM Infoprint XT Extender for z/OS** (5655-J65) transforms Xerox files to AFP format. The Xerox files can be line-conditioned data streams (LCDS) or metacode data streams. For more information, see "x2afp—Transform Xerox files to AFP data" on page 96 and *Infoprint XT Extender for z/OS: Customization and Usage*.

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

Usually, you do not have to worry about transforming your data to another format. If Infoprint Server Transforms or another 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 for an e-mail destination) that your administrator has configured for transformation. You might, however, want to transform a file without printing it if you intend to print the 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.

Transforming jobs from AFP format

Infoprint transform products convert jobs from AFP format into PCL, PDF, and PostScript. They let you print files in AFP format on PCL and PostScript printers, and transform an AFP file to PDF format for viewing on a workstation. The transform products are:

- Infoprint Server Transforms V1.1 (5697-F51)
- Infoprint Transforms V2.1, which replace the equivalent features of Infoprint Server Transforms V1.1:
  - Infoprint Transform for AFP to HP PCL V2.1 for z/OS (5655-P19)
  - Infoprint Transform for AFP to Adobe PDF V2.1 for z/OS (5655-P20)
  - Infoprint Transform for AFP to Adobe PostScript V2.1 for z/OS (5655-P21)

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

Usually, you do not have to worry about transforming your data to another format. If Infoprint Server Transforms or another 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 for an e-mail destination) that your

administrator has configured for transformation. You might, however, 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.

How do you...

This section is an overview of the rest of this chapter. It tells you what Infoprint Server command you need to use for a printing task and sends you to the right 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 33.

Send a file to an e-mail destination?

To send one or more files to an e-mail 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 e-mail destination `dept123`, which is defined in the Infoprint Server Printer Inventory, enter:

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

The recipients listed in the printer definition receive two separate e-mails.

For more information, see "lp—Print a file" on page 33.

Print or e-mail 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 e-mail

Use the **-o** option of the **lp** command to specify attribute values when you print a file or send a print file to an e-mail 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, `010DD`, on all the front sides of the paper and another, `01EVEN`, on all the back sides. Both overlays reside in a library called `MYOVR.LIBRARY`. Enter:

```
lp -d Printer2 -o "input-tray=top duplex=yes
   overlay-front=010DD overlay-back=01EVEN
   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 "Attribute listing" on page 99. For information about attributes files, see "Attributes files" on page 98. For information about the **-o** option of the **lp** command, see "lp—Print a file" on page 33.

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 e-mail destinations known to Infoprint Server, enter:

```
lpstat -a
```

For more information, see "lpstat—Show printer names and locations and status of print jobs" on page 43.

Find out if 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 if any of them are printing. To display information about all your jobs 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 has 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 has printed, enter:

```
lpstat -o Printer3
```

For more information, see "lpstat—Show printer names and locations and status of print jobs" on page 43.

Cancel an Infoprint Server job?

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

If you don't 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 31.

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 has 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.

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. When you submit a job using the Print Interface subsystem, the z/OS job ID is returned to you.

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 don't remember the Infoprint Server job ID. Enter:

```
lpstat
```

lpstat 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 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*.

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

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

Description

The **lp** command prints one or more files, or sends the files to an e-mail destination. The address of the printer is specified in the printer definition in the Infoprint Server Printer Inventory, which your administrator manages. The e-mail 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 zSeries 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 Infoprint Server Transforms or another optional 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. Copying files lets you change the original files after submitting the **lp** command. The printed file does not contain the changes. -**c** is the default.

-**d** *destination*
         Selects the printer or the e-mail 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 there is a default printer. 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 there is no default, the **lp** command displays an error message.

-**m**   Notifies you by electronic mail when the file is removed from the system spool for any reason. Some reasons are:

- The file has finished printing.
- The file has been transmitted to a local area network (LAN) printer or to the z/OS UNIX sendmail function. You might receive notification before the file has finished printing or been sent to the e-mail destination. You might receive notification even though a transmission error has occurred.

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

- The operator has deleted the file.

Tip: Notification might be delayed to improve system performance.

-n *copies*

Prints the specified number of copies of each file. You can specify a value from 1 to 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: VTAM-controlled printers (IP PrintWay basic mode only) and 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 e-mail 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 "Attribute listing" on page 99.

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 called `attributes` to specify the file. For examples, see "Specify the attributes files" on page 38 and "Creating an attributes file" on page 98.

You can also set the **AOPOPTIONS** environment variable to a string of attributes and values. The **lp** command treats these attributes as if you had 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 39.

To specify more than one attribute, either repeat the **-o** option or specify the **-o** option with multiple attributes. 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 has 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 e-mail destination, this description is the subject of the e-mail. 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 126.

Tip: Whether a title is printed on a separator pages depends on how the administrator has 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 an e-mail notification when the file is removed from the system spool for any reason. Some reasons are:

- The file has finished printing.
- The file has been transmitted to a LAN printer or to the z/OS UNIX sendmail function. You might receive notification before the file has finished printing or has been sent to the e-mail destination. You might receive notification even though a transmission error has occurred.

  If your administrator has requested that Infoprint Server retain files on the system spool after transmission, you receive notification after the retention time expires.
- The operator has 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 e-mail 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 can help the system operator find your job on the JES spool. The job ID field of the data set that Infoprint Server allocates on the JES spool contains the Infoprint Server job ID.

The Infoprint Server job ID is different, however, 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.

Sending a file to an e-mail destination

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

- Your administrator can specify the e-mail address list of the recipients in the printer definition in the Printer Inventory.
- You can specify an address list in an alias file that your administrator defines to z/OS UNIX sendmail. For information, see "Specifying the e-mail address list in an alias file" on page 133. 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 e-mail addresses of the recipients using these job attributes:

Use this attribute:	To specify the e-mail addresses of the:
mail-bcc-addresses	"Blind copy (bcc)" recipients of an e-mail. A *bcc* means that other recipients of the e-mail do not see the bcc recipient listed.
mail-cc-addresses	"Copy (cc)" recipients of an e-mail. A *cc* means that other recipients of the e-mail can see the cc recipient listed.
mail-to-addresses	Primary recipients of an e-mail.

The e-mail has these characteristics:

- The file is an e-mail attachment. The name of the attachment is the name specified in one of these:

  IP PrintWay extended mode:
  1. The **mail-file-name** job attribute
  2. The file name

  IP PrintWay basic mode:
  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 an extension that indicates the type of data in the file. For example, `txt` indicates text data and `pdf` indicates PDF data.

- The subject of the e-mail is the value specified in the **-t** option or in the **title-text** job attribute. If none is specified, the subject is the title 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 **mail-from-name** job attribute.

- You can receive replies from the e-mail unless a firewall prevents the z/OS system from receiving replies from the sending system. To receive replies, use the z/OS UNIX **mail** or **mailx** command. If you want to receive replies at an e-mail address other than your user ID at your z/OS system, you can specify the e-mail address that recipients of an e-mail can reply to in the **mail-reply-address** job attribute. If you do not specify the **mail-reply-address** job attribute, the mail-reply-address in the printer definition is used. If the **mail-reply-address** attribute is not specified in the job or printer, replies are sent to your user ID on the z/OS system.

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 has not defined this printer. You must specify:

- The name that your administrator has 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 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 your installation has installed Infoprint Server Transforms or another optional transform product, you can submit a job in a format different from the ones the printer accepts. For more information, see "Transforming files to AFP format" on page 50 and "Transforming files from AFP format" on page 49.

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 only use `filter-options` to specify **-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` 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
```

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

Tip: VTAM-controlled printers (IP PrintWay basic mode only) and 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 e-mail 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 have set the **AOPPATH** environment variable to include the directories where the attributes files reside. If this is not the case, you would 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 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 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 an e-mail when the file is transmitted to the printer. When you receive the e-mail, the file might not actually 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 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 has 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 105.

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 e-mail destination specified in the printer definition

To send files `File1` and `File2` to the e-mail address list in printer definition `deptmail`, specify a subject for the e-mail, 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 listed in printer definition `deptmail` receive two e-mails:

- The sender of the e-mails is the user ID of the user who entered the **lp** command. The domain name is the system where sendmail is running.
- File `File1` is attached to one e-mail, while file `File2` is attached to another e-mail. The name 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.
- The subject of both e-mails is `Monthly Report`.

Send a file to an e-mail destination specified in job attributes

To send file `File1` to the e-mail addresses specified in job attributes instead of to the e-mail addresses specified in the printer definition, and also specify a subject, sender name, attachment name, and reply address for the e-mail, 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
```

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

Results: An e-mail is sent with these specifications:
- The subject is `Monthly Report`.
- The recipient of the e-mail is `user1@xyz.com`.
- The "copy (cc)" recipient is `user2@xyz.com`.
- The "blind copy (bcc)" recipient is `user3@xyz.com`.
- The attached file is `February 2004 sales report.txt`.
- The sender of the e-mail 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 sendmail is running is `SYSTEM1`.
- The e-mail address that recipients can reply to is `secretary@xyz.com`.
- The file that is attached is `FILE1.pdf`. The file is in PDF format and can be viewed and printed with Adobe Acrobat Reader.

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

LANG The language used for messages.

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

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

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

PRINTER Names the default printer if **LPDEST** is not defined.

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

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.

lp

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.
- 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.
- There was an error in reading the Infoprint Server configuration file.

Portability

The **-m**, **-o**, **-s**, **-t**, and **-w** options are extensions to the POSIX.2 standard. There are no extensions 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

lpstat writes printer definition names, location information 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.

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 submitted to the printer definition
- The location information in the printer definition
- The description information in the printer definition

For jobs that Infoprint Server has processed (including jobs 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.

  The Infoprint Server job ID is different, however, 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 has been canceled and will not be processed.

  completed   The file has been processed successfully. It remains on the JES spool for one of these reasons:

  - Other files in the job are still being processed. The file will be removed from the spool after all files in the job have been processed.
  - Your administrator has specified that files should be retained after transmission to a LAN printer or to a print server. The file will be removed from the spool when the retention period expires.

  failed   Processing has 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 z/OS UNIX sendmail function has failed. Your administrator has specified that files should be retained after transmission. The file will be 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 submitting the job.
>
> > **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 was 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 have been selected for processing or held on the JES spool.

processing   The file has been placed on the JES spool and selected for processing. It might be:

> – Being transmitted to a local area network (LAN) printer or to a print server
>
> – Printing

purged   The file was deleted before printing.

rejected   The file was rejected and will not be 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 will process it again. The printer might be turned off.

spooling   The file is being 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 filename 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 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 was not specified, this field is blank.

When **lpstat** returns information about multiple jobs, the order is not significant. The first job 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 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 has defined. If there is no default printer, **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 defined in the Printer Inventory and all jobs 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 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 defined in the Printer Inventory and all jobs 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 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 have been 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*.

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

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 **lpstat** command.

lpstat

Chapter 3. Transforming files using transform commands

This chapter describes the z/OS UNIX transform commands of Infoprint Server Transforms V1.1 (5697-F51).

For information about the V2.1 Infoprint transforms, see these books instead:
- *Infoprint Transforms to AFP for z/OS*, G550-0443
- *Infoprint Transforms from AFP for z/OS*, G550-0444

The transform commands work with the Advanced Function Presentation (AFP) format. The transform commands let you convert files from one format to another without printing the files.

You can convert files:
- From AFP format
- To AFP format

This chapter also briefly describes the transform commands that other IBM transform products provide:
- IBM Infoprint XML Extender for z/OS (5655-J66), which transforms Extensible Markup Language (XML) files to AFP or to Portable Document Format (PDF) format.
- IBM Infoprint XT Extender for z/OS (5655-J65), which transforms Xerox files to AFP format. The Xerox files can be line-conditioned data streams (LCDS) or metacode data streams.

The transform commands that this chapter describes are:

Transform commands	See page
afp2pcl—Transform AFP data to PCL data	52
afp2pdf—Transform AFP data to PDF data	59
afp2ps—Transform AFP data to PostScript data	67
pcl2afp—Transform PCL data to AFP data	74
pdf2afp and ps2afp—Transform PDF or PostScript data to AFP data	79
sap2afp—Transform SAP OTF or ABAP data to AFP data	89
xml2afp—Transform XML to AFP data	94
xml2pdf—Transform XML to PDF data	95
x2afp—Transform Xerox files to AFP data	96

Transforming files from AFP format

You can transform files from AFP to these formats:
- Printer Control Language (PCL)
- Portable Document Format (PDF)
- PostScript

You can use either of these methods to transform files from AFP:

49

Printer definitions

Your administrator can set up the printer definitions in the Infoprint Server Printer Inventory so that Infoprint Server automatically transforms files to the appropriate format.

For example, suppose that your administrator has configured the `printer1` printer definition to use the AFP to PCL or AFP to PostScript transform. To submit the AFP file `sample.afp` to the printer named `Printer1`, where Printer1 is a non-AFP printer, and transform it automatically, enter:

```
lp -d Printer1 sample.afp
```

Transform commands

You can use these transform commands:

- afp2pcl—Transform AFP data to PCL data
- afp2pdf—Transform AFP data to PDF data
- afp2ps—Transform AFP data to PostScript data

For example, to transform the AFP file `myfile.afp` to a PostScript file called `myfile.ps`, printed in duplex, enter:

```
afp2ps -j "duplex=yes" -o myfile.ps myfile.afp
```

For the levels of each format that the transform creates, see "Infoprint transforms" on page 20.

Transforming files to AFP format

You can transform files to AFP from these formats:

- Printer Control Language (PCL)
- Portable Document Format (PDF)
- PostScript
- SAP Advanced Business Application Programming (ABAP)
- SAP Output Text Format (OTF)

You can use either of these methods to transform files to AFP:

Printer definitions

Your administrator can set up the printer definitions in the Infoprint Server Printer Inventory so that Infoprint Server automatically transforms files to the appropriate format.

For example, suppose that your administrator has configured the `printer1` printer definition to use the PCL to AFP or PostScript to AFP transform. To submit the PCL file `sample.pcl` to the printer named `Printer1` and transform it automatically, enter:

```
lp -d Printer1 sample.pcl
```

Transform commands

You can use these transform commands:

- pcl2afp—Transform PCL data to AFP data
- pdf2afp and ps2afp—Transform PDF or PostScript data to AFP data
- sap2afp—Transform SAP OTF or ABAP data to AFP data

For example, to transform the PostScript file `myfile.ps` to an AFP file called `myfile.afp`, with each page 5.5 inches long and 4 inches wide, enter:

```
ps2afp -o myfile.afp -l 5.5in -w 4in myfile.ps
```

For the levels of each format that the transform creates, see "Infoprint transforms" on page 20.

afp2pcl—Transform AFP data to PCL data

Format

afp2pcl [**-c** *transformclass*] [**-F** *tracefile*] [**-i** *inputcodepage*] [**-j** *jobattributes*]...

[**-o** *outputfile*] [**-T** *traceoptions*] [*inputfile ...*]

Description

The **afp2pcl** command converts an Advanced Function Presentation (AFP) data file into a Printer Control Language (PCL) 5, 5e, or 5c (color) data stream file. This command is part of the Infoprint Server Transforms V1.1 product.

For information about the V2.1 Infoprint transform, see this book instead: *Infoprint Transforms from AFP for z/OS*, G550-0444.

Error messages related to errors in the input data stream are written at the end of the output document.

Options

-c *transformclass*
Specifies the name of a transform class that your administrator has defined. The transform class determines options such as:

- The characteristics of the printer, such as whether it supports color
- The size of paper in each input tray, such as letter, ledger, A4, B4, or B5
- Defaults for page formatting options, such as the default page definition, form definition, and font
- Resource libraries

You do not always have to specify a transform class. If you do need to specify one, however, ask your administrator for the name of a transform class suitable for the printer and the type of job.

-F *tracefile*
Specifies the file in which to store the trace. This option should only be used as instructed by IBM service personnel. For information about this option, see *z/OS Infoprint Server Messages and Diagnosis*.

-i *inputcodepage*
This option applies only when you transform line data. If you specify this option for AFP data, it is ignored.

This option identifies the code page to which line data is converted before it is transformed. Specify a code page that corresponds to the coded fonts specified in the page definition or in the **chars** job attribute.

To transform line data that is already encoded in the code page that corresponds to the coded fonts, do *not* specify this option. If this option is not specified, line data is not converted before it is transformed. For example, to transform a line data document that specifies coded fonts in the **chars** job attribute and currently prints correctly on an AFP printer, do *not* specify this option.

You must specify this option to correctly transform documents encoded in code pages that do not correspond to the code page for the coded fonts. This is most likely to occur when you transform an ASCII file.

In the **-i** option, you must specify an IBM-supplied or custom code page that the iconv utility supports. For code page information, see *z/OS C/C++ Programming Guide*. To find the AFP code page for each character set, see *IBM AFP Fonts: Font Summary for AFP Font Collection*. The AFP code page and the name of the code pages that iconv uses are different. Be careful to specify the iconv code page value. For example, if you specify one of these coded fonts in the **chars** job attribute, specify `-i IBM-500`:

Coded font	AFP code page	iconv code page
40D0, 40F0, 40E0, 4100	T1V10500	IBM-500
60D9 (default font)	T1V10500	IBM-500

> **Note:** When you specify this option, also make sure that the code page specified in the **document-codepage** job attribute correctly identifies the code page in which the input document is encoded. If you do not specify the **document-codepage** attribute, the default is the code page of the locale, which is usually an EBCDIC code page.

-j *jobattributes*

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

- 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 might be interpreted by the shell (such as **$ & ( ) > < | ' "**), enclose the option in single or double quotation marks:

```
-j 'attribute1=value1 attribute2=value2'
-j "attribute='value with spaces'"
-j "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:

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

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

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

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 called `attributes` to specify the file.

You can specify any of these attributes, which apply to all files to be transformed with the command:

carriage-control-type	chars	document-codepage
document-format	duplex	form-definition
input-tray-number	output-bin-number	overlay-back

overlay-front	page-definition	resource-library
shift-out-shift-in	table-reference-characters	x-image-shift-back
x-image-shift-front	y-image-shift-back	y-image-shift-front

For more information about the attributes, see "Attribute listing" on page 99.

-o *outputfile*

Specifies the output path and file into which the transform output (that is, PCL 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 only need one set of quotation marks. For example, `"//PDS(MYDOC)"` or `"//SEQDS"`.

If you specify an MVS data set, you might need to allocate the data set before you run this command, especially when you transform a large document. 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. Allocate the output data set with these characteristics:
- Record format: VB
- Record length: 1024 or larger is recommended

-T *traceoptions*

Specifies the trace options. This should only be used as instructed by IBM service personnel. For information about this option, see *z/OS Infoprint Server Messages and Diagnosis*.

Tip: You can use the **filter-options** job attribute with, for example, the **lp** command to pass the **-c** *transformclass* and **-i** *inputcodepage* options to the transform. For information about the **filter-options** job attribute, see "Attribute listing" on page 99.

Operand

inputfile

Specifies an input file to be transformed. If you specify more than one input file name, the **afp2pcl** command concatenates the files. 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, **afp2pcl** 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 only need one set of quotation marks. For example, `"//PDS(MYDOC)"` or `"//SEQDS"`.

Usage notes

- Some properties of the output, such as page size, input tray numbers, and color output, are defined in the configuration file **aopxfd.conf**. Your administrator sets up this file.

- If you specify multiple values of the same option, except for **-j**, the transform uses the last value that you specified.
- All AFP resources are transformed into PCL and are included in the output data stream to guarantee resource availability.
- IBM recommends that you print transform output on printers that support PCL 5, 5e, or 5c. A printer that supports PCL 5c is required to print color output.
- The document formatting options in your document, such as paper size and duplexing, are converted to PCL commands. However, the interpretation of these commands might vary slightly from printer to printer. Unpredictable results can occur if you request formatting options that are not installed in your printer.
- When transforming line data in UNIX files that contain ANSI or no carriage control characters, you must specify **document-format=line**. If the data has ANSI control characters, also specify **carriage-control-type=ansi**.
- To create output that prints edge-to-edge on capable printers, your administrator must specify a paper name designed for edge-to-edge printing in the transform configuration file.

  To use the edge-to-edge paper on a capable printer, ask your administrator which printer definition and input tray to specify.

  Some printers do not support edge-to-edge printing. On such printers, documents created for edge-to-edge printing have the outside 50 pels, approximately 4 millimeters, of output cut off.
- 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.

Supported objects and controls

The AFP to PCL transform supports:

MO:DCA-P objects:
- BCOCA™: Most bar codes except, for example, QR bar codes.
- FOCA:
  - Single-byte (SBCS) fonts:
    - 300-pel raster fonts, fixed metrics, and relative metrics.
    - The transform can map AFP outline fonts to equivalent raster fonts.
  - Double-byte (DBCS) fonts:
    - 300-pel raster fonts, fixed metrics, and relative metrics.
    - AFP outline fonts are not supported.
- GOCA: All functions.
- IM: All functions, in single and double dot, in all rotations.
- IOCA:
  - Uncompressed, compressed MMR, G3, G4, RL4, ABIC (non-concatenated), JPEG baseline and extended.
  - IDE 1-8, 24 (lookup table).
- Object containers for JFIF, JPEG, and TIFF image objects.
- PTOCA1, PTOCA2.

AFP resources:

- Page definitions, including conditional processing.
- Form definitions, including basic N_UP processing.
- Overlays.
- Page segments.
- User resource libraries.

Line data:
- Carriage control (ANSI, machine).
- Table reference characters.
- Shift out/shift in DBCS data - SOS1, SOSI2, and SOSI3 options.
- Mixed line data and AFP records (including IDM, IMM).

Limitations

This section lists the items in the AFP architecture that the AFP to PCL transform does not currently support. Because the AFP architecture and PSF continue to be enhanced with new functional capabilities, this list might be incomplete after the publication date. IBM suggests that you test how your AFP applications print on your non-AFP printers to make sure the output is acceptable.

- Include Page (IPG).
- Internal copy groups.
- IOCA Color Plus image objects (IOCA FS45).
- Map Color Attribute Table (MCA).
- Map Media Type (MMT).
- Map Page (MPG).
- Medium Finishing Control (MFC).
- Preprocess Presentation Object (PPO).
- Presentation Fidelity Control (PFC).
- QR bar codes.
- SOSI4 for DBCS data.

The transform does not support these fonts:
- DBCS outline fonts.
- OpenType fonts.
- TrueType fonts.
- UTF-16 fonts.
- Outline fonts. However, the transform can map single-byte outline fonts to raster fonts. Font-mapping supports single-byte fonts provided in the IBM AFP Font Collection (program number 5648–B33).

  Tip: The transform cannot scale outline fonts. Therefore, the page definition you use must specify a RATIO of 100 or omit the RATIO keyword. For information about font mapping, see *z/OS Infoprint Server Customization*.

Other limitations include:
- Output is generated using a resolution of 300 pels. If the input includes resources (for example, fonts) that are not 300 pels, the resulting output is degraded.
- The transform might create bar codes that are larger or smaller than the same bar codes printed on AFP printers. The transform creates bar codes with a resolution of 300 pels per inch. Even though the size of bar codes might be different, the bar codes will scan properly.

| • The transform does not check all AFP structured fields in the AFP documents for validity. PSF might check additional structured fields for validity when it prints the AFP documents. Therefore, do not use the AFP to PCL transform to determine if PSF can print an AFP document.

Examples -- afp2pcl

Transform an AFP file, specifying a transform class and output file

To transform the AFP file `myfile.afp` into a PCL file, using the `us` transform class, and write a file called `myfile.pcl`, enter:

```
afp2pcl -c us -o myfile.pcl myfile.afp
```

Transform an MVS data set, specifying a form definition

| To transform the MVS data set `USERX.AFP(MYFILE)` into a PCL file, using the form definition `F1CP0110`, and write a file called `myfile.pcl`, enter:

| ```
afp2pcl -j "form-def=f1cp0110" -o myfile.pcl "//'USERX.AFP(MYFILE)'"
```

### Transform an AFP file, specifying a form definition and a resource library

To transform the AFP file `myfile.afp` into a PCL file, using the form definition `F1CP0110` that contains references to user-supplied AFP resources, and write a file called `myfile.pcl`, enter this command on one line:

```
afp2pcl -j "form-def=f1cp0110 res-lib={lib1.pseglib lib3.private}"
        -o myfile.pcl myfile.afp
```

Transform and print an MVS data set, specifying a form definition and a resource library

To transform the MVS data set `PROD.AFPOUT(JOB1)` into a PCL file, using the form definition `F1CP0110` that contains references to user-supplied AFP resources, and print the output, enter this command on one line:

```
afp2pcl -j "form-def=f1cp0110 res-lib={lib1.pseglib lib3.private}"
   "//'PROD.AFPOUT(JOB1)'" | lp
```

Transform a job using redirection

To transform the AFP file `input.afp` into the PCL output file called `output.pcl`, enter:

```
afp2pcl < input.afp > output.pcl
```

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

Transform multiple files and concatenate the output

To transform the AFP files `input.01.afp`, `input.02.afp`, ... `input.xx.afp` into one PCL output file called `output.pcl`, enter:

```
afp2pcl -o output.pcl input.01.afp input.02.afp ... input.xx.afp
```

Transform a UNIX file to an MVS data set

To transform the line data file `input.line` into an MVS PCL output data set called `hlq.OUTPUT.PCL(MYDOC)`, enter:

```
afp2pcl -j doc-format=line -o "//'hlq.OUTPUT.PCL(MYDOC)'" input.line
```

Transform an MVS data set, writing the output to a UNIX file

To transform the MVS data set `HLQ.INPUT.LINE(MYDOC)` into an output file called `output.pcl`, enter:

```
afp2pcl -o output.pcl "//'hlq.INPUT.LINE(MYDOC)'"
```

Transform line data, specifying a form definition and a page definition

To transform line data in file `myfile.line` that contains ANSI carriage control characters into a PCL file, using the form definition `F1CP0110` and page definition `P1P06362`, and write a file called `myfile.pcl`, enter this command on one line:

```
afp2pcl -j "form-def=f1cp0110 page-def=p1p06362 c-c-t=a doc-format=line"
-o myfile.pcl myfile.line
```

Transform line data, specifying a form definition and fonts

To transform the line data file `myfile.line` containing machine carriage control characters and table reference characters into a PCL file, using the form definition `F1CP0110`, and write a file called `myfile.pcl`, enter this command on one line:

```
afp2pcl -j "form-def=f1cp0110 c-c-t=m t-r-c=yes chars={60D8 60D0}"
-o myfile.pcl myfile.line
```

Environment variables

The **afp2pcl** 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*.

NLSPATH   Names the directory paths that the **afp2pcl** command searches for message catalogs.

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.

For the format of the configuration file, see *z/OS Infoprint Server Customization*.

Exit values

0   The data was transformed successfully. However, the output document might contain error messages related to errors in the input data stream.

>0   An error occurred. No output document was created.

afp2pdf—Transform AFP data to PDF data

Format

afp2pdf [-c *transformclass*] [-F *tracefile*] [-i *inputcodepage*] [-j *jobattributes*]...

[-o *outputfile*] [-T *traceoptions*] [*inputfile*]

Description

The **afp2pdf** command converts an Advanced Function Presentation (AFP) data file into an Adobe Portable Document Format (PDF) 1.2 data stream file for printing or e-mailing. This command is part of the Infoprint Server Transforms V1.1 product.

For information about the V2.1 Infoprint transform, see this book instead: *Infoprint Transforms from AFP for z/OS*, G550-0444.

Error messages related to errors in the input data stream are written at the end of the output document.

Options

-c *transformclass*

Specifies the name of a transform class that your administrator has defined. The transform class determines options such as:

- The characteristics of the printer, such as whether it supports color
- The size of paper in each input tray, such as letter, ledger, A4, B4, or B5
- Defaults for page formatting options, such as the default page definition, form definition, and font
- Resource libraries

You do not always have to specify a transform class. If you do need to specify one, however, ask your administrator for the name of a transform class suitable for the printer and the type of job.

-F *tracefile*

Specifies the file in which to store the trace. This should only be used as instructed by IBM service personnel. For information about this option, see *z/OS Infoprint Server Messages and Diagnosis*.

-i *inputcodepage*

This option applies only when you transform line data. If you specify this option for AFP data, it is ignored.

This option identifies the code page to which line data is converted before it is transformed. Specify a code page that corresponds to the coded fonts specified in the page definition or in the **chars** job attribute.

To transform line data that is already encoded in the code page that corresponds to the coded fonts, do *not* specify this option. If this option is not specified, line data is not converted before it is transformed. For example, to transform a line data document that specifies coded fonts in the **chars** job attribute and currently prints correctly on an AFP printer, do *not* specify this option.

You must specify this option to correctly transform documents encoded in code pages that do not correspond to the code page for the coded fonts. This is most likely to occur when you transform an ASCII file.

afp2pdf

In the **-i** option, you must specify an IBM-supplied or custom code page that the iconv utility supports. For code page information, see *z/OS C/C++ Programming Guide*. To find the AFP code page for each character set, see *IBM AFP Fonts: Font Summary for AFP Font Collection*. The AFP code page and the name of the code pages that iconv uses are different. Be careful to specify the iconv code page value. For example, if you specify one of these coded fonts in the **chars** job attribute, specify `-i IBM-500`:

Coded font	AFP code page	iconv code page
40D0, 40F0, 40E0, 4100	T1V10500	IBM-500
60D9 (default font)	T1V10500	IBM-500

> **Note:** When you specify this option, also make sure that the code page specified in the **document-codepage** job attribute correctly identifies the code page in which the input document is encoded. If you do not specify the **document-codepage** attribute, the default is the code page of the locale, which is usually an EBCDIC code page.

-j *jobattributes*

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

- 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 might be interpreted by the shell (such as **$ & ( ) > < | ' "**), enclose the option in single or double quotation marks:

```
-j 'attribute1=value1 attribute2=value2'
-j "attribute='value with spaces'"
-j "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:

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

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

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

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 called `attributes` to specify the file.

You can specify any of these attributes, which apply to all files to be transformed with the command:

carriage-control-type	chars	document-codepage
document-format	duplex	form-definition
input-tray-number	output-bin-number	overlay-back

overlay-front	page-definition	resource-library
shift-out-shift-in	table-reference-characters	x-image-shift-back
x-image-shift-front	y-image-shift-back	y-image-shift-front

For more information about the attributes, see "Attribute listing" on page 99.

-o *outputfile*

Specifies the output path and file into which the transform output (that is, PDF 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 only need one set of quotation marks. For example, `"//PDS(MYDOC)"` or `"//SEQDS"`.

If you specify an MVS data set, you might need to allocate the data set before you run this command, especially when you transform a large document. 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. Allocate the output data set with these characteristics:
- Record format: VB
- Record length: 1024 or larger is recommended

-T *traceoptions*

Specifies the trace options. This should only be used as instructed by IBM service personnel. For information about this option, see *z/OS Infoprint Server Messages and Diagnosis*.

Tip: You can use the **filter-options** job attribute with, for example, the **lp** command to pass the **-c** *transformclass* and **-i** *inputcodepage* options to the transform. For information about the **filter-options** job attribute, see "Attribute listing" on page 99.

Operand

inputfile

Specifies an input file to be transformed. If you specify more than one input file name, the **afp2pdf** command will fail.

If you do not specify an input file, or if you specify a dash (**-**) for the file name, **afp2pdf** 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 only need one set of quotation marks. For example, `"//pds(MYDOC)"` or `"//seqds"`.

Usage notes

- Some properties of the output, such as page size, input tray numbers, and color output, are defined in the configuration file **aopxfd.conf**. Your administrator sets up this file.
- If you specify multiple values of the same option, except for **-j**, the transform uses the last value that you specified.

- If your original document or formatting options (for example, form definition or job attributes) requires use of specific media options or printer features, such as generation of multiple copies, duplex, input and output bins, finishing, and jogging, this information is not contained in the PDF document output. However, options such as duplex printing and input bin do interact with other variables to affect the PDF output. Any formatting that affects the placement of the image on the page is still valid with the AFP to PDF transform. When printing PDF documents, you can use the printer driver options to select printer features.

- All AFP resources are transformed into PDF and are included in the output data stream (this is the default). This guarantees resource availability.

  Your administrator can override this by specifying BUILTIN on the AOP_OUTLINES configuration option. When this is specified, font resources are not transformed and included in the data stream. Adobe Acrobat Reader will try to resolve the font references. It is possible that Acrobat will not be able to resolve some characters. However, in many applications BUILTIN will be a preferable mode of creating PDF files, because it can significantly reduce the size of the output PDF file.

- When transforming line data in UNIX files that contain ANSI or no carriage control characters, you must specify **document-format=line**. If the data has ANSI control characters, also specify **carriage-control-type=ansi**.

- The IBM Document Composition Facility (DCF) program produces AFP documents that contain BookMaster® fonts (this is the default). Because BookMaster fonts do not have equivalent outline fonts, the transform cannot map them to outline fonts. To improve the readability of the documents with Adobe Acrobat, IBM recommends that you use these two DCF options when you create AFP documents:
  - @COREFNT(YES)
  - @BOOKFNT(3)

  These options tell DCF to create AFP documents that use raster fonts in the AFP Font Collection instead of BookMaster fonts. All raster fonts in the AFP Font Collection have outline equivalents.

- 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.

- If you want to view PDF data with Adobe Acrobat Reader in the landscape direction, do this when you transform line data:
  - Specify a form definition that specifies these in the COPYGROUP command:
    - PRESENT LANDSCAPE
    - DIRECTION ACROSS
    - CUTSHEET NO (this is the default)
  - Specify a page definition that is suitable for DIRECTION ACROSS printing.
  - Make sure that your administrator sets the AOP_CUTSHEET variable to no in the Infoprint Server transform configuration file, **aopxfd.conf**. (The default value for the AOP_CUTSHEET variable is no.) For an example of the **afp2pdf** command that you can use, see "Transform line data for viewing in landscape orientation" on page 66.

- You can use Adobe Acrobat Reader 3.0 or later to view and print the PDF output. These considerations apply when you view and print the PDF output:

- The printed output might be smaller or larger than expected. For example, the output might be 90% of the original size if the Fit To Page option is selected in the Acrobat Reader Print dialog. To solve this problem, deselect the Fit To Page option. The Fit To Page option is selected as the default in Acrobat Reader 4.0.
- Transformed PDF images might look different from the original AFP image, depending on your monitor and printer.
- If landscape output has been requested, the PDF document is in landscape format. If you later need portrait output, the PDF output can be rotated using Adobe Acrobat Reader.
- The transform uses the AFP font encoding to create the PDF document. The characters contained in the document might not be the same as the ASCII character mapping available on the keyboard used for PDF viewing.
- The actual appearance of raster fonts using Adobe Acrobat Viewer or Acrobat plug-in can differ from the printed output. For example, in the Acrobat Reader some characters might not appear to be aligned on the character baseline. The appearance might change as higher magnification levels are chosen in Acrobat Reader.

  The default setting of the Acrobat Reader is to show all fonts under 6 pixels as Greek, or shaded gray lines. Therefore, some of the AFP output might not be visible in the viewer. To correct this problem, in the Reader select **File** and select **Preferences**. On the **General** page, make sure that **Use Greek text below xx pixels** is not selected.
- PDF output contains a unique page number identification that is assigned during the creation of the PDF output file. This page number might not correspond to the page numbers used in the AFP input document.

Supported objects and controls

The AFP to PDF transform supports:

MO:DCA-P objects:
- BCOCA: Most bar codes except, for example, QR bar codes.
- FOCA:
  - Single-byte (SBCS) fonts:
    - 300-pel raster fonts, fixed metrics, and relative metrics.
    - AFP outline fonts.
  - Double-byte (DBCS) fonts:
    - 300-pel raster fonts, fixed metrics, and relative metrics.
    - AFP outline fonts are not supported.
- GOCA: All functions.
- IM: All functions, in single and double dot, in all rotations.
- IOCA:
  - Uncompressed, compressed MMR, G3, G4, RL4, ABIC (non-concatenated), JPEG baseline and extended.
  - IDE 1-8, 24 (lookup table).
- Object containers for JFIF, JPEG, and TIFF image objects.
- PTOCA1, PTOCA2.

AFP resources:
- Page definitions, including conditional processing.

| • Form definitions, including basic N_UP processing.
- Overlays.
- Page segments.
- User resource libraries.

Line data:
- Carriage control (ANSI, machine).
- Table reference characters.
- Shift out/shift in DBCS data - SOS1, SOSI2, and SOSI3 options.
- Mixed line data and AFP records (including IDM, IMM).

Limitations

This section lists the items in the AFP architecture that the AFP to PDF transform does not currently support. Because the AFP architecture and PSF continue to be enhanced with new functional capabilities, this list might be incomplete after the publication date. IBM suggests that you test how your AFP applications print on your non-AFP printers to make sure the output is acceptable.

- Include Page (IPG).
- Internal copy groups.
- IOCA Color Plus image objects (IOCA FS45).
- Map Color Attribute Table (MCA).
- Map Media Type (MMT).
- Map Page (MPG).
- Medium Finishing Control (MFC).
- Preprocess Presentation Object (PPO).
- Presentation Fidelity Control (PFC).
- QR bar codes.
- SOSI4 for DBCS data.

The transform does not support these fonts:
- DBCS outline fonts.
- OpenType fonts.
- TrueType fonts.
- UTF-16 fonts.

Limitations of viewing and searching with Adobe Acrobat Reader:
- Text that has been generated using AFP GOCA output graphic characters cannot be found.
- To preserve the output fidelity of a document, corresponding placement of characters is done in the PDF output document, which can result in additional "space" characters in a character string. This restricts the operation of the Adobe find function.
- The AFP representation of a code page might not match its ASCII representation. This can cause problems searching, especially with raster fonts.

Other limitations include:
| • The transform might create bar codes that are larger or smaller than the same
| bar codes printed on AFP printers. The transform creates bar codes with a

resolution of 300 pels per inch. Even though the size of bar codes might be different, the bar codes will scan properly.

- The transform does not check all AFP structured fields in the AFP documents for validity. PSF might check additional structured fields for validity when it prints the AFP documents. Therefore, do not use the AFP to PDF transform to determine if PSF can print an AFP document.
- The transform formats all output for the size of the paper in the first input tray selected.

Examples -- afp2pdf

Transform an AFP file, specifying a transform class and output file

To transform the AFP file `myfile.afp` into a PDF file, using the `us` transform class, and write a file called `myfile.pdf`, enter:

```
afp2pdf -c us -o myfile.pdf myfile.afp
```

Transform an MVS data set, specifying a form definition

To transform the MVS data set `USERX.AFP(MYFILE)` into a PDF file, using the form definition `F1C10110`, and write a file called `myfile.pdf`, enter:

```
afp2pdf -j "form-def=f1c10110" -o myfile.pdf "//'USERX.AFP(MYFILE)'"
```

Transform an AFP file, specifying a form definition and a resource library

To transform the AFP file `myfile.afp` into a PDF file, using the form definition `F1C10110` that contains references to user-supplied AFP resources, and write a file called `myfile.pdf`, enter this command on one line:

```
afp2pdf -j "form-def=f1c10110 res-lib={lib1.pseglib lib3.private}"
        -o myfile.pdf myfile.afp
```

Transform a job using redirection

To transform the AFP file `input.afp` into the PDF output file called `output.pdf`, enter:

```
afp2pdf < input.afp > output.pdf
```

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

Transform a UNIX file to an MVS data set

To transform the line data file `input.line` into an MVS PDF output data set called `HLQ.OUTPUT.PDF(MYDOC)`, enter:

```
afp2pdf -j doc-format=line -o "//'HLQ.OUTPUT.PDF(MYDOC)'" input.line
```

Transform an MVS data set, writing the output to a UNIX file

To transform the MVS data set *hlq*`.INPUT.LINE(MYDOC)` into an output file called `output.pdf`, enter:

```
afp2pdf -o output.pdf "//'HLQ.INPUT.LINE(MYDOC)'"
```

Transform line data, specifying a form definition and a page definition

To transform the line data file `myfile.line` that contains ANSI carriage control characters into a PDF file, using the form definition `F1C10110` and page definition `P1P06362`, and write a file called `myfile.pdf`, enter this command on one line:

```
afp2pdf -j "form-def=f1c10110 page-def=p1p06362 c-c-t=a doc-format=line"
   -o myfile.pdf myfile.line
```

Transform line data for viewing in landscape orientation

To transform the line data file `myfile.line` that contains ANSI carriage control characters into a PDF file that you can view with Adobe Acrobat Reader in the landscape direction, enter this command on one line:

```
afp2pdf -j "form-def=f10101la page-def=p1a06462 c-c-t=a doc-format=line"
    -o myfile.pdf myfile.line
```

Transform line data, specifying a form definition, a page definition, and fonts

To transform the line data file `myfile.line` containing machine carriage control characters and table reference characters into a PDF file, using the form definition `F1C10110` and page definition `F1P06362`, and write a file called `myfile.pdf`, enter this command on one line:

```
afp2pdf -j "form-def=f1c10110 page-def=p1p06362 c-c-t=m t-r-c=yes chars={60D8 60D0}"
   -o myfile.pdf myfile.line
```

Transform line data, specifying a page definition and print offset

To transform the line data file `myfile.line` containing machine carriage control characters into a PDF file, using the page definition `P1P06362`, positioning the output 24 millimeters (approximately one inch) from the left edge of the paper, and write a file called `myfile.pdf`, enter this command on one line:

```
afp2pdf -j "page-def=p1p06362 c-c-t=m x-image-shift-front=24" -o myfile.pdf
myfile.line
```

Environment variables

The **afp2pdf** 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*.

NLSPATH   Names the directory paths that the **afp2pdf** command searches for message catalogs.

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.

For the format of the configuration files, see *z/OS Infoprint Server Customization*.

Exit values

0   The data was transformed successfully. However, the output document might contain error messages related to errors in the input data stream.

>0   An error occurred. No output document was created.

afp2ps—Transform AFP data to PostScript data

Format

afp2ps [**-c** *transformclass*] [**-F** *tracefile*] [**-i** *inputcodepage*] [**-j** *jobattributes*]...

[**-o** *outputfile*] [**-T** *traceoptions*] [*inputfile ...*]

Description

The **afp2ps** command converts an Advanced Function Presentation (AFP) data file into a PostScript Language Level 3 data stream file. This command is part of the Infoprint Server Transforms V1.1 product.

For information about the V2.1 Infoprint transform, see this book instead: *Infoprint Transforms from AFP for z/OS*, G550-0444.

Error messages related to errors in the input data stream are written at the end of the output document.

Options

-c *transformclass*

Specifies the name of a transform class that your administrator has defined. The transform class determines options such as:

- The characteristics of the printer, such as whether it supports color
- The size of paper in each input tray, such as letter, ledger, A4, B4, or B5
- Defaults for page formatting options, such as the default page definition, form definition, and font
- Resource libraries

You do not always have to specify a transform class. If you do need to specify one, however, ask your administrator for the name of a transform class suitable for the printer and the type of job.

-F *tracefile*

Specifies the file in which to store the trace. This should only be used as instructed by IBM service personnel. For information about this option, see *z/OS Infoprint Server Messages and Diagnosis*.

-i *inputcodepage*

This option applies only when you transform line data. If you specify this option for AFP data, it is ignored.

This option identifies the code page to which line data is converted before it is transformed. Specify a code page that corresponds to the coded fonts specified in the page definition or in the **chars** job attribute.

To transform line data that is already encoded in the code page that corresponds to the coded fonts, do *not* specify this option. If this option is not specified, line data is not converted before it is transformed. For example, to transform a line data document that specifies coded fonts in the **chars** job attribute and currently prints correctly on an AFP printer, do *not* specify this option.

You must specify this option to correctly transform documents encoded in code pages that do not correspond to the code page for the coded fonts. This is most likely to occur when you transform an ASCII file.

afp2ps

In the **-i** option, you must specify an IBM-supplied or custom code page that the iconv utility supports. For code page information, see *z/OS C/C++ Programming Guide*. To find the AFP code page for each character set, see *IBM AFP Fonts: Font Summary for AFP Font Collection*. The AFP code page and the name of the code pages that iconv uses are different. Be careful to specify the iconv code page value. For example, if you specify one of these coded fonts in the **chars** job attribute, specify -i IBM-500:

Coded font	AFP code page	iconv code page
40D0, 40F0, 40E0, 4100	T1V10500	IBM-500
60D9 (default font)	T1V10500	IBM-500

Note: When you specify this option, also make sure that the code page specified in the **document-codepage** job attribute correctly identifies the code page in which the input document is encoded. If you do not specify the **document-codepage** attribute, the default is the code page of the locale, which is usually an EBCDIC code page.

-j *jobattributes*

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

- 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 might be interpreted by the shell (such as **$ & ( ) > < | ' "**), enclose the option in single or double quotation marks:

  ```
  -j 'attribute1=value1 attribute2=value2'
  -j "attribute='value with spaces'"
  -j "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:

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

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

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

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 called `attributes` to specify the file.

You can specify any of these attributes, which apply to all files to be transformed with the command:

carriage-control-type	chars	document-codepage
document-format	duplex	form-definition
input-tray-number	output-bin-number	overlay-back

overlay-front	page-definition	resource-library
shift-out-shift-in	table-reference-characters	x-image-shift-back
x-image-shift-front	y-image-shift-back	y-image-shift-front

For more information about the attributes, see "Attribute listing" on page 99.

-o *outputfile*

Specifies the output path and file into which the transform output (that is, PostScript 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 only need one set of quotation marks. For example, `"//PDS(MYDOC)"` or `"//SEQDS"`.

If you specify an MVS data set, you might need to allocate the data set before you run this command, especially when you transform a large document. 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. Allocate the output data set with these characteristics:
- Record format: VB
- Record length: 1024 or larger is recommended

-T *traceoptions*

Specifies the trace options. This should only be used as instructed by IBM service personnel. For information about this option, see *z/OS Infoprint Server Messages and Diagnosis*.

Tip: You can use the **filter-options** job attribute with, for example, the **lp** command to pass the **-c** *transformclass* and **-i** *inputcodepage* options to the transform. For information about the **filter-options** job attribute, see "Attribute listing" on page 99.

Operand

inputfile

Specifies an input file to be transformed. If you specify more than one input file name, the **afp2ps** command concatenates the files. 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 (**-**) as the file name, **afp2ps** 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 only need one set of quotation marks. For example, `"//pds(MYDOC)"` or `"//seqds"`.

Usage notes

- Some properties of the output, such as page size, input tray numbers, and color output, are defined in the configuration file **aopxfd.conf**. Your administrator sets up this file.

- If you specify multiple values of the same option, except for **-j**, the transform uses the last value that you specified.
- The transform converts the document formatting options to corresponding PostScript commands (for example: paper size, input tray, duplexing). The interpretation of these commands depends on your printer.
- All AFP resources are transformed into PostScript and are included in the output data stream. This guarantees resource availability.
- When transforming line data in UNIX files that contain ANSI or no carriage control characters, you must specify **document-format=line**. If the data has ANSI control characters, you must also specify **carriage-control-type=ansi**.
- To create output that prints edge-to-edge on capable printers, your administrator must specify a paper name designed for edge-to-edge printing in the transform configuration file.

  To use the edge-to-edge paper on a capable printer, ask your administrator which printer definition and input tray to specify.

  Some printers do not support edge-to-edge printing. On such printers, documents created for edge-to-edge printing have the outside 50 pels, approximately 4 millimeters, of output cut off.
- 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.

Supported objects and controls

The AFP to PostScript transform supports:

MO:DCA-P objects:
- BCOCA: Most bar codes except, for example, QR bar codes.
- FOCA:
  - Single-byte (SBCS) fonts:
    - 300-pel raster fonts, fixed metrics, and relative metrics.
    - AFP outline fonts.
  - Double-byte (DBCS) fonts:
    - 300-pel raster fonts, fixed metrics, and relative metrics.
    - AFP outline fonts are not supported.
- GOCA: All functions.
- IM: All functions, in single and double dot, in all rotations.
- IOCA:
  - Uncompressed, compressed MMR, G3, G4, RL4, ABIC (non-concatenated), JPEG baseline and extended.
  - IDE 1-8, 24 (lookup table).
- Object containers for JFIF, JPEG, and TIFF image objects.
- PTOCA1, PTOCA2.

AFP resources:
- Page definitions, including conditional processing.
- Form definitions, including basic N_UP processing.
- Overlays.

- Page segments.
- User resource libraries.

Line data:
- Carriage control (ANSI, machine).
- Table reference characters.
- Shift out/shift in DBCS data - SOS1, SOSI2, and SOSI3 options.
- Mixed line data and AFP records (including IDM, IMM).

Limitations

This section lists the items in the AFP architecture that the AFP to PostScript transform does not currently support. Because the AFP architecture and PSF continue to be enhanced with new functional capabilities, this list might be incomplete after the publication date. IBM suggests that you test how your AFP applications print on your non-AFP printers to make sure the output is acceptable.

- Include Page (IPG).
- Internal copy groups.
- IOCA Color Plus image objects (IOCA FS45).
- Map Color Attribute Table (MCA).
- Map Media Type (MMT).
- Map Page (MPG).
- Medium Finishing Control (MFC).
- Preprocess Presentation Object (PPO).
- Presentation Fidelity Control (PFC).
- QR bar codes.
- SOSI4 for DBCS data.
- TrueType and OpenType fonts in AFP documents.
- UTF-16 fonts.

The transform does not support these fonts:
- DBCS outline fonts.
- OpenType fonts.
- TrueType fonts.
- UTF-16 fonts.

Other limitations include:
- The transform might create bar codes that are larger or smaller than the same bar codes printed on AFP printers. The transform creates bar codes with a resolution of 300 pels per inch. Even though the size of bar codes might be different, the bar codes will scan properly.
- The transform does not check all AFP structured fields in the AFP documents for validity. PSF might check additional structured fields for validity when it prints the AFP documents. Therefore, do not use the AFP to PostScript transform to determine if PSF can print an AFP document.

Examples -- afp2ps

Transform an AFP file, specifying a transform class and output file

To transform the AFP file `myfile.afp` into a PostScript file, using the `us` transform class, and write a file called `myfile.ps`, enter:

```
afp2ps -c us -o myfile.ps myfile.afp
```

Transform an MVS data set, specifying a form definition

To transform the MVS data set `USERX.AFP(MYFILE)` into a PostScript file, using the form definition `F1CP0110`, and write a file called `myfile.ps`, enter:

```
afp2ps -j "form-def=f1cp0110" -o myfile.ps "//'USERX.AFP(MYFILE)'"
```

Transform an AFP file, specifying a form definition and a resource library

To transform the AFP file `myfile.afp` into a PostScript file, using the form definition `F1CP0110` that contains references to user-supplied AFP resources, and write a file called `myfile.ps`, enter this command on one line:

```
afp2ps -j "form-def=f1cp0110 res-lib={lib1.pseglib lib3.private}"
       -o myfile.ps myfile.afp
```

Transform and print an MVS data set, specifying a form definition and a resource library

To transform the MVS data set `PROD.AFPOUT(JOB1)` into a PostScript file, using the form definition `F1CP0110` that contains references to user-supplied AFP resources, and print the output, enter this command on one line:

```
afp2ps -j "form-def=f1cp0110 res-lib={lib1.pseglib lib3.private}"
   "//'PROD.AFPOUT(JOB1)'" | lp
```

Transform a job using redirection

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

```
afp2ps < input.afp > output.ps
```

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

Transform multiple files and concatenate the output

To transform the AFP files `input.01.afp`, `input.02.afp`, ... `input.xx.afp` into one PostScript output file called `output.ps`, enter:

```
afp2ps -o output.ps input.01.afp input.02.afp ... input.xx.afp
```

Transform a UNIX file to an MVS data set

To transform the line data file `input.line` into an MVS PostScript output data set called `hlq.OUTPUT.PS(MYDOC)`, enter:

```
afp2ps -j doc-format=line -o "//'hlq.OUTPUT.PS(MYDOC)'" input.line
```

Transform an MVS data set, writing the output to a UNIX file

To transform the MVS data set `hlq.INPUT.LINE(MYDOC)`, where *hlq* is your user ID, into a PostScript output file called `output.ps`, enter:

```
afp2ps -o output.ps "//'hlq.INPUT.LINE(MYDOC)'"
```

Transform line data, specifying a form definition and a page definition

To transform the line data file `myfile.line` that contains ANSI carriage control characters into a PostScript file, using the form definition `F1CP0110` and page definition `P1P06362`, and write a file called `myfile.ps`, enter this command on one line:

```
afp2ps -j "form-def=f1cp0110 page-def=p1p06362 c-c-t=a doc-format=line"
    -o myfile.ps myfile.line
```

Transform line data, specifying a page definition and fonts

To transform the line data file `myfile.line` containing machine carriage control characters and table reference characters into a PostScript file, using the page definition `P1P06362`, and write a file called `myfile.ps`, enter this command on one line:

```
afp2ps -j "page-def=p1p06362 c-c-t=m t-r-c=yes chars={60D8 60D0}" -o myfile.ps
myfile.line
```

Transform line data, specifying a page definition and print offset

To transform the line data file `myfile.line` containing machine carriage control characters into a PostScript file, using the page definition `P1P06362`, positioning the output approximately 1 inch from the left edge of the paper, and write a file called `myfile.ps`, enter this command on one line:

```
afp2ps -j "page-def=p1p06362 c-c-t=m x-image-shift-front=24" -o myfile.ps
myfile.line
```

Environment variables

The **afp2ps** 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*.

NLSPATH
Names the directory paths that the **afp2ps** command searches for message catalogs.

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.

For the format of the configuration files, see *z/OS Infoprint Server Customization*.

Exit values

0
The data was transformed successfully. However, the output document might contain error messages related to errors in the input data stream.

>0
An error occurred. No output document was created.

---

pcl2afp—Transform PCL data to AFP data

Format

pcl2afp [**-a** *imagetype*] [**-c** *transformclass*] [**-o** *outputfile*]

[**-p** *pagerange*] ... [**-t** *outputtype*] [*inputfile ...*]

Description

The **pcl2afp** command converts a Printer Control Language (PCL) 5 or 5e data file into an Advanced Function Presentation (AFP) data stream file. This command is part of the Infoprint Server Transforms V1.1 product.

For information about the V2.1 Infoprint transform, see this book instead: *Infoprint Transforms to AFP for z/OS*, G550-0443.

If you specify the same option multiple times, the command uses only the last option, with the exception of the **-p** option. You can specify the **-p** option up to 19 times.

You can specify one or more input files to be transformed. If you do not specify an input file name, or if you specify a dash (**-**) as the file name, **pcl2afp** uses standard input. The output file name is also optional. If you do not specify one, the **pcl2afp** command writes the results to standard output.

Options

-a *imagetype*
Determines the type of AFP data stream image to generate for each page in the PCL file.

Values are:

io1-g4 Compressed Image Object Content Architecture (IOCA) image in Modified Telecommunication Standardization Sector (TSS) T.6 G4 Facsimile Coding Scheme (G4 MMR) format. This is the recommended output type because it takes up less space on the hard disk, and it prints faster.

Tips:

1. Some older AFP printers do not support printing with an image type of **io1-g4**. For these printers, specify an image type of **io1-mmr** because it is the compressed image type that they support. This image type results in faster printing than uncompressed image types.

2. TSS was formerly the International Telegraph and Telephone Consultative Committee (CCITT).

im1 IM1 image. This type of image is not compressed.

io1 IOCA image. This type of image is not compressed.

io1-mmr
Compressed IOCA image in Modified Modified Read (MMR) format.

-c *transformclass*
Specifies the name of a transform class that your administrator has defined. The transform class determines these options:

- The length and width of the generated image
- The page margins
- The resolution of the output image
- The amount of memory that the transform allocates

Ask your administrator for the name of a transform class suitable for the printer and the type of job.

Tip: If the transform class specifies a resolution that the printer does not support, PSF prints the image under most conditions, but with degraded results.

-o *outputfile*

Specifies the output path and file into which the transform output (that is, AFP data) is written. The transform overwrites any existing data in the output file. If you specify more than one output file, the last path and file name are used. 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 only need 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 you select in the **-a** option. Typically, an output AFP data stream is several times as large as the input data stream. Allocate the output data set with these characteristics:
- Record format: VBM
- Record length: 8K (8192) bytes or larger

-p *pagerange*

Specifies that the output should contain only selected pages. You can specify the **-p** option up to 19 times.

The **-p** option counts pages by their actual sequence in the document, not by page number. For example, to write only the last page of a document whose pages are numbered i, ii, 1, 2, 3, 4, specify -p 6.

Examples of values include:

-p even	Write even pages.
-p odd	Write odd pages.
-p 1-10	Write the first through tenth pages.
-p 10-	Write pages from the tenth page until the end of the file.
-p 1 -p 3 -p 6	
	Write the first, third, and sixth pages.

-t *outputtype*

Determines the type of output to generate.

Values are:

document
> Printable document.

overlay
> Graphic image that can be printed on each page of a printable document.

pagesegment
> Graphic image that can be embedded in a printable document.

> **Tip:** When generating overlays or page segments from multiple-page documents, use the **-p** option to select a single page. Otherwise, the output will contain multiple overlays or page segments (one for each page). The AFP architecture does not allow multiple, concatenated overlays or page segments.

Tip: You can use the **filter-options** job attribute with, for example, the **lp** command to pass any of these options except **-o** *outputfile* to the transform. For information about the **filter-options** job attribute, see "Attribute listing" on page 99.

Operand

inputfile
> Specifies an input file to be transformed. If you specify more than one input file name, the **pcl2afp** command concatenates the files. The results are written to a single output file (if one is specified) or to standard output.

> If you do not specify an input file, or if you specify a dash (**-**) as the file name, **pcl2afp** uses standard input.

Limitations

These limitations apply to the PCL to AFP transform:

- The transform does not produce color output. It produces monochrome output only.
- PCL data can contain device commands (for example, to begin or end duplexing or to change the input bin). Because the AFP architecture defines those device functions in an AFP form definition, the transform ignores the device commands in the PCL data stream. To obtain these device functions, you must specify them in the form definition or Infoprint Server job attributes.
- Resolution conversion algorithms might produce a degraded appearance when used to reduce the resolution of a data stream. For this reason, the transform might degrade the appearance of higher-resolution data streams when used with 240-pel printers. You should verify that print fidelity is satisfactory.
- Subtle differences exist between PCL4 and PCL5e related to handling fonts. While many PCL4 files work with the transform, some might not produce the expected output.
- The transform uses fonts that are built in to the transform and produces a rasterized image of the data. However, only certain fonts are built in. For fonts that are not built in, the transform substitutes another font that is the best match for the specified font. The administrator cannot customize this. To use a font that is not built in to the transform, you must embed the font in the input data stream.

  The fonts that are built in to the transform are:

  Embedded Intellifonts:
  Albertus Extra Bold
  Albertus Medium

```
Antique Olive
Antique Olive Bold
Antique Olive Italic
CG Omega
CG Omega Bold
CG Omega Bold Italic
CG Omega Italic
CG Times
CG Times Bold
CG Times Bold Italic
CG Times Italic
Clarendon Condensed Bold
Coronet
Courier
Courier Bold
Courier Bold Italic
Courier Italic
Garamond Antiqua
Garamond Halbfett
Garamond Kursiv
Garamond Kursiv Halbfett
Letter Gothic
Letter Gothic Bold
Letter Gothic Italic
Marigold
Univers Bold
Univers Bold Italic
Univers Condensed Bold
Univers Condensed Bold Italic
Univers Condensed Medium
Univers Condensed Medium Italic
Univers Medium
Univers Medium Italic

Embedded True Type Fonts:
Arial
Arial Bold
Arial Bold Italic
Arial Italic
Times New Roman
Times New Roman Bold
Times New Roman Bold Italic
Times New Roman Italic
TT_Symbol
WingDings
```

Examples -- pcl2afp

Transform a file, specifying transform class

To transform the PCL file `myfile.pcl` into an AFP data stream, using the `a4_300` transform class, and write the result to a file called `myfile.afp`, enter:

```
pcl2afp -c a4_300 -o myfile.afp myfile.pcl
```

Transform and print a file, specifying image type

To transform the PCL file `myfile.pcl` into an AFP data stream as an IO1-MMR image, and send the result to the default printer with the **lp** command, enter:

```
pcl2afp -a io1-mmr myfile.pcl | lp
```

Transform a file using redirection

To transform the PCL file `input.pcl` into the AFP output file called `output.afp`, enter:

```
pcl2afp < input.pcl > output.afp
```

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

Transform multiple files and concatenate the output

To transform the PCL files `input.01.pcl`, `input.02.pcl`, ... `input.xx.pcl` into one AFP output file called `output.afp`, enter:

```
pcl2afp -o output.afp input.01.pcl input.02.pcl ... input.xx.pcl
```

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:

```
pcl2afp -o "//'hlq.OUTPUT.AFP(member)'" input.pcl
```

Transform an MVS data set, writing the output to a UNIX file

To transform the MVS data set `hlq.INPUT.PCL(member)`, where `hlq` is your user ID, into an output file called `output.afp`, enter:

```
pcl2afp -o output.afp "//'hlq.INPUT.PCL(member)'"
```

Environment variables

The **pcl2afp** 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*.

NLSPATH Names the directory paths that the **pcl2afp** command searches for message catalogs.

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.

For the format of the configuration files, see *z/OS Infoprint Server Customization*.

Exit values

0 The data was transformed successfully. However, the output document might contain error messages related to errors in the input data stream.

>0 An error occurred. No output document was created.

pdf2afp and ps2afp—Transform PDF or PostScript data to AFP data

Format

pdf2afp [-**a** *imagetype*] [-**c** *transformclass*] [-**l** *length*] [-**o** *outputfile*]

[-**p** *pagerange*] ... [-**r** *resolution*] [-**t** *outputtype*] [-**w** *width*]

[-**x** *xmargin*] [-**y** *ymargin*] [*inputfile...*]

ps2afp [-**a** *imagetype*] [-**c** *transformclass*] [-**g** *pagerange*] ...

[-**i** *initializationfile*] ... [-**l** *length*] [-**o** *outputfile*] [-**p** *pagerange*] ...

[-**r** *resolution*] [-**t** *outputtype*] [-**w** *width*] [-**x** *xmargin*] [-**y** *ymargin*]

[*inputfile...*]

Description

The **ps2afp** command and its alias, the **pdf2afp** command, convert a PostScript or Portable Document Format (PDF) data file into an Advanced Function Presentation (AFP) data stream file. These commands are part of the Infoprint Server Transforms V1.1 product.

For information about the V2.1 Infoprint transform, see this book instead: *Infoprint Transforms to AFP for z/OS*, G550-0443.

If the Kanji AFP Print feature of Infoprint Server Transforms is installed, you can transform Japanese PostScript and PDF documents to AFP format. The **pdf2afp** and **ps2afp** commands map a variety of DBCS fonts to the Heisei Kaku Gothic or Heisei Mincho font.

If you specify the same option multiple times, the command uses only the last option, with the exception of the **-g** and **-p** options. You can specify the **-g** option any number of times. You can specify the **-p** option up to 20 times.

You can specify one or more input files to be transformed. If you do not specify an input file name, or if you specify a dash (-) as the file name, **ps2afp** uses standard input. The output file name is also optional. If you do not specify one, the **ps2afp** command writes the results to standard output.

Options

-**a** *imagetype*
    Determines the type of AFP data stream image to generate for each page in the PostScript or PDF file.

    Values are:

    io1-g4 Compressed Image Object Content Architecture (IOCA) image in Modified Telecommunication Standardization Sector (TSS) T.6 G4 Facsimile Coding Scheme (G4 MMR) format. This is the recommended output type because it takes up less space on the hard disk, and it prints faster.

> **Tips:**
>
> 1. Some older AFP printers do not support printing with an image type of **io1-g4**. For these printers, specify an image type of **io1-mmr** because it is the compressed image type that these printers support. This image type results in faster printing than uncompressed image types.
>
> 2. TSS was formerly the International Telegraph and Telephone Consultative Committee (CCITT).

im1 IM1 image. This type of image is not compressed.

io1 IOCA image. This type of image is not compressed.

io1-mmr
> Compressed IOCA image in Modified Modified Read (MMR) format.

-c *transformclass*
> Specifies the name of a transform class that your administrator has defined. The transform class determines these options:
>
> - The initial transform configuration
> - The fonts used in the transformed files
>
> Ask your administrator for the name of a transform class suitable for the type of job.

-g *pagerange*
> Specifies that the output should contain only selected pages. You can specify the **-g** option any number of times. The **-g** option can be used only for PostScript documents that conform to the Data Stream Compatibility (DSC) standard. It is not valid for PDF documents.
>
> The difference between the **-g** and **-p** options is that **-g** identifies pages by the label specified with the PostScript **%%Page** command (usually a page number), while **-p** counts them by their actual sequence in the document. For example, to write only the last page of a document whose pages are numbered i, ii, 1, 2, 3, 4, specify -g 4 or -p 6.
>
> **Tip:** Unlike the **-p** option, the **-g** option does not support the **even** and **odd** keywords.
>
> Examples of values include:
>
> `-g iii-vi` Write pages iii through vi.
>
> `-g 1-10` Write pages 1 through 10.
>
> `-g 10-` Write pages from page 10 until the end of the job.
>
> `-g 1 -g 3 -g 6`
>   Write pages 1, 3, and 6.
>
> `-g 3-1 3-28` Write pages 3-1 through 3-28.

-i *initializationfile*
> Specifies one or more ASCII PostScript files that are added to the start of the job to set up and initialize the PostScript transform. If you specify more than one file, they are processed in the order that you specify them. The **-i** option is not valid for PDF documents.

-l *length*
> Specifies the length of the generated image. In general, specify the length

...

of the physical page. For more information about this option, see "Usage notes" on page 85. Specify a number followed by one of these units:

in   Inches

mm   Millimeters

<u>**pel**</u>   Pels, the default unit

Inch values and millimeter values can contain a decimal point. Pel values cannot.

Values are:

<u>**11in**</u>	11 inches, the default for all printers
0.1334in to **53in**	Inch values for 240-pel printers
0.1067in to **53in**	Inch values for 300-pel printers
0.0667in to **53in**	Inch values for 480-pel printers
0.0534in to **53in**	Inch values for 600-pel printers
3.3867mm to **1346.2mm**	Millimeter values for 240-pel printers
2.7094mm to **1346.2mm**	Millimeter values for 300-pel printers
1.6934mm to **1346.2mm**	Millimeter values for 480-pel printers
1.3547mm to **1346.2mm**	Millimeter values for 600-pel printers
32pel to **12720pel**	Pel values for 240-pel printers
32pel to **15900pel**	Pel values for 300-pel printers
32pel to **25440pel**	Pel values for 480-pel printers
32pel to **31800pel**	Pel values for 600-pel printers

Examples of values include:

```
-l 40mm
-l 200.5mm
-l 13in
-l 5280
-l 5280pel
```

Tip: If a text margin is already built into the file, try **-l 11in** to set the length to 11 inches.

-o *outputfile*

Specifies the output path and file into which the transform output (that is, AFP data) is written. The transform overwrites any existing data in the output file. If you specify more than one output file, the last path and file name are used. 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 only need 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 you select in the **-a** option. Typically, an output AFP data stream is several times as large as the input data stream. Allocate the output data set with these characteristics:
* Record format: VBM
* Record length: 8K (8192) bytes or larger

-p *pagerange*

Specifies that the output should contain only selected pages. You can specify the **-p** option up to 20 times.

The difference between the **-p** and **-g** options is that **-p** counts pages by their actual sequence in the document, while **-g** identifies them by page label. For example, to write only the last page of a document whose pages are numbered i, ii, 1, 2, 3, 4, specify -p 6 or -g 4.

Examples of values include:

-p even   Write even pages.

-p odd   Write odd pages.

-p 1-10   Write the first through tenth pages.

-p 10-   Write pages from the tenth page until the end of the job.

-p 1 -p 3 -p 6
                 Write the first, third, and sixth pages.

-r *resolution*

Specifies the resolution of the output image. Select the correct resolution for the printer on which you intend to print the image.

Values are:

240   240 pels per inch (for example, IBM 3812, 3825, 3827, 3835, and 3900 printers)

300   300 pels per inch (for example, IBM 4019, 4028, 4029, and 4039 printers and some Hewlett-Packard printers)

480   480 pels per inch

600   600 pels per inch (for example, IBM Infoprint 60 and Infoprint 4000 printers), the default

Tip: If you specify a resolution that the printer does not support, PSF prints the image under most conditions, but with degraded results.

-t *outputtype*

Determines the type of output to generate.

Values are:

document
        Printable document.

overlay
        Graphic image that can be printed on each page of a printable document.

pagesegment
        Graphic image that can be embedded in a printable document.

| | **Tip:** When generating overlays or page segments from multiple-page documents, limit your input and output to a single page. Otherwise, the output will contain multiple overlays or page segments (one for each page). The AFP architecture does not allow multiple, concatenated overlays or page segments.

-w *width*

Specifies the maximum width of the generated image. In general, specify the width of the physical page. For more information about this option, see "Usage notes" on page 85. Specify a number followed by one of these units:

in   Inches

mm   Millimeters

pel   Pels, the default unit

Inch values and millimeter values can contain a decimal point. Pel values cannot.

Values are:

8.5in	8.5 inches, the default for all printers
0.1334in to **25.5in**	Inch values for 240-pel printers
0.1067in to **25.5in**	Inch values for 300-pel printers
0.0667in to **25.5in**	Inch values for 480-pel printers
0.0534in to **25.5in**	Inch values for 600-pel printers
3.3867mm to **647.7mm**	Millimeter values for 240-pel printers
2.7094mm to **647.7mm**	Millimeter values for 300-pel printers
1.6934mm to **647.7mm**	Millimeter values for 480-pel printers
1.3547mm to **647.7mm**	Millimeter values for 600-pel printers
32pel to **6120pel**	Pel values for 240-pel printers
32pel to **7650pel**	Pel values for 300-pel printers
32pel to **12240pel**	Pel values for 480-pel printers
32pel to **15300pel**	Pel values for 600-pel printers

Examples of values include:

```
-w 40mm
-w 200.5mm
-w 13in
-w 4000
-w 4000pel
```

Tip: If a text margin is already built into the file, try **-w 8.5in** to set the width to 8.5 inches.

-x *xmargin*

Specifies a horizontal margin or border around the generated image to avoid the non-printable areas of some printers. For more information about this option, see "Usage notes" on page 85. Specify a number followed by one of these units:

in   Inches

mm Millimeters

pel Pels, the default unit

Inch values and millimeter values can contain a decimal point. Pel values cannot.

Values are:

0 Zero, the default for all printers

0in to **12.75in** Inch values for all printers

0mm to **323.85mm**
Millimeter values for all printers

0pel to **3060pel**
Pel values for 240-pel printers

0pel to **3825pel**
Pel values for 300-pel printers

0pel to **6120pel**
Pel values for 480-pel printers

0pel to **7650pel**
Pel values for 600-pel printers

Tips:
1. Because the X value specifies margins on *both* the left and right sides of the page, the X value can be no more than half of the width (**-w**) of the generated image. For example, if you specify a width of 8 inches, the X value can be no larger than 4 inches. If you specify an X value of 5 inches, a blank page is printed because the sum of the left and right margins exceeds the width of the paper.
2. The X value does not shift the image on the page. The image is cropped if it is defined to print in the left or right margin.

-y *ymargin*
Specifies a vertical margin or border around the generated image to avoid the non-printable areas of some printers. For more information about this option, see "Usage notes" on page 85. Specify a number followed by one of these units:

in Inches

mm Millimeters

pel Pels, the default unit

Inch values and millimeter values can contain a decimal point. Pel values cannot.

Values are:

0 Zero, the default for all printers

0in to **26.5in** Inch values for all printers

0mm to **673.1mm**
Millimeter values for all printers

0pel to **6360pel**
Pel values for 240-pel printers

0pel to **7950pel**

Pel values for 300-pel printers

0pel to **12720pel**

Pel values for 480-pel printers

0pel to **15900pel**

Pel values for 600-pel printers

Tips:

1. Because the Y value specifies margins on *both* the top and bottom of the page, the Y value can be no more than half of the length (**-l**) of the generated image. For example, if you specify a length of 12 inches, the Y value can be no larger than 6 inches. If you specify a Y value of 7 inches, a blank page is printed because the sum of the top and bottom margins exceeds the length of the paper.

2. The Y value does not shift the image on the page. The image is cropped if it is defined to print in the top or bottom margin.

Tip: You can use the **filter-options** job attribute with, for example, the **lp** command to pass any of these options except **-o** *outputfile* to the transform. For information about the **filter-options** job attribute, see "Attribute listing" on page 99.

Operand

inputfile

Specifies an input file to be transformed. If you specify more than one input file name, the **ps2afp** command concatenates the files. The results are written to a single output file (if one is specified) or to standard output.

If you do not specify an input file, or if you specify a dash (**-**) as the file name, **ps2afp** uses standard input.

Usage notes

- The PostScript or PDF file might contain the commands **letter** and **legal**. If these commands are present in the PostScript or PDF file, the size of the transformed image might not be what you expect. The **letter** and **legal** commands override the length and width values specified for the transform.

- The position of PostScript or PDF data on the page depends on the interaction of the length and width values specified for the transform with the form definition you use (if you do not use the **letter** and **legal** commands).

  In general, to position data on the page:

  – Use **-l** and **-w** to set the physical page dimensions.

  – Use **-x** and **-y** to set the amount of white space between the physical page dimensions and the image.

  These options do not shift or scale the image on the page. If the image is defined to print in the unprintable areas, it is cropped.

  For example, to create a 6.5 x 9 inch image that is centered on an 8.5 x 11 inch page, enter:

  ```
  -l 11in -w 8.5in -x 1in -y 1in
  ```

  – Use a form definition that specifies zero vertical offset and zero horizontal offset, or specify X and Y offsets of 0 when you submit the print job.

pdf2afp, ps2afp

Limitations

These limitations apply to the PDF to AFP transform and to the PostScript to AFP transform:

- The transform does not produce color output. It produces monochrome output only.

  In addition, this transform cannot create AFP FS45 image objects, which some IBM color printers require. However, the PostScript to AFP transform available with IBM Infoprint Manager for AIX can create FS45 images. If your installation has installed Infoprint Manager for AIX, the administrator can set up the printer definitions for the color printers to run the transform remotely using Infoprint Manager. For information about how to set up printer definitions to run transform remotely, see *z/OS Infoprint Server Operation and Administration*.

- The PDF to AFP transform might not be able to transform very large PDF documents that contain non-balanced page trees. For information about page trees, see the Adobe PDF Reference, which is available on the Adobe Web site (www.adobe.com).

  Tip: Applications that create PDF documents by combining a large number of separate PDF documents sometimes create PDF documents with non-balanced page trees.

- PostScript data can contain device commands (for example, to begin or end duplexing or to change the input bin). Because the AFP architecture defines those device functions in a form definition resource, the transform command ignores the device commands in the print data. To access those device functions, you must specify them in the form definition or attributes file, or on a print command, when you print the job.

- Resolution conversion algorithms might produce a degraded appearance when used to reduce the resolution of images imbedded in a data stream. For this reason, the transform might degrade the appearance of higher-resolution images when used with 240-pel printers. You should verify that print fidelity is satisfactory.

Examples -- pdf2afp and ps2afp

Transform a file, specifying transform class
To transform the PostScript file `myfile.ps` into an AFP data stream, using the `bigjob` transform class, and write the result to a file called `myfile.afp`, enter:

```
ps2afp -c bigjob -o myfile.afp myfile.ps
```

Transform and print a file, specifying image type
To transform the PDF `myfile1.pdf` file into an AFP data stream as an IO1-MMR image, and send the result to the default printer with the **lp** command, enter:

```
pdf2afp -a io1-mmr myfile1.pdf | lp
```

Transform a file, specifying image size
To transform the PostScript file `myfile2.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 `myfile2.afp`, enter:

```
ps2afp -l 8in -w 5in -o myfile2.afp myfile2.ps
```

Transform and print a file, specifying resolution
To transform the PDF file `myfile1.pdf` into an AFP data stream, and then submit it to the 4019 printer called `robin`, enter:

```
pdf2afp -r 300 myfile1.pdf | lp -d robin
```

| Tip: You need to specify a resolution of 300 pels (`-r 300`) because the 4019 is a
| 300-pel resolution printer. The default resolution for the **pdf2afp** command is
| 600 pels.

Transform a file, using redirection

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

```
ps2afp < input.ps > output.afp
```

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

Transform multiple files and concatenate the output

To transform the PostScript files `input.01.ps`, `input.02.ps`, ... `input.xx.ps` into one
AFP output file called `output.afp`, enter:

```
ps2afp -o output.afp input.01.ps input.02.ps ... input.xx.ps
```

Transform a UNIX file to an MVS data set

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

```
ps2afp -o "//'hlq.OUTPUT.AFP(member)'" input.ps
```

Transform and print a file, specifying image type and resolution

| To transform the PDF `myfile1.pdf` file into an AFP data stream in 300-pel
| resolution, as an IO1-MMR image, and send the result to the default printer with the
| **lp** command, enter:

| ```
| pdf2afp -a io1-mmr -r 300 myfile1.pdf | lp
| ```

| ### Transform an MVS data set, writing the output to a UNIX file

To transform the MVS data set `hlq`.INPUT.PDF(`member`), where `hlq` is your user ID,
into an output file called `output.afp`, enter:

```
pdf2afp -o output.afp "//'hlq.INPUT.PDF(member)'"
```

Environment variables

The **pdf2afp** and **ps2afp** commands use 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*.

NLSPATH Names the directory paths that the **pdf2afp** command and the
ps2afp command search for message catalogs.

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.

For the format of the configuration files, see *z/OS Infoprint Server Customization*.

pdf2afp, ps2afp

Exit values

| | 0 | The data was transformed successfully. However, the output document might contain error messages related to errors in the input data stream. |
| | >0 | An error occurred. No output document was created. |

sap2afp—Transform SAP OTF or ABAP data to AFP data

Format

sap2afp [**-st**] [**-o** *outputfile*] [**-p** *pagerange*] ... [**-r** *resolution*]

[*inputfile ...*]

Description

The **sap2afp** command converts System Generic Output Format (SAPGOF) R/3
Release 4.6C (as well as lower SAP R/3 releases) Output Text Format (OTF) and
Advanced Business Application Programming (ABAP) data files:

- SAP OTF data files are converted into Advanced Function Presentation (AFP)
  Presentation Text Object Content Architecture (PTOCA) data streams.
- SAP ABAP data files are converted into line data streams.

This command is part of the Infoprint Server Transforms V1.1 product.

For information about the V2.1 Infoprint transform, see this book instead: *Infoprint
Transforms to AFP for z/OS*, G550-0443.

If you specify the same option multiple times, the command uses only the last
option, with the exception of the **-p** option. You can specify the **-p** option up to 20
times.

You can specify one or more input files to be transformed. If you specify more than
one input file, the command concatenates the files, and the job attributes are
determined by the first file transformed. If you do not specify an input file name, or if
you specify a dash (**-**) as the file name, **sap2afp** uses standard input. The output
file name is also optional. If you do not specify one, the **sap2afp** command writes
the results to standard output.

Tip: The size of the transformed image and the position of SAP data on the page
depend on the values that the administrator has defined.

Options

-o *outputfile*

Specifies the output path and file into which the transform output (that is,
AFP or line data) is written. The transform overwrites any existing data in
the output file. If you specify more than one output file, the last specified
path and file name are used. 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 only need 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. Typically, an output AFP data stream is several times as large as the input data stream. Allocate the output data set with these characteristics:
- Record format: VBM
- Record length: 8K (8192) bytes or larger

-p *pagerange*

Specifies that the output should contain only selected pages. You can specify the **-p** option up to 20 times.

The **-p** option counts pages by their actual sequence in the document, not by page number. For example, to write only the last page of a document whose pages are numbered i, ii, 1, 2, 3, 4, specify -p 6.

Examples of values include:

-p even   Write even pages.

-p odd   Write odd pages.

-p 1-10   Write the first through tenth pages.

-p 10-   Write pages from the tenth page until the end of the job.

-p 1 -p 3 -p 6
               Write the first, third, and sixth pages.

-r *resolution*

Specifies the resolution used to print image data in the job. Select the correct resolution for the printer on which you intend to print the job.

Values are:

240   240 pels per inch (for example, IBM 3812, 3825, 3827, 3835, and 3900 printers)

300   300 pels per inch (for example, IBM 3112, 3116, 4019, 4028, 4029, and 4039 printers and Hewlett-Packard printers)

480   480 pels per inch

600   600 pels per inch (for example, the IBM Infoprint 60 and Infoprint 4000 printers)

The default resolution is the resolution defined by the administrator. If the resolution has not been set, the transform fails with error message AOP2009E.

Tip: If you specify a resolution that the printer does not support, PSF prints the image data under most conditions, but with degraded results.

-s   Suppresses Graphic Object Content Architecture (GOCA) boxes. Some older printers do not print these boxes.

-t   Requests a trace. Specify this option only if instructed by IBM service personnel. For information about this option, see *z/OS Infoprint Server Messages and Diagnosis*.

Tip: You can use the **filter-options** job attribute with, for example, the **lp** command to pass any of these options except **-o** *outputfile* to the transform. For information about the **filter-options** job attribute, see "Attribute listing" on page 99.

Operand

inputfile

Specifies an input file to be transformed. If you specify more than one input file name, the **sap2afp** command concatenates the files. The results are written to a single output file (if one is specified) or to standard output.

The data in the file must be in stream mode. That is, it must not contain any record data.

If you do not specify an input file, or if you specify a dash (**-**) as the file name, **sap2afp** uses standard input.

Customization

You can customize the SAP to AFP transform by modifying these configuration files:

barcode.tab

Maps SAP OTF bar code names to the bar codes in Bar Code Object Content Architecture™ (BCOCA).

defcp.tab

Maps the Open Systems EBCDIC 1047 code page to the code page associated with the ABAP coded fonts specified in **pagedef.tab**.

fonts.tab

Maps the fonts used in the OTF data stream to AFP fonts.

image.tab

Defines values used to print image data.

pagedef.tab

Specifies the page definition, form definition, ABAP coded fonts, and the value of the OTF print option **PJFORM**.

*xxxx***0000.tab**

Maps a SAP code page to an AFP code page.

See your administrator for help with any file that you need to change. Note that even if you change only one configuration file, you must do these steps for the SAP to AFP transform to find the configuration files:

- Copy all the configuration files into the same directory.
- Change the **AOP_SAP2AFP_RESOURCES** environment variable to point to that directory.

Supported input code pages

The SAP to AFP transform supports these input code pages:

- 0000 EBCDIC ISO-1 (Latin 1)
- 0120 EBCDIC ISO-1 (Latin 1)
- 1100 ASCII ISO 8859/1 (Latin 1)
- 4001 OCR-A (ASCII)
- 4004 OCR-B (ASCII)
- 8000 Japanese ISO Shift-JIS

For information about the 4-byte codes (such as 0120, 1100), see the SAP R/3 4.6C specifications.

Limitations

These limitations apply to the SAP to AFP transform:

- The transform does not produce color output. It produces monochrome output only.
- The transform cannot create FS45 image objects, which some IBM color printers require.

Examples -- sap2afp

Transform a file, specifying resolution

To transform the SAP ABAP file `myfile.abap` for printing on a 600-pel AFP printer, and write the result to a file called `myfile.afp`, enter:

```
sap2afp -r 600 -o myfile.afp myfile.abap
```

Transform and print a file

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

```
sap2afp myfile.otf | lp
```

Transform a file using redirection

To transform the SAP file `input.sap` into the AFP output file called `output.afp`, enter:

```
sap2afp < input.sap > output.afp
```

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

Transform multiple files and concatenate the output

To transform the SAP files `input.01.sap`, `input.02.sap`, ... `input.xx.sap` into one AFP output file called `output.afp`, enter:

```
sap2afp -o output.afp input.01.sap input.02.sap ... input.xx.sap
```

Transform a UNIX file to an MVS data set

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

```
sap2afp -o "//'hlq.OUTPUT.AFP(member)'" input.sap
```

Transform an MVS data set, writing the output to a UNIX file

To transform the MVS data set *hlq*.INPUT.SAP(*member*), where *hlq* is your user ID, into an output file called `output.afp`, enter:

```
sap2afp -o output.afp "//'hlq.INPUT.SAP(member)'"
```

Environment variables

The **sap2afp** command uses these environment variables:

AOP_SAP2AFP_RESOURCES

Specifies the directory that contains all of the SAP to AFP transform resources. The default value is **/usr/lpp/Printsrv/sap2afp**.

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*.

NLSPATH   Names the directory paths that the **sap2afp** command searches for message catalogs.

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.

barcode.tab, defcp.tab, fonts.tab, image.tab, pagedef.tab, *xxxx***0000.tab**
Customization files for the SAP to AFP transform.

Exit values

0   The data was transformed successfully. However, the output document might contain error messages related to errors in the input data stream.

>0   An error occurred. No output document was created.

xml2afp—Transform XML to AFP data

The optional IBM Infoprint XML Extender for z/OS (5655-J66) lets you transform Extensible Markup Language (XML) files to AFP format for printing or e-mailing. Using XML Extender with Infoprint Server, you can:

- Transform XML data to the AFP data format without printing the AFP data. To do this, use **xml2afp**. For information about **xml2afp**, see *Infoprint XML Extender for z/OS*.
- Print XML data on an IBM AFP printer. Infoprint Server automatically transforms the XML data to AFP format if your administrator has specified the XML to AFP transform in the printer definition for the AFP printer in the Printer Inventory.
- Print XML files on a non-AFP printer, such as a PCL printer. You can use this process:

  1. Transform XML data to the AFP data format without printing the AFP data. To do this, use **xml2afp**.
  2. Print the AFP data on a non-AFP printer. To do this, use the **lp** command or AOPPRINT JCL procedure. Infoprint Server automatically transforms the AFP data to the non-AFP data format if your administrator has specified a transform in the printer definition for the non-AFP printer in the Printer Inventory. For example, to print AFP data on a PCL printer, your administrator must specify the AFP to PCL transform in the printer definition for the PCL printer.

     Example: This example shows that the **xml2afp** command transforms XML data in `myfile.xml` to AFP format in `myfile.afp`. The **lp** command prints `myfile.afp` on a PCL printer named `mypclprinter`. Infoprint Server automatically transforms the AFP data to PCL format before sending the data to the printer.

     ```
     xml2afp -s mystyle.xsl -o myfile.afp myfile.xml
     lp -d mypclprinter myfile.afp
     ```

- Transform XML data to the PDF data format for printing or e-mailing. For information, see "xml2pdf—Transform XML to PDF data" on page 95.

Tip: You can print XML files without using the XML to AFP transform because PSF can process XML files using a page definition. For more information, see *PSF for z/OS: User's Guide*.

xml2pdf—Transform XML to PDF data

The optional IBM Infoprint XML Extender for z/OS (5655-J66) lets you transform Extensible Markup Language (XML) files to PDF format for printing or e-mailing. Using XML Extender with Infoprint Server, you can:

- Transform XML data to the PDF data format for printing or e-mailing. To do this, use **xml2pdf**. For information about **xml2pdf**, see *Infoprint XML Extender for z/OS*.
- Transform XML data to the AFP data format for printing or e-mailing. For information, see "xml2afp—Transform XML to AFP data" on page 94.

x2afp—Transform Xerox files to AFP data

The optional IBM Infoprint XT Extender for z/OS (5655-J65) lets you transform Xerox files to AFP format for printing or e-mailing. The Xerox files can be line-conditioned data streams (LCDS) or metacode data streams. XT is the IBM Xerox transform technology.

To use XT Extender with Infoprint Server, use **x2afp**. For information about **x2afp**, see *Infoprint XT Extender for z/OS: Customization and Usage*.

Chapter 4. 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 *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** attribute.

You can specify job attributes in different ways, depending on the method you use to submit a print job. Table 3 shows how to specify job attributes for different job submission methods and refers you to the section that contains more information.

Table 3. How to specify job attributes

Job submission method	How to specify job attributes	See page
z/OS UNIX **lp** command	**-o** option	33
z/OS UNIX **afp2pcl**, **afp2pdf**, and **afp2ps** commands	**-j** option	52, 59, 67, 187
Print Interface subsystem	SUBSYS parameter on the DD JCL statement	165
AOPPRINT JCL procedure	OPTIONS parameter on the EXEC JCL statement	182
NetSpool	Embed job attributes in print data	198
Infoprint Port Monitor	Infoprint Port Monitor Options window (select during port configuration)	204
AIX **enq** command	**-o** option	215
OS/400 LPR command	DESTOPT option	217
OS/400 remote queue defined with CRTOUTQ	Destination options field	217
lprafp command	**-o** option	221

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 used to print the job. For example, the page definition can specify fonts.
- Values in the form definition 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 5 copies of a job and you submit a job with a value of 10 for the **copies** job attribute, your job will not be 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 book 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**, **afp2pcl**, **afp2pdf**, and **afp2ps** 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 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 equals sign to align the equals 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 could create an attributes file called `myatts` to request 5 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 **afp2pcl**, **afp2pdf**, and **afp2ps** commands.

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

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

This command 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 6, "Printing using the AOPPRINT JCL procedure," on page 181.

For information about how to specify an attributes file with the Print Interface subsystem, see "JCL parameters for the Print Interface subsystem" on page 165.

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 225.

Attribute listing

This section lists job attributes in alphabetical order.

address-text

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

Allowed values

You can specify 1 to 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 has 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.

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 has 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 interpreting and printing this document.

Allowed values
You can enter one of these fixed values:
> **ansi**
> **machine**
> **none**

Default value
- 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).
- For UNIX files, such as HFS 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 from 1 to 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 4 alphanumeric characters. X042B2 is an example of a coded font name. For more information about coded fonts, see *IBM AFP Fonts: Font Summary for AFP 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 to 4 characters.

Tip: Some coded fonts have 6-character names, not counting the prefix. For these coded fonts, see *IBM AFP Fonts: Font Summary for AFP Font Collection* for the 4-character alternate coded font name.

Omit the 2-character prefix from the coded font name or the alternate 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 has 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 IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript 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.
- The AFP to PCL, AFP to PDF, and AFP to PostScript transforms use this attribute only if the page definition used to print the job does not specify fonts.
- 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 recommends 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**. PSF and the AFP to PCL, AFP to PDF, and AFP to PostScript transforms use the TRC characters to select the corresponding coded font specified with the **chars** attribute.
  - If the job contains SOSI codes, PSF and the AFP to PCL, AFP to PDF, and AFP to PostScript transforms use the first coded font specified with the **chars** attribute as the single-byte font and the second coded font 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 has 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 from 1 to 32640.

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

Usage guidelines
- Only one copy prints when you print on VTAM-controlled printers (IP PrintWay basic mode only) or on Internet Printing Protocol (IPP) printers that do not support the **copies** IPP job attribute. This attribute is supported for VTAM-controlled printers when you use IP PrintWay extended mode.
- Only one copy of the file is sent to an e-mail destination.
- The administrator can limit the number of copies that you can specify. Before accepting a job, Infoprint Server verifies that the printer can support the value of this attribute.
- The value 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 has 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 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 value

1. The default code page that the administrator has 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 C/C++ Programming Guide*.

  If you specify a custom code page, ask your administrator to make sure conversion tables exist to convert between:
  - The custom code page and the code page 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 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 placing 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 printing 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:

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.

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.

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

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

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

postscript
PostScript data format, defined by Adobe.

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

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

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

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

Usage guidelines
- Before accepting a job, Infoprint Server verifies that the printer can support the
  value of this attribute.
- IBM recommends 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 value

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

Usage guidelines

- This attribute applies only to documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- The value you specify for this attribute overrides any value in the form definition used to print the job.
- Before accepting 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.

filter-options

This **single-valued** attribute lets you pass options to a filter that converts this document from one data format to another. For example, you can pass options to these filters:

- A transform filter that Infoprint Server Transforms or another optional transform product provides
- The Infoprint Server LPD compatibility filter (**lpd_compat.so**)
- The Infoprint Server remote transform filter (**aoprform.dll**)
- A filter written by your installation

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 -p 21-30'"
```

For information about which options the transform filters accept, see the description of the **pcl2afp**, **pdf2afp**, **ps2afp**, **sap2afp**, **afp2pcl**, **afp2ps**, and **afp2pdf** commands in Chapter 3, "Transforming files using transform commands," on page 49.

For information about the V2.1 Infoprint transforms, see these books instead:
- *Infoprint Transforms to AFP for z/OS*, G550-0443
- *Infoprint Transforms from AFP for z/OS*, G550-0444

For information about which options the remote transform filter (**aoprform.dll**) accepts, see *z/OS Infoprint Server Operation and Administration*.

For information about filter options for the **xml2afp** and **xml2pdf** commands, see *Infoprint XML Extender for z/OS*. For information about filter options for the **x2afp** command, see *Infoprint XT Extender for z/OS: Customization and Usage*.

The LPD compatibility filter (**lpd_compat.so**) lets you specify 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 this to blank, "1", "0", "+", and "-" carriage controls. 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 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 "Transform and print a job" on page 38 and "Paginate line data and print with a header on each page" on page 40.

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

Usage guidelines

- The filter options 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 printing 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 used when 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 has defined for the printer.

Usage guidelines

- This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- If the document has an inline form definition, specify either the name of that form definition or **dummy**.
- You can instruct the AFP to PCL, AFP to PDF, and AFP to PostScript transforms to select a form definition from your user library rather than from a system library assigned to the transforms. To use a form definition from a user library:
  1. Refer to the user library containing 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 value

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

Usage guidelines

- This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- Before accepting 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:	Input synonym:
true	**yes**
false	**no**

Default value

1. The default value that the administrator has 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 used for normal document pages.

Allowed values

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

> **alternate**
> **bottom**
> **envelope**
> **large-capacity**
> **main**
> **manual**
> **middle**
> **side**
> **top**

Default value

1. The default input tray that the administrator has 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 printed on an IBM AFP printer or automatically transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- This attribute does not apply to data transformed to another format using the **afp2pcl**, **afp2pdf**, or **afp2ps** command.

- When data is being transformed from AFP format, the value on this attribute is mapped to an input-tray-number value. For example, **letter** might be mapped to **input-tray-number=2**.

  The input-tray-number is then mapped 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 will use input tray 4.

  For the default input-tray-number mapping, see "Usage guidelines." Your system programmer defines the mapping from input-tray to input-tray-number in the printer definition.
- Before accepting a job, Infoprint Server verifies that the printer can support the value of this attribute.
- The value 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 used for normal document pages.

Allowed values
You can enter any number that the AFP printer supports. Some typical values are:
> **1–255**

Default value
1. The default input tray that the administrator has 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 printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- The value 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 only apply 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 Table 4 on page 110. 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 this mapping is valid for the transform you are using.

Table 4. 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-priority

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

Allowed values
You can enter an integer from 0 to 255.

Default value
The default value that the administrator has defined for the printer.

Usage guidelines
- 255 is the highest priority. 0 is the lowest.
- If the z/OS system is not configured to honor priority values, it ignores this attribute.
- This attribute is equivalent to the PRTY parameter of the OUTPUT JCL statement.

mail-bcc-addresses

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

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

Each e-mail address can be 1-60 characters. You can specify any EBCDIC text characters, including blanks. If the e-mail address contains special characters (such as **@ $ & ( ) > < | ' " #**), enclose the entire e-mail 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 e-mail address contains double quotation marks, enclose the address in single quotation marks.

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

Usage guidelines

- The e-mail address can be an alias name defined to z/OS UNIX sendmail. For more information, see "Specifying the e-mail address list in an alias file" on page 133.
- This attribute is equivalent to the MAILBCC parameter of the OUTPUT JCL statement.

mail-cc-addresses

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

Allowed values

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

Each e-mail address can be 1-60 characters. You can specify any EBCDIC text characters, including blanks. If the e-mail address contains special characters (such as **@ $ & ( ) > < | ' " #**), enclose the entire e-mail 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 e-mail address contains double quotation marks, enclose the address in single quotation marks.

Default value

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

Usage guidelines

- The e-mail address can be an alias name defined to z/OS UNIX sendmail. For more information, see "Specifying the e-mail address list in an alias file" on page 133.
- This attribute is equivalent to the MAILCC parameter of the OUTPUT JCL statement.

mail-file-name

This **single-valued** attribute specifies the file name of the attachment to an e-mail.

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 extended mode, spooled by Print Interface:
1. The file name

IP PrintWay extended mode, spooled by NetSpool:
1. The **sysout-dataset-name** job attribute
2. The VTAM PLU name of the application that sent the data

IP PrintWay basic mode, 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 basic mode, 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 e-mail.

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-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 has defined in the printer definition.

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

mail-reply-address

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

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 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 e-mail address contains double quotation marks, enclose the address in single quotation marks.

Default value

The default value that the administrator has defined in the printer definition. If none is specified in the printer definition, most e-mail programs use the sender's e-mail 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 e-mail addresses of the recipients of an e-mail.

Allowed values

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

Each e-mail address can be 1-60 characters. You can specify any EBCDIC text characters, including blanks. If the e-mail address contains special characters (such as **@ $ & ( ) > < | ' " #**), enclose the entire e-mail 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 e-mail address contains double quotation marks, enclose the address in single quotation marks.

Default value

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

Usage guidelines

* The e-mail address can be an alias name defined to z/OS UNIX sendmail. For more information, see "Specifying the e-mail address list in an alias file" on page 133.
* 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 has 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 has defined. Some typical values are:

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

Default value

1. The default output bin that the administrator has 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 printed on an IBM AFP printer or automatically transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- This attribute does not apply to data transformed to another format using the command **afp2pcl**, **afp2pdf**, or **afp2ps**.
- Before accepting a job, Infoprint Server verifies that the printer can support the value of this attribute.
- The value 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 value
1. The default output bin that the administrator has 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 printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript 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 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 PSF and the AFP to PCL, AFP to PDF, and AFP to PostScript transforms place 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. Note that 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 has defined for the printer.

Usage guidelines
- This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript 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 PSF and the AFP to PCL, AFP to PDF, and AFP to PostScript transforms place 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. Note that 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 has defined for the printer.

Usage guidelines

- This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript 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 has 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 using Infoprint Central.

page-definition

This **single-valued** attribute identifies the page definition 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 has defined for the printer.

Usage guidelines
- This attribute applies to line data documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript 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-encryption-level

This **single-valued** attribute specifies the level of encryption 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 e-mail 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.

Default value
bits128

Usage guidelines
- IBM Infoprint Transform for AFP to Adobe PDF for z/OS (5655-P20) supports this attribute. The AFP to PDF transform that Infoprint Server Transforms V1.1 provides does not support it.

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 has specified in the printer definition. If none is specified, there is no default.

Usage guidelines

- IBM Infoprint Transform for AFP to Adobe PDF for z/OS (5655-P20) supports this attribute. The AFP to PDF transform that Infoprint Server Transforms V1.1 provides does not support it.
- 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 should 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 • Fill in form fields or sign • Create template pages

Default value

The value that the administrator has specified in the printer definition. If none is specified, no actions are restricted.

Usage guidelines

- IBM Infoprint Transform for AFP to Adobe PDF for z/OS (5655-P20) supports this attribute. The AFP to PDF transform that Infoprint Server Transforms V1.1 provides does not support it.

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 opening the encrypted PDF document.

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 has specified in the printer definition. If none is specified, any user can open the PDF document without a password.

Usage guidelines

* IBM Infoprint Transform for AFP to Adobe PDF for z/OS (5655-P20) supports this attribute. The AFP to PDF transform that Infoprint Server Transforms V1.1 provides does not support it.

* 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 should 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 printing 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 has defined for the printer.

Usage guidelines

* This attribute applies to line data and AFP documents printed on an IBM AFP printer.

* Before accepting 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 has defined for the printer.

Usage guidelines

- The value in this attribute overrides the print queue name specified in the printer definition. You must use this attribute for local area network (LAN) printers 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 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:

    printer1.boulder.IBM.com

Note: If a printer has an IPv6 address, you must specify the host name of the printer instead of the colon-hexadecimal format.

Default value

The IP address that the administrator has defined for the printer.

Usage guidelines

- The value in this attribute overrides the IP address 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 using 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 searching system-defined resource directories. PSF searches the directories in the order that you specify them.

Allowed values

You can enter up to 8 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 has defined for the printer.
2. PSF determines the resource directories.

Usage guidelines

*   PSF must be enabled for Unicode. PSF V3R4 (or higher) is required. 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 8 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 has defined for the printer.
2. PSF or the AFP to PCL, AFP to PDF, or AFP to PostScript transform determine the resource libraries.

Usage guidelines

*   This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
*   If PSF or the AFP to PCL, AFP to PDF, or AFP to PostScript transform cannot find a resource, it processes the job and prints error messages at the end of the job. Infoprint Server reports the job as completed.
*   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 AFP security information in *z/OS Infoprint Server Customization*.
*   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 has 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 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 PSF or the AFP to PCL, AFP to PDF, or AFP to PostScript transform converts each shift-out, shift-in code to a blank and a Set Coded Font Local text control.

two PSF or the AFP to PCL, AFP to PDF, or AFP to PostScript transform converts each shift-out, shift-in code to a Set Coded Font Local text control.

three PSF or the AFP to PCL, AFP to PDF, or AFP to PostScript transform converts each shift-in code to a Set Coded Font Local text control and two blanks. It converts each shift-out code to a Set Coded Font Local text control.

four PSF skips each shift-out, shift-in code and does not count the code when calculating offsets for the print data set. SOSI4 is used when double-byte character set (DBCS) text is converted from ASCII to EBCDIC. The transforms from AFP do not support SOSI4.

Default value

The default value that the administrator has defined for the printer.

Usage guidelines

- This attribute applies only to line data documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- For the shift-in, shift-out process to work correctly, either the **chars** attribute or the page definition 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 recommends 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 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 e-mail 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 e-mail 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 value

- If you use the Print Interface subsystem, the job ID that z/OS assigns to your job is used.
- 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 composed of the 2-character prefix specified in the Infoprint Server configuration file, **aopd.conf**, 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 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 using Infoprint Central.

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 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 value

- If you use the Print Interface subsystem, the job name specified on the JOB JCL statement, or the name assigned by the z/OS system, is used.
- 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 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 using Infoprint Central.

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 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:	Input synonym:
true	yes
false	no

Default value

The default value that the administrator has defined for the printer.

Usage guidelines

- This attribute applies only to line data documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript 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 will not be correct. PSF or the AFP to PCL, AFP to PDF, or AFP to PostScript transform interprets the TRCs as text characters instead of font identifiers.
- IBM recommends 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 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 e-mail destination, this value is the subject of the e-mail.

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 value
- For a separator page created by an IP PrintWay or PSF exit: The default value is the title your administrator specified in the Allocation section of the printer definition. If none is specified, there is no default value.
- For the LPD's separator page: The default value is the title your administrator specified in the Allocation section of the printer definition. If none is specified, the default value is the title or filename your administrator specified in the Protocol section of the printer definition. If none is specified, the default value is the data set name.
- For the subject of an e-mail: The default value is the title 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.

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 to 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 value

1. The default X offset that the administrator has 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 printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- This attribute overrides the X-offset value in the form definition 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 from 0 through 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 126.

Default value

1. The default X offset that the administrator has 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 printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- This attribute overrides the X-offset value in the form definition used to print the job.

- This attribute is similar to the OFFSETXF parameter of the OUTPUT JCL statement.

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 from 0 through 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 126.

Default value

1. The default Y offset that the administrator has 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 printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- This attribute overrides the Y-offset value in the form definition 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 from 0 through 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 126.

Default value

1. The default Y offset that the administrator has 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 printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- This attribute overrides the Y-offset value in the form definition used to print the job.
- This attribute is similar to the OFFSETYF parameter of the OUTPUT JCL statement.

Chapter 5. Printing from batch applications using DD and OUTPUT JCL statements

This chapter describes how to code the OUTPUT and DD statements of the Job Control Language to use Infoprint Server to process an output data set. It describes how to:

- Print output data sets using IP PrintWay to a printer or print server in your TCP/IP network or to a VTAM-controlled printer. IP PrintWay can also send an output data set to an e-mail destination.
- Transform data from one data format to another format and print it on any printer.

Printing output using IP PrintWay

To direct an output data set to IP PrintWay, on the DD or OUTPUT JCL statement for the data set you must specify (1) the work-selection criteria that your administrator defined to JES for the IP PrintWay basic mode functional subsystem application (FSA) or (2) the job-selection criteria that your administrator defined 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 e-mail destination, you can use one of these methods, which are described in more detail in the next sections:

- Specify the name of the printer definition your administrator created for the printer or e-mail destination
- Specify the output class, destination name, or form name 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 e-mail 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 created by your administrator in the Infoprint Server Printer Inventory.

IP PrintWay can use the IP address or the e-mail address in the named printer definition to find the printer or e-mail destination. However, if you specify an IP address in the DEST=IP: parameter of the OUTPUT JCL statement, or an e-mail address in the MAILTO parameter of the OUTPUT JCL statement, IP PrintWay uses that address to find the printer or e-mail destination instead of the address in the

129

printer definition. You might want to specify the DEST=IP: parameter or MAILTO parameter when your administrator has not created a printer definition for your printer or e-mail destination.

Related information: For an example, see "Direct output to IP PrintWay and to a printer by specifying the printer definition name" on page 171.

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 e-mail 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 IP PrintWay and to a printer by specifying DEST, CLASS, or FORMS" on page 172.

Specifying the printer's IP address

To print a data set on a printer for which your administrator has not created 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 specified in that printer definition, but uses the printer's IP address specified in the DEST=IP: parameter. If you do not specify the name of a printer definition, IP PrintWay uses printing options 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 IP PrintWay and to a printer by specifying a host name or an IP address" on page 171.

Sending output to an e-mail destination

When you submit a print request, you can send the file to an e-mail destination instead of to a printer. You can specify the e-mail addresses of the primary and secondary recipients in one of these ways:

- Your administrator can specify the e-mail address list of the recipients in the printer definition in the Printer Inventory.

- You can specify the e-mail addresses using optional JCL parameters. For information, see "Modifying JCL to send output to an e-mail destination" on page 132.

You can specify an address list in an alias file that your administrator defines to z/OS UNIX sendmail. For information, see "Specifying the e-mail address list in an alias file" on page 133. Your administrator can specify the name of the alias file in the printer definition, or you can specify it in a JCL parameter.

The e-mail has these characteristics:

- Each output data set is a separate e-mail attachment. The name of the attachment is the value specified in one of these:

  1. The MAILFILE parameter on the OUTPUT statement for the output data set
  2. The DSNAME parameter on the DD statement for the output data set
  3. The job name

  If your job creates multiple output data sets that JES places in the same output group, IP PrintWay can send the output data sets as attachments in the *same* e-mail. 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* e-mail.

  - **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.

  For more information about when JES groups data sets in the same output group, see *z/OS JES2 Initialization and Tuning Guide* or *z/OS JES3 Initialization and Tuning Guide*.

- The subject of the e-mail is the value specified in the TITLE parameter on the OUTPUT JCL statement. If the TITLE parameter is not specified, the subject is either the title value your administrator specified in the Allocation section of the printer definition or the job name. The title in the printer definition is used only if either the resubmit for filtering function (IP PrintWay basic mode) or Print Interface subsystem is used.

- The sender is the user ID of the user who ran the job. You can add a descriptive name or other identifier of the sender in the MAILFROM parameter.

- You can receive replies from an e-mail unless a firewall prevents the z/OS system from receiving replies from the sending system. Use the z/OS UNIX **mail** or **mailx** command to view your mail. To use these commands, your ID must be a valid z/OS UNIX user ID. For more information about these commands, see *z/OS UNIX System Services Command Reference*. If you want to receive replies at an e-mail address other than your user ID at your z/OS system, you can specify an e-mail address that recipients of an e-mail can reply to using the REPLYTO parameter. If you do not specify the REPLYTO parameter, the mail-reply-address in the printer definition is used. If you do not specify the REPLYTO parameter and it is not specified in the printer definition, replies are sent to your user ID on the z/OS system.

Table 5 shows the tasks related to sending output to an e-mail destination. Required tasks are required by all installations. Optional tasks are required only if the listed condition applies.

Table 5. Sending output to an e-mail destination

Task	Condition	See page
Modifying JCL to send output to an e-mail destination	Required	132
Specifying the e-mail address list in an alias file	Optional: If a z/OS UNIX sendmail alias name is specified in the printer definition	133

Modifying JCL to send output to an e-mail destination

If you currently use JCL to print output using 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 e-mail 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 retries are not recommended when you send output to e-mail destinations.

You can specify these optional JCL parameters to customize your e-mails:

Use this parameter:	To specify:
MAILBCC	The e-mail addresses of the "blind copy (bcc)" recipients of an e-mail. A *bcc* means that other recipients of the e-mail do not see the bcc recipient listed.
MAILCC	The e-mail addresses of the "copy (cc)" recipients of an e-mail. A *cc* means that other recipients of the e-mail can see the cc recipient listed.
MAILFILE	The file name of the attachment to an e-mail.
MAILFROM	The descriptive name or other identifier of the sender of an e-mail.
MAILTO	The e-mail addresses of the recipients of an e-mail.
REPLYTO	The e-mail address that recipients of an e-mail can reply to.
TITLE	The subject of the e-mail.

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 IBM 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 e-mail destination, see "JCL examples" on page 170.

Specifying the e-mail 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 name defined to z/OS UNIX sendmail that represents one or more actual e-mail addresses. For example, alias name `dept123` might represent the e-mail addresses of all employees in department 123.

The actual e-mail address list can be defined in any UNIX file. If the file is one that you can edit, the administrator does not need to change the printer definition whenever you need to change the address list and you do not need to change your JCL. For example, your administrator can specify that the actual e-mail address list for alias `dept123` is in file `/u/user1/dept123.list`.

Before you begin: For each address list, your administrator must do these tasks:
- Create a printer definition and specify a sendmail alias name in the definition.
- In the sendmail aliases file **/etc/aliases**, specify the same alias name and specify the name of a file to contain the actual e-mail address list. Ask your administrator for the name of this file so that you can create it.

Steps for creating an alias file:

1. Create a file using the name defined by your administrator. For example, create file `/u/user1/dept123.list` using your preferred editor:

   ```
   oedit /u/user1/dept123.list
   ```

   _____

2. Specify the e-mail addresses in this file:

   ```
   user1@xyz.com,user2@xyz.com,user3@xyz.com,user4@xyz.com,
   user5@xyz.com
   ```

   _____

3. Change the permissions of the file so that the file is readable by everyone but writeable only by the owner:

   ```
   chmod 644 /u/user1/dept123.list
   ```

   _____

4. Change the permissions of the directory so that it is readable and executable by everyone but writeable only by the owner:

   ```
   chmod 755 /u/user1
   ```

   _____

For more information about the z/OS UNIX commands used in this example, see *z/OS UNIX System Services Command Reference*.

Transforming output data

Infoprint Server can transform data created by a batch application to a format the printer accepts or to a format suitable for viewing in an e-mail attachment. These IBM program products provide transforms:
- Infoprint Server Transforms (5697–F51), which can transform PCL, PDF, PostScript, and SAP files to AFP format. Also, it provides transforms that can transform line data and AFP files to PCL, PDF, and PostScript format.

- IBM Infoprint XML Extender for z/OS, which transforms Extensible Markup Language (XML) files to AFP or PDF format. For more information, see *Infoprint XML Extender for z/OS*.
- IBM Infoprint XT Extender for z/OS (5655-J65), which transforms Xerox files to AFP format. The Xerox files can be line-conditioned data streams (LCDS) or metacode data streams. XT is the IBM Xerox transform technology. For more information, see *Infoprint XT Extender for z/OS: Customization and Usage*.

Table 6 lists the transforms that are available with Infoprint Server Transforms and other transform products, and refers you to the section in this book that contains more information.

Table 6. Data transforms

Transform	See page
Line data and AFP data to Printer Control Language (PCL) format	52
Line data and AFP data to Portable Data Format (PDF)	59
Line data and AFP data to PostScript format	67
PCL data to AFP format	74
PDF data to AFP format	79
PostScript data to AFP format	79
SAP Output Text Format (OTF) data to AFP format	89
SAP Advanced Business Application Programming (ABAP) data to line data	89
XML to AFP format	94
XML to PDF format	95
Xerox to AFP format	96

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 writing 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 e-mail 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 e-mail 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 e-mail destination. Your administrator must select the resubmit for filtering function in the printer definition.

Table 7 on page 135 compares the advantages and limitations of these transform methods.

Table 7. 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 e-mail 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).	The data set can be sent only to a printer or e-mail 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 e-mail 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 recommended). 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 e-mail destination. For more information, see Chapter 6, "Printing using the AOPPRINT JCL procedure," on page 181.

• **Transform commands:** The z/OS UNIX transform commands, which you can run 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 7, "Transforming data with the AOPBATCH program," on page 187.

Related administrator tasks: To transform data, your administrator must:

• Customize Infoprint Server Transforms (5697–F51), the Infoprint Server Transform Manager, and any other transform products. To use the AFP to PCL, AFP to PostScript, or AFP to PDF transform, the administrator must scale 240–pel fonts to 300 pels because these transforms require 300-pel fonts.

• Edit the Infoprint Server configuration file so that the subsystem starts. The administrator must do this only if you want to use the Print Interface subsystem.

• Specify the appropriate transforms in the printer definitions in the Printer Inventory. If you want to use the resubmit for filtering function (IP PrintWay basic mode only), the administrator must select this function in the printer definition.

For information, see *z/OS Infoprint Server Customization* and *z/OS Infoprint Server Operation and Administration*.

Transforming data using the Print Interface subsystem

The Print Interface subsystem can transform data 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 e-mail destination. You might want to use the Print Interface subsystem in these situations:

- To print PCL, PostScript, and PDF data on IBM 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 e-mail destinations using the IP PrintWay e-mail 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 4, "Using job attributes," on page 97.

    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 attributes:
    - The **filter-options** attribute, which lets you specify 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.
    - The **document-format** attribute, which lets you specify the data format. This attribute is required only if you print data whose format Infoprint Server cannot detect.
    - The **document-codepage** attribute, which lets you specify a code page for the input data. This attribute is 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.
- 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:
- You *cannot* use the DEST, CLASS, and FORMS parameters on the OUTPUT JCL statement to select the IP PrintWay printer definition.

- Do *not* code the SEGMENT and SYSOUT parameters on the DD JCL statement. If you do, you receive a JCL error.
- 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.
- Specify only one OUTPUT JCL statement for each DD statement. 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.
- 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 specified in the GROUPID parameter on the OUTPUT JCL statement.
- 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.
- JES2 /*OUTPUT JCL statements and JES3 //*FORMAT JCL statements are ignored.
- 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 using 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 abnormally terminates with abend code 09B after writing 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 103.
- The data transform is not installed or is not customized correctly.

Related information:
- "JCL parameters for the Print Interface subsystem" on page 165
- JCL Examples:
  - "Print line or AFP data on a PostScript printer using the Print Interface subsystem" on page 178
  - "Print PostScript, PCL, or PDF data on an IBM AFP printer using the Print Interface subsystem" on page 179

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:

Example 1: JCL that does *not* use the Print Interface subsystem

```
//DD1     DD SYSOUT=E,DEST=PRT003,DSNAME=&&MYDATA
```

Example 2: JCL that uses the Print Interface subsystem (changes in bold)

```
//DD1     DD SUBSYS=(AOP1,'printer003'),DSNAME=&&MYDATA
```

These examples assume that printer definition `printer003` in the Infoprint Server Printer Inventory contains these values:

Field	Value
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 could code the CLASS, DEST, and FORMS parameters on an OUTPUT JCL statement.

Transforming data using 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 e-mail 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 e-mail destination

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.

Related information:

- "JCL parameters for transforming AFP and line data to PCL, PostScript, or PDF format" on page 156
- JCL Examples:
  - "Print line or AFP data on a PostScript or PCL printer using IP PrintWay extended mode" on page 177
  - "Send line or AFP data to an e-mail destination as PDF data and print the AFP data on an AFP printer" on page 176

Transforming data using 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 e-mail 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 e-mail 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:

- Do not code the DEST=IP:, PRTQUEUE, and PORTNO JCL parameters on the OUTPUT JCL statement because IP PrintWay ignores these parameters.
- JES output grouping is not supported. Each output data set is placed in a separate JES output group, regardless of the value specified in the GROUPID parameter on the OUTPUT JCL statement.
- All AFP user libraries must have universal read access, or the administrator must set the AOPRESUBMITUSER environment variable (not recommended). For more information, see the USERLIB parameter.

Related information:

- "JCL parameters for transforming AFP and line data to PCL, PostScript, or PDF format" on page 156
- JCL Examples:
  - "Print line or AFP data on a PostScript or PCL printer using the IP PrintWay basic mode resubmit for filtering function" on page 178
  - "Send line or AFP data to an e-mail destination as PDF data and print the AFP data on an AFP printer" on page 176
- *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.

JCL parameters

This section describes JCL parameters that have special considerations when you print data sets using IP PrintWay or when you use the Print Interface subsystem. You can find detailed information about these types of JCL parameters:

JCL parameters	See page
Parameters for printing with IP PrintWay	139
Parameters for transforming AFP data and line data to PCL, PostScript, or PDF format	156
Parameters for the Print Interface subsystem	165
Parameters for distributing output	169
Parameters for printing with Infoprint Manager for AIX or Infoprint Manager for Windows	170

For more information about JCL parameters, see *z/OS MVS JCL Reference*.

JCL parameters for printing with IP PrintWay

This section describes JCL parameters that IP PrintWay uses when it sends a data set to a printer or to an e-mail destination. 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.

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']
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 10. 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.

Default:
- 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.
- 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 e-mail destination, IP PrintWay uses these priorities:

   a. The printer's host name or address specified by the DEST=IP: parameter, or the e-mail address specified in the MAILTO parameter

   b. The printer's address or the e-mail address in the printer definition specified in the SUBSYS parameter

   c. The printer's address or the e-mail address in the printer definition specified in the FSSDATA parameter

   d. The printer's address or the e-mail address specified in the printer definition that matches the values of any combination of the DEST=*destination_name*, CLASS, and FORMS parameters

Examples:

In this example, IP PrintWay uses the printer definition associated with CLASS P and DEST MYPRINT to process the data set:

```
//OUTDS  OUTPUT CLASS=P,DEST=MYPRINT
//DD1    DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

In this example, the Print Interface subsystem and IP PrintWay use the printer definition 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, from 1 to 255.

Tips:

1. Only one copy prints when you print on VTAM-controlled printers (IP PrintWay basic mode only) or on Internet Printing Protocol (IPP) printers that do not support the **copies** IPP job attribute. This parameter is supported for VTAM-controlled printers when you use IP PrintWay extended mode.

   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 e-mail 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.

Default:
- 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.
- 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 to 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*).

Default:
- 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.
- 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 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 to 8 character node name of the printer's host system. The node name is optional.

Default:

- 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.
- If the Print Interface subsystem does not process the data set, JES determines the default node.

host

Specifies the 1 to 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 address

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
```

Note: If a printer has an IPv6 address, you must specify the host name of the printer instead of the colon-hexadecimal format.

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'
```

Tips:

1. If you specify more than one parameter that can be used to find the printer or e-mail destination, IP PrintWay uses these priorities:
   a. The printer's host name or address specified by the DEST=IP: parameter, or the e-mail address specified in the MAILTO parameter
   b. The printer's address or the e-mail address in the printer definition specified in the SUBSYS parameter
   c. The printer's address or the e-mail address in the printer definition specified in the FSSDATA parameter
   d. The printer's address or the e-mail 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 lower and uppercase characters. This ensures 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 155.

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 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 ($,#,@) characters, a hyphen, or a character X'C0'. The first character after the ampersands must be alphabetic or national ($,#,@).

Recommendations: Specify a DSNAME parameter so that you can identify printed output more easily:

- 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 your administrator has selected in the printer definition and how your administrator has configured the printer's separator page.
- **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 processing 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 e-mail, FEBSALES is the name of the e-mail attachment if the MAILFILE parameter is not specified.

FCB=_fcb_name_

Specifies the 1 to 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_, then FCB2_fcb_name_, then FCB3_fcb_name_ unless you are printing to a VTAM-controlled printer. In this case, IP PrintWay searches the SYS1.IMAGELIB library only for FCB2_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.

Default:

- 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, there is no default FCB.
- – If IP PrintWay basic mode processes the data set, JES can provide a default FCB.
- If the Print Interface subsystem does not process the data set:
  - – If IP PrintWay extended mode processes the data set, there is no default FCB.
  - – 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 to 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 e-mail destination, IP PrintWay uses these priorities:
   a. The printer's host name or address specified by the DEST=IP: parameter, or the e-mail address specified in the MAILTO parameter
   b. The printer's address or the e-mail address in the printer definition specified in the SUBSYS parameter
   c. The printer's address or the e-mail address in the printer definition specified in the FSSDATA parameter
   d. The printer's address or the e-mail 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.

Default:
- 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.
- 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 to 17 character name of the printer definition in the Printer Inventory.

Rules:
- Enter the **printer** subparameter in _lowercase_.

- Enter the printer definition name with exactly the same uppercase and lowercase letters 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 e-mail destination, IP PrintWay uses these priorities:

1. The printer's host name or address specified by the DEST=IP: parameter, or the e-mail address specified in the MAILTO parameter

2. The printer's address or the e-mail address in the printer definition specified in the SUBSYS parameter

3. The printer's address or the e-mail address in the printer definition specified in the FSSDATA parameter

4. The printer's address or e-mail 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 155.

Default:
- 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.
- 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 e-mail addresses of the "blind copy (bcc)" recipients of an e-mail. A *bcc* means that other recipients of the e-mail do not see the bcc recipient listed.

username
Specifies the name of the recipient, or an alias name that is defined in z/OS UNIX sendmail. For example, user1.

@domainname
Specifies the domain of the recipient. For example, @xyz.com. The default is the host name that sendmail is running on. If you specify an alias name, omit *@domainname*.

Rules:
- You can specify 1-32 e-mail addresses.
- Each e-mail address can be 1-60 characters.
- You can specify any characters, including blanks.
- If the e-mail address contains special characters or lowercase letters, enclose the entire e-mail address in apostrophes.
- If you specify only one e-mail address, you can omit the parentheses.

- 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 155.

Default: IP PrintWay sends the e-mail to any bcc recipients specified in the printer definition.

Example: In this example, user1@xyz.com receives the e-mail, and user2@xyz.com and all the recipients defined in the sendmail alias named "dept01list" receive a bcc of the e-mail:

```
//OUTDS  OUTPUT MAILTO='user1@xyz.com',MAILBCC=('user2@xyz.com',dept01list)
```

MAILCC=('_username_[_@domainname_]**'**[,...]**)**
Specifies the e-mail addresses of the "copy (cc)" recipients of an e-mail. A *cc* means that other recipients of the e-mail can see the cc recipient listed.

username
Specifies the name of the recipient, or an alias name that is defined in z/OS UNIX sendmail. For example, `user1`.

@domainname
Specifies the domain of the recipient. For example, `@xyz.com`. The default is the host name that sendmail is running on. If you specify an alias name, omit _@domainname_.

Rules:
- You can specify 1-32 e-mail addresses.
- Each e-mail address can be 1-60 characters.
- You can specify any characters, including blanks.
- If the e-mail address contains special characters or lowercase letters, enclose the entire e-mail address in apostrophes.
- If you specify only one e-mail address, you can omit the parentheses.
- 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 155.

Default: IP PrintWay sends the e-mail to any cc recipients specified in the printer definition.

Example: In this example, user1@xyz.com receives the e-mail, and user2@xyz.com and all the recipients defined in the sendmail alias named "dept01list" receive a cc of the e-mail:

```
//OUTDS  OUTPUT MAILTO='user1@xyz.com',MAILCC=('user2@xyz.com',dept01list)
```

MAILFILE='_filename_**'**
Specifies the file name of the attachment to an e-mail.

Rules:
- The name can be 1-60 characters.
- You can specify any characters, including blanks.
- 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 e-mail attachment. You can specify the last qualifier in the DSNAME parameter of the DD statement. However, the DSNAME parameter lets you specify only 8 characters (see the description of the DSNAME parameter). If you do not specify the DSNAME parameter, IP PrintWay uses the job name.

Example: In this example, the e-mail 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 e-mail.

Rules:
- The name can be 1-60 characters.
- You can specify any characters, including blanks.
- 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 155.

Default: IP PrintWay uses the value specified in the printer definition.

Tip: To specify the e-mail address that recipients of an e-mail can reply to, use the REPLYTO parameter.

Example:

This specification:
```
//OUTDS  OUTPUT MAILFROM='John Q. Sender'
```

Puts this information in the e-mail:
```
From: John Q. Sender <JOHN@SYSTEM1>
```

MAILTO=('*username***[***@domainname***]'[***,...***])**
Specifies the e-mail addresses of the recipients of an e-mail.

username
Specifies the name of the recipient, or an alias name that is defined in z/OS UNIX sendmail. For example, `user1`.

@domainname
Specifies the domain of the recipient. For example, `@xyz.com`. The default is the host name that sendmail is running on. If you specify an alias name, omit *@domainname*.

Rules:
- You can specify 1-32 e-mail addresses.
- Each e-mail address can be 1-60 characters.

- You can specify any characters, including blanks.
- If the e-mail address contains special characters or lowercase letters, enclose the entire e-mail address in apostrophes.
- If you specify only one e-mail address, you can omit the parentheses.
- 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 155.

Default: IP PrintWay sends the e-mail to the e-mail recipients specified in the printer definition.

Example: In this example, user1@xyz.com, user2@xyz.com, and all the recipients defined in the sendmail alias named "dept01list" receive the e-mail:
```
//OUTDS  OUTPUT MAILTO=('user1@xyz.com','user2@xyz.com',dept01list)
```

NOTIFY=([*node*.]*userid*,...)
Specifies up to 4 user IDs that IP PrintWay basic mode notifies when the data set has been successfully or unsuccessfully transmitted. IP PrintWay extended mode ignores the NOTIFY parameter. Separate the user IDs with commas.

node
   Specifies a 1 to 8 character node name. The node name is optional.

userid
   Specifies a 1 to 8 character user ID.

Default: If either the Print Interface subsystem processes the data set or the resubmit for filtering function is used (IP PrintWay basic mode), the notify values in the printer definition apply. Otherwise, no users are notified.

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 to 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 specified in the printer definition.

Default: The printer's port number in the printer definition is used.

Example:

```
//OUTDS   OUTPUT PORTNO=2501
```

PRTOPTNS='*component_name***'**

Specifies the 1 to 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 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 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 specified in these components and instead uses the options 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 specified in the printer definition.

Default: IP PrintWay determines the default printing options:

1. The options specified in the printer definition are used.
2. For options not specified in the printer definition, IP PrintWay uses hard-coded default values.

Example:

```
//OUTDS   OUTPUT PRTOPTNS='PostScript'
```

PRTQUEUE='*print_queue***'**

Specifies the 1 to 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 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 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 e-mail address that recipients of an e-mail can reply to.

username
   Specifies the name portion of the address, or an alias name that is defined in z/OS UNIX sendmail. For example, `user1`.

@domainname
   Specifies the domain portion of the address. For example, `@xyz.com`. The default is the host name that sendmail is running on.

Rules:
- The name can be 1-60 characters.
- You can specify any characters, including blanks.
- 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 155.

Default: IP PrintWay uses the value specified in the printer definition. If none is specified in the printer definition, most e-mail programs use the sender's e-mail 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 period of time for which IP PrintWay retains the data set on the JES spool after a transmission fails and all requested retries have been attempted.

Specify the time in the format *hhhh*:*mm*:*ss*:
hhhh   is the number of hours (range 0 to 9999)
mm   is the number of minutes (range 0 to 59)

ss   is the number of seconds (range 0 to 59)

You can omit zeroes 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 155.

Default: IP PrintWay determines the default value:
1. The retain value in the printer definition is used.
2. No retention.

Examples:
- This OUTPUT statement specifies that IP PrintWay should retain the data set on the JES spool for 48 hours:

  `//OUTDS  OUTPUT RETAINF='48:00:00'`
- This OUTPUT statement specifies that IP PrintWay should retain 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 period of time for which IP PrintWay retains the data set on the JES spool after a successful transmission.

Specify the time in the format *hhhh*:*mm*:*ss*:
hhhh   is the number of hours (range 0 to 9999)
mm   is the number of minutes (range 0 to 59)
ss   is the number of seconds (range 0 to 59)

You can omit zeroes 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 155.

Default: IP PrintWay determines the default value:
1. The retain value in the printer definition is used.
2. No retention.

Examples:
- This OUTPUT statement specifies that IP PrintWay should retain the data set on the JES spool for 4 hours:

  `//OUTDS  OUTPUT RETAINS='04:00:00'`
- This OUTPUT statement specifies that IP PrintWay should not retain the data set on the JES spool:

  `//OUTDS  OUTPUT RETAINS='0'`

RETRYL=*nnnnn*

Specifies the maximum number of times that IP PrintWay is to retry an unsuccessful transmission. Specify a number from 0 to 32767.

IP PrintWay extended mode: If your job creates multiple output data sets, see "JCL considerations for IP PrintWay extended mode" on page 155.

Recommendations:

- When you send the output data set to an e-mail destination, omit both the RETRYL and RETRYT parameters.
- Do not specify this parameter so that the value your administrator specifies in the printer definition is used. The value you specify can affect IP PrintWay performance.

Default: The retry value in the printer definition is used. If none is specified, see Table 8.

Example:

```
//OUTDS  OUTPUT RETRYL=10
```

Table 8. How retry limit and retry time work together

Retry limit	Retry time	IP PrintWay action
0 or blank	Any value	IP PrintWay does not retry the transmission.
>0	0 or blank	IP PrintWay retries the transmission automatically one time right after the original transmission fails. Then IP PrintWay retries for the specified number of times at the specified interval. If retry time is blank, IP PrintWay retries 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   is the number of hours (range 0 to 9999)
mm   is the number of minutes (range 0 to 59)
ss   is the number of seconds (range 0 to 59)

You can omit zeroes 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 155.

Recommendations:

- When you send the output data set to an e-mail destination, omit both the RETRYL and RETRYT parameters.
- Do not specify this parameter so that the value your administrator specifies in the printer definition is used. The value you specify can affect IP PrintWay performance.

Default: The retry value in the printer definition is used. If none is specified, see Table 8.

Examples: These examples both specify that IP PrintWay should retry one time immediately, then wait 1 minute between subsequent retries:

```
//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 to 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 has configured the separator page or how the LPD is implemented. If the output data set is sent to an e-mail destination, this value is the subject of the e-mail.

Specify 1 to 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 e-mail, specify the TITLE parameter with exactly the same value for all output data sets.

Default:
- 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 specified in the Allocation section of the printer definition in the Printer Inventory. If no title is specified in the Allocation section, there is no default value.
  - Otherwise, there is no default value.
- 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 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 filename your administrator specified 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 filename your administrator specified in the Protocol section of the printer definition. If none is specified, the default value is the fully qualified data set name.

- For the subject of an e-mail:

    – 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 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 and can send them to different e-mail destinations. However, IP PrintWay extended mode prints all data sets in the same JES output group on the same printer and sends them all to the same e-mail destinations. Also, IP PrintWay extended mode uses the same retry times, retention values, and other e-mail values for all data sets in the output group.

If your job creates more than one output data set and you want to specify different values for each data set in the DEST=IP:, FSSDATA, MAILBCC, MAILCC, MAILFROM, MAILTO, REPLYTO, RETAINF, RETAINS, RETRYL, or RETRYT parameter, you must 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:

   – 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)
```

   – **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
```

– **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 extended mode ignores the NOTIFY JCL parameter.
- **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 recommends that you instead specify a held output class on the DD or OUTPUT statement. This recommendation applies whether you print on IP PrintWay extended mode printers or on PSF printers.

JCL parameters for transforming AFP and line data to PCL, PostScript, or PDF format

This section describes JCL parameters that the AFP to PCL, AFP to PDF, and AFP to PostScript transforms can use. These parameters apply to AFP or line data files that Infoprint Server automatically transforms to another format.

The parameters are summarized in Figure 11. All parameters are optional.

```
DD JCL Statement:

CHARS=(font_name1[,font_name2][,font_name3][,font_name4])
DCB=OPTCD=J
FCB=fcb_name
UCS=font_name

OUTPUT JCL Statement:

CHARS=(font_name1[,font_name2][,font_name3][,font_name4])
DUPLEX={NO | NORMAL | TUMBLE}
FCB=fcb_name
FORMDEF=form_definition_name
INTRAY=nnn
OFFSETXB=nnnn[.mmm]unit
OFFSETXF=nnnn[.mmm]unit
OFFSETYB=nnnn[.mmm]unit
OFFSETYF=nnnn[.mmm]unit
OUTBIN=1-65 535
OVERLAYB=overlay_name
OVERLAYF=overlay_name
PAGEDEF=page_definition_name
PRMODE={SOSI1 | SOSI2 | SOSI3}
TRC={YES | NO}
UCS=font_name
USERLIB=('library_name[,...])
```

Figure 11. Summary of JCL parameters for all line and AFP output to be transformed to PCL, PostScript, or PDF format

In most cases, transforms interpret the parameters in the same way as PSF does, so that you can use the same JCL that you use when the output is printed on IBM AFP printers. These parameters have different characteristics when used with these transforms:

- **CHARS:** If the page definition used to print the job is the system default page definition and the page definition specifies a font, the transforms do not use the font specified in the CHARS parameter. Instead, the transforms use the font in the page definition. PSF, on the other hand, uses the font specified in the CHARS parameter.

- **INTRAY:** The transforms use default input tray 1. PSF, on the other hand, uses the printer's default source.

The parameters you can specify are:

CHARS=(_font_name1_**[,**_font_name2_**][,**_font_name3_**][,**_font_name4_**])**
> Specifies the 4-character member name of the coded font that you want to use to print a data set that contains line data. You can specify up to four fonts.
>
> _font_name_
>> Specifies the name of a coded font (in a font library) containing 4 or fewer characters, not including the prefix.
>>
>> **Tip:** Some coded fonts have 6-character names, not counting the prefix. For these coded fonts, see _IBM AFP Fonts: Font Summary for AFP Font Collection_ for the 4-character alternate coded font name.
>
> When you uses CHARS to specify the member name, do not include the 2-character prefix of the coded-font name (X0 through XG).
>
> Coded fonts that can be used with the CHARS parameter are supplied with the IBM AFP Font Collection. The fonts you specify must reside in a font library assigned to the transform in the transform configuration file or in a user library specified with the USERLIB JCL parameter, or else they must be inline with the data set. For details about available fonts and the naming conventions, see _IBM AFP Fonts: Font Summary for AFP Font Collection_.
>
> If you specify more than one font with the JCL CHARS parameter, you must use the TRC parameter to tell these transforms which font to use for each line of data.
>
> Raster fonts are used unless the administrator has requested font mapping to outline fonts and your font name is in the font mapping table.
>
> If the page definition specifies fonts, the transforms ignore the CHARS parameter.
>
> **Default:** The transforms use the first value found in this order:
> 1. The font specified in the page definition.
> 2. The font specified in the UCS JCL parameter.
> 3. The font specified in the printer definition.
> 4. The default page definition if IP PrintWay basic mode processes the data set. However, JES does not provide a default page definition if you use IP PrintWay extended mode or the Print Interface subsystem.

5. The font specified in the Infoprint Server transform configuration file.

6. Font X060D9.

Examples:

```
//DD1 DD CHARS=(GT10,GT12)
```

or

```
//OUTDS OUTPUT CHARS=(GT10,GT12)
```

DCB=OPTCD=J

Specifies whether the print data set contains table reference characters (TRCs). This is the same as **TRC=YES**. For more information, see the TRC parameter on page 164.

DUPLEX={NO | NORMAL | TUMBLE}

Specifies whether printing is to be done on both sides of each sheet.

NO The job is printed only on the front side of each sheet.

NORMAL

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

Tip: The administrator can limit the value that you can specify in this parameter. If you specify a value that is not allowed, the data set might not print.

Default: The transforms use the first value found in this order:

1. The duplex option specified in the printer definition
2. The duplex option specified in the form definition

Example:

```
//OUTDS OUTPUT DUPLEX=NORMAL
```

FCB=_fcb_name_

Specifies the 1 to 4 character name of the page definition. The transforms add the prefix P1 to the FCB name you specify. Therefore, do not specify the prefix P1.

You can also specify the name of the page definition in the PAGEDEF parameter. If you specify both the FCB and the PAGEDEF parameters, the transforms ignore the FCB parameter. For more information, see the PAGEDEF parameter.

FORMDEF=_form_definition_name_

Specifies the member name (from 1 to 6 alphanumeric or national characters) of the form definition you want to use. Omit the system prefix, F1, from the name. These transforms add F1 to the member name you specify.

You can store the form definition that you use in any of these places:
- In a system library assigned to these transforms
- In a user library referred to in the printer definition
- In a user library referred to in your JCL
- Inline in the print data set

Using form definitions from a user library: You can instruct these transforms to select a form definition from your user library rather than from a system library assigned to these transforms. To use a form definition from a user library:

- Refer to the user library containing the form definition in your JCL. For details, see the USERLIB parameter.
- Specify the name of the form definition in the JCL FORMDEF parameter.

Using inline form definitions: To use an inline form definition:

- Include the inline form definition in the print data set.
- If you specify the FORMDEF parameter, make sure that the name of the inline form definition matches the form definition name that you specified, or else specify FORMDEF=DUMMY. If you do not specify the FORMDEF parameter, these transforms select the first inline form definition in the print data set.
- Make sure that the data set is identified as containing carriage control characters.

You can include more than one inline form definition in a print data set, and you can change the form definition name in the JCL for different printing jobs to test different form definitions. If the name of an inline form definition does not match the FORMDEF name specified in the JCL, these transforms use the form definition from the resource library that matches the name in the JCL.

Default: The transforms use the first value found in this order:

1. The form definition specified in the printer definition
2. The first inline form definition
3. The form definition specified in the Infoprint Server transform configuration file
4. Form definition F1CP0111

Example: To specify F1USER10 as the form definition, enter:

```
//OUTDS OUTPUT FORMDEF=USER10
```

INTRAY=*nnn*

Specifies the 1 to 3 decimal digit number from 1 to 255 that identifies the tray from which paper is to be selected. These transforms map this tray number to the tray number of the PCL or PostScript printer, using tray-mapping values specified by the administrator in the transform configuration file. For more information about tray mapping, see "input-tray-number" on page 109.

The value you specify for this attribute overrides any input tray selection in the AFP data stream or in the form definition.

Default: The transforms use the first value found in this order:

1. The input tray specified in the printer definition
2. The input tray selected in the AFP data stream
3. The input tray specified in the form definition
4. Tray 1

Example:

```
//OUTDS OUTPUT INTRAY=4
```

OFFSETXB=_nnnn_**[.**_mmm_**]**_unit_

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.

For unit, specify one of these units:

Unit	Meaning
IN	Specifies a unit of inches
CM	Specifies a unit of centimeters
MM	Specifies a unit of millimeters
PELS	Specifies a unit of picture elements (1/240 inch)
POINTS	Specifies a unit of points (1/72 inch)

Note: If you specify the unit as PELS or POINTS, you must specify the value as a whole number with no decimal point.

Default: The transforms use the first value found in this order:
1. The offset specified in the printer definition
2. The offset specified in the form definition

OFFSETXF=_nnnn_**[.**_mmm_**]**_unit_

Specifies the X offset of the logical page origin to the right of the physical page origin on the front of the sheet.

For unit, specify one of these:

IN	Specifies a unit of inches
CM	Specifies a unit of centimeters
MM	Specifies a unit of millimeters
PELS	Specifies a unit of picture elements (1/240 inch)
POINTS	

Specifies a unit of points (1/72 inch)

Note: If you specify the unit as PELS or POINTS, you must specify the value as a whole number with no decimal point.

Default: The transforms use the first value found in this order:
1. The offset specified in the printer definition
2. The offset specified in the form definition

OFFSETYB=_nnnn_**[.**_mmm_**]**_unit_

Specifies the Y offset of the logical page origin below the physical page origin on the back side of a double-sided sheet.

For unit, specify one of these:

IN	Specifies a unit of inches
CM	Specifies a unit of centimeters
MM	Specifies a unit of millimeters
PELS	Specifies a unit of picture elements (1/240 inch)
POINTS	

Specifies a unit of points (1/72 inch)

> **Note:** If you specify the unit as PELS or POINTS, you must specify the value as a whole number with no decimal point.

> **Default:** The transforms use the first value found in this order:
> 1. The offset specified in the printer definition
> 2. The offset specified in the form definition

OFFSETYF=_nnnn_**[.**_mmm_**]**_unit_
Specifies the offset in the Y direction of the logical page origin below the physical page origin on the front of the sheet.

For unit, specify one of these:

IN Specifies a unit of inches

CM Specifies a unit of centimeters

MM Specifies a unit of millimeters

PELS Specifies a unit of picture elements (1/240 inch)

POINTS
Specifies a unit of points (1/72 inch)

> **Note:** If you specify the unit as PELS or POINTS, you must specify the value as a whole number with no decimal point.

> **Default:** The transforms use the first value found in this order:
> 1. The offset specified in the printer definition
> 2. The offset specified in the form definition

Example: This example sets the page origin to .5 inches, 1.1 inches on the front side, and 1.5 inches, 1.1 inches on the back side:
```
//OUTDS OUTPUT OFFSETXF=0.5IN,OFFSETYF=1.1IN,
//         OFFSETXB=1.5IN,OFFSETYB=1.1IN
```

OUTBIN=_1-65 535_
Specifies the 1 to 5 decimal digit identifier of the output bin into which Infoprint Server will place a print job. If the printer does not support the selection of an output bin, the job is stacked in the default output bin for the printer.

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 you specify for this parameter overrides any output bin that the form definition specifies.

> **Default:** The transforms use the first value found in this order:
> 1. The output bin specified in the printer definition
> 2. The output bin selected in the AFP data stream
> 3. The output bin specified in the form definition

Example:
```
//OUTDS OUTPUT OUTBIN=4
```

OVERLAYB=_overlay_name_
Specifies the member name (from 1 to 8 alphanumeric or national characters) of a medium overlay to be placed on the back side of each

sheet in a two-sided job, in addition to overlays from other sources. Specify the complete name of the overlay member because these transforms do not add an O1 prefix.

Default: The transforms use the first value found in this order:

1. The overlay specified in the printer definition
2. The overlay specified in the form definition

OVERLAYF=*overlay_name*

Specifies the member name (from 1 to 8 alphanumeric or national characters) of a medium overlay to be placed on the front side of each sheet, in addition to overlays from other sources. Specify the complete name of the overlay member because these transforms do not add an O1 prefix.

Default: The transforms use the first value found in this order:

1. The overlay specified in the printer definition
2. The overlay specified in the form definition

Example: This example requests overlay O1FOVLY be placed on the front side of each sheet and overlay O1BOVLY be placed on the back side of each sheet:

```
//OUTDS OUTPUT OVERLAYF=O1FOVLY,OVERLAYB=O1BOVLY
```

PAGEDEF=*page_definition_name*

Specifies the member name (from 1 to 6 alphanumeric or national characters) of the page definition you want to use. When you specify the name in the JCL, omit the system prefix, P1. These transforms add it automatically.

If a PAGEDEF parameter is not coded in your JCL, these transforms use the page definition specified in the printer definition. If no form definition is specified in the printer definition, these transforms use the form definition in the Infoprint Server transform configuration file.

You can store the page definition that you use in any of these places:
- In a system library assigned to these transforms
- In a user library referred to in the printer definition
- In a user library referred to in your JCL
- Inline in the print data set

Using page definitions from a user library: You can instruct these transforms to select a page definition from your user library rather than from a system library assigned to these transforms. To use a page definition from a user library:
- Include in your JCL a reference to the user library that contains the page definition.
- Specify the name of the page definition in the JCL PAGEDEF parameter of your JCL.

Using inline page definitions: To use an inline page definition:
- Include the inline page definition in the print data set.
- If you specify the PAGEDEF parameter, make sure that the name of the inline page definition matches the name of the page definition name that you specified, or else specify PAGEDEF=DUMMY.

- If you do not specify the PAGEDEF parameter, these transforms select the first inline page definition in the print data set, unless a JES default page definition exists.
- If a page definition resource is included inline with the data, make sure to identify the data set as containing carriage control characters.

You can include more than one inline page definition in a print data set, and you can change the page definition name in the JCL on different printing jobs to test different page definitions. If, however, the name of an inline page definition does not match the PAGEDEF name specified in the JCL, these transforms use the page definition from the resource library that matches the name in the JCL.

Default: The transforms use the first value found in this order:
1. The page definition specified in the PAGEDEF parameter.
2. The page definition specified in the FCB parameter.
3. The page definition specified in the printer definition.
4. The FCB value specified in the printer definition.
5. The default page definition if IP PrintWay basic mode processes the data set. However, JES does not provide a default page definition if you use IP PrintWay extended mode or the Print Interface subsystem.
6. The first inline page definition.
7. The page definition specified in the Infoprint Server transform configuration file.
8. Page definition P1P08682.

Example: In this example, P1USER10 is the page definition name:
```
//OUTDS OUTPUT PAGEDEF=USER10
```

PRMODE={SOSI1| SOSI2 | SOSI3}
Specifies the type of data in the print data set and whether these transforms must do optional processing of the data.

SOSI1
Specifies that each shift-out, shift-in code is converted to a blank and a Set Coded Font Local text control.

SOSI2
Specifies that each shift-out, shift-in code is converted to a Set Coded Font Local text control.

SOSI3
Specifies that the shift-in code is converted to a Set Coded Font Local text control and two blanks. A shift-out code is converted to a Set Coded Font Local text control.

JES uses values in the PRMODE parameter for job routing. These transforms ignore all values except SOSI1, SOSI2, and SOSI3, which they use to format data sets that contain both single-byte and double-byte fonts.

When you use the SOSI process, remember that:
- For the process to work correctly, you must specify two fonts in the CHARS parameter or in a page definition font list. The first font must be the single-byte font, and the second font must be the double-byte font.
- IBM recommends that you do not mix SOSI codes and TRCs in the same job.

Default:
- If the Print Interface subsystem processes the data set, the value in the printer definition is used. If none is specified in the printer definition, JES provides a default value. However, the transforms do not use the JES default value.
- If the Print Interface subsystem does not process the data set, JES provides a default value.

Example:
```
//OUTDS OUTPUT CHARS=(font_name1,font_name2),PRMODE=SOSI1
```

TRC={YES|NO}

Specifies whether the print data set contains table reference characters (TRCs). This is the same as the DCB=OPTCD=J parameter.

In line data, you can use different fonts on different lines of a file by specifying TRCs at the beginning of each line after the carriage control characters, if any are present.

Examples:
```
//OUTDS OUTPUT CHARS=(GT10,GT12),TRC=YES
//DD2    DD     CHARS=(GT10,GT12),DCB=OPTCD=J
```

When you use table reference characters, remember that:
- If the TRC=YES and the page definition does not identify fonts, you must specify fonts with the CHARS parameter.
- The order in which the fonts are specified in the CHARS parameter establishes which number is assigned to each associated TRC. For example, the TRCs for the fonts in the preceding example are zero for *font_name1* and one for *font_name2*.
- If you do not specify TRC=YES, but your line data contains a TRC as the first character of each line (or the second character if carriage control characters are used), the TRC is not used as a font identifier, but is printed as a text character.
- IBM recommends that you do not mix SOSI codes and TRCs in the same job.

UCS=_font_name_

Serves as another way to select a font. When a CHARS parameter is not specified, you can specify the universal character set (UCS) parameter to select one font. If the page definition specifies a font, the UCS parameter is ignored.

Example:
```
//DD1 DD UCS=GT10
```

USERLIB=(_library_name_**[,...])**

Specifies the name of 1 to 8 cataloged MVS data sets (user libraries) containing AFP resources for processing the data set. The transforms dynamically allocate these data sets and search for resources in them in the order specified on the USERLIB statement. If the transforms find no resources, they search the system libraries defined in the Infoprint Server transform configuration file. The libraries you specify can contain any AFP resources: fonts, page segments, overlays, page definitions, form definitions, or object container resources.

Notes:

1. The user who starts the Infoprint Server daemons must have RACF authorization to read the AFP user resource libraries. For more information, see the AFP security information in *z/OS Infoprint Server Customization*.

2. If Infoprint Server uses the IP PrintWay basic mode resubmit for filtering function to transform data from AFP format to PCL, PostScript, or PDF format, the AFP user resource libraries must have universal read access. This is because the resubmit for filtering function does not, by default, use the job submitter's user ID to check RACF authorization to the AFP user resource libraries. If you do not want to grant universal read access to the AFP user resource libraries, use one of these methods to transform and print the data set because these methods do not use the resubmit for filtering function:
   - Print Interface subsystem
   - AOPPRINT JCL procedure
   - z/OS UNIX lp command

3. If you must use the IP PrintWay basic mode resubmit for filtering function, your administrator can set the AOPRESUBMITUSER environment variable to let the resubmit for filtering function use the job submitter's user ID to check RACF authorization. However, IBM recommends that you do not use the AOPRESUBMITUSER environment variable. For information about the AOPRESUBMITUSER variable, see *z/OS Infoprint Server Customization*.

Default: The transforms use the first value found in this order:

1. Resource libraries specified in the printer definition
2. Resource libraries specified in the Infoprint Server transform configuration file or, if no library is specified, a hard-coded default resource library

Example: In this example, the USERLIB parameter tells the transforms to search the libraries specified for AFP resources.

```
//OUTDS OUTPUT USERLIB=('USER.IMAGES','USER.AFP.RESOURCES')
```

JCL parameters for the Print Interface subsystem

This section 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 12. 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 the printer definition name is omitted.
>
> **Default:** The first printer definition name found, using this order:
> 1. The printer definition name 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 4, "Using job attributes," on page 97.
>
> **Rules:**
> * Attribute names and values are case-sensitive. All attribute names are lowercase.
> * Enclose the entire list of job attributes in single quotation marks.
> * Separate job attributes with one or more spaces.
> * If an attribute value contains blanks or special characters, enclose that attribute value in double quotation marks.
> * You can specify up to 120 characters of job attributes.
> * To continue the SUBSYS parameter on another line, end the first line with a comma at the end of a complete subparameter.
> * 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 enclosed in apostrophes.
>
> **Tip:** If you want to specify more than 120 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 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 225.
>
> **Using an attributes file:** You can store attributes and values in an MVS data set or in a UNIX file (such as an HFS file). Follow these rules:
> * Specify the MVS data set name or UNIX file name from which attributes are to be read in the attribute called `attributes`.
> * If attributes are in an MVS data set, specify the fully qualified MVS data set name, and code four single quotation marks before the data set name and four single quotation marks after it.

- Because Print Interface must be able to read the attributes data set, give the MVS data set RACF universal read access and set the UNIX file permissions to let everyone read the file.
- For information about how to specify the attributes in the attributes file, see "Attributes files" on page 98.

Default: The first value found for each job attribute, using this order:

1. The value in a corresponding JCL parameter specified on the DD statement.
2. The value in a corresponding JCL parameter specified on the first OUTPUT statement referred to in the OUTPUT parameter on the DD statement.
3. The value in a corresponding JCL parameter specified on the first default OUTPUT statement in the job step.
4. The value in a corresponding JCL parameter specified on the first default OUTPUT statement in the job.
5. The value 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:
- This example shows how to submit output to the Print Interface subsystem named AOP1:

```
//DD1 DD SUBSYS=(AOP1,'myprinter')
```

- This example shows how to submit output to the subsystem named AOP1 and specify that the output from the transform should include only pages 1 through 10 and should be 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')
```

- This example shows how to submit output to the subsystem named AOP1 and specify attributes in an HFS 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 9 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 9. 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.

Table 9. Parameters of the DD JCL statement that the Print Interface subsystem supports (continued)

DD statement parameter	Print Interface subsystem considerations
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 one 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.
DSNAME	Begin the name with two ampersands (&&). Follow the ampersands with 1 to 8 alphanumeric or national ($,#,@) characters, a hyphen, or a character X'C0'. The first character after the ampersands must be alphabetic or national ($,#,@). 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

Table 10 on page 169 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 10. 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 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 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 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
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 specified in this parameter.
JESDS	Ignored
All other OUTPUT parameters	If you do not specify a parameter on the OUTPUT statement, the corresponding value 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. **Note:** Parameters defined after April 1, 2004 are not supported unless support was added in an Infoprint Server PTF.

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

Figure 13 on page 170 summarizes the parameters 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 13. Summary of JCL parameters for the distribution of output

The values 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 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.

AFP parameters for remote printing with Infoprint Manager or Infoprint Server

This section lists the JCL parameters 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 IBM AFP printer. Also, data transforms provided with Infoprint
Manager, Infoprint Server Transforms, and other transform products can use some
of these parameters when transforming 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	DEPT	INTRAY	OUTBIN
BUILDING	DEST	NAME	PAGEDEF
CHARS	DUPLEX	OFFSETXB	PRMODE[1]
CLASS	FCB	OFFSETXF	ROOM
COPIES	FORMDEF	OFFSETYB	TITLE
DATACK	FORMS	OFFSETYF	TRC
			UCS

1. Values other than SOSI1, SOSI2, SOSI3, and SOSI4 are ignored. However, the
   transforms from AFP do not support SOSI4.

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 specified in a printer
  definition.

- Class `P`, destination `DEPT002`, and form name `WIDE` are printer-selection values 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 attached to a remote system 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 IP PrintWay and to a printer by specifying the printer definition name

These examples show how to direct an output data set to IP PrintWay and to a 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 defined by your administrator in this printer definition. If these values are not defined in the printer definition, IP PrintWay uses the standard defaults described in "JCL parameters" on page 139.

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 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 IP PrintWay and to a printer by specifying a host name or an IP address

These examples show how to direct an output data set to IP PrintWay and to a 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 defined in the default printer definition or, if none exists in IP PrintWay basic mode, the standard defaults described in "JCL parameters" on page 139.

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 IP PrintWay and to a 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 matches the values you specify in the JCL.

You can override the name of the print queue in the printer definition, as shown in Example 3.

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 3.

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 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 IP PrintWay and to more than one printer

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.

- 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)
```

- 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 "JCL considerations for IP PrintWay extended mode" on page 155.

```
|                            //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 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 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 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 retries a failed transmission one time immediately, then waits 8 minutes between retries.

• Retry limit of 3 times. If the immediate retry fails, IP PrintWay retries 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 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 transmitting 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 e-mail addresses on the OUTPUT JCL statement

This example shows how to specify e-mail recipient addresses, the sender's name and reply address, the e-mail subject line, and the e-mail attachment name in parameters on the OUTPUT JCL statement.

This example assumes that the administrator has set up a printer definition in the Printer Inventory:

- The IP PrintWay printer definition is named `mail`.

- The e-mail protocol is selected and an e-mail address is specified for the primary recipient. However, the e-mail address you specify in the MAILTO parameter on the OUTPUT JCL statement overrides the e-mail 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:

- The recipient of the e-mail is `user1@xyz.com`.
- The "copy (cc)" recipient of the e-mail is `user2@xyz.com`. A *cc* means that other recipients of the e-mail can see the cc recipient listed.
- The "blind copy (bcc)" recipient of the e-mail is `user3@xyz.com`. A *bcc* means that other recipients of the e-mail do not see the bcc recipient listed.
- The sender of the e-mail is `John Q. Sender<JOHN@SYSTEM1>`. JOHN is the user ID of the user who ran the job, and SYSTEM1 is the system where z/OS UNIX sendmail is running.
- The e-mail address that recipients of an e-mail can reply to is `secretary@xyz.com`.
- The e-mail attachment is `January report.txt`. The attachment is in text format unless a transform is specified in the mail printer definition.
- The subject of the e-mail is `Monthly Report`.

Send two data sets to an e-mail 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 e-mail. This example specifies the subject of the e-mail in the TITLE parameter, and the names of the attachments in the MAILFILE parameters.

This example assumes that the administrator has set up the printer definition in the Printer Inventory:

- The IP PrintWay printer definition is named `deptmail`.
- The e-mail protocol is selected, and the recipient e-mail address list or a z/OS UNIX 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 e-mail.

```
//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 listed in the printer definition receive an e-mail:

- The sender of the e-mail is the user ID who ran the job. For example, USER1@DOMAIN1.
- The subject of the e-mail is `Monthly Report`.
- The e-mail 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 e-mail 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 e-mail addresses as an attachment in PDF format and (2) print it on an IBM AFP printer that PSF controls. This example specifies the subject of the e-mail in the TITLE parameter and the name of the attachment in the MAILFILE parameter.

This example assumes that the administrator has set up a printer definition for the e-mail destination in the Printer Inventory:

- The IP PrintWay printer definition is named `deptmail`.
- The e-mail protocol is selected and the recipient e-mail address list or a z/OS UNIX 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 has 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:

- The recipients listed in the printer definition `deptmail` receive an e-mail:
  - The sender of the e-mail is the user ID who ran the job. For example, USER1@DOMAIN1.
  - The subject of the e-mail is `Monthly Report`.
  - The e-mail 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.
- The file is printed on the PSF-controlled printer defined with JES work-selection criteria of CLASS F and DEST PRT633.

Send line or AFP data to an e-mail 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 e-mail destination as an AFP file. This example specifies the subject of the e-mail 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 e-mail recipient can view the file using the IBM AFP Viewer plug-in for Windows and also print the file.

This example assumes that the administrator has set up the printer definition in the Printer Inventory:

- The IP PrintWay printer definition is named `deptmail`.
- The e-mail protocol is selected and the recipient e-mail address list or a z/OS UNIX 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.FONTOLN
 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 listed in the printer definition `deptmail` receive an e-mail:

- The sender of the e-mail is the user ID who submitted the job. For example, USER1@DOMAIN1.
- The subject of the e-mail is `Monthly Report`.
- The e-mail attachment is named `January Report.afp` and is in AFP format with all AFP resources inline. The attachment can be viewed with the IBM AFP Viewer plug-in for Windows.

Print line or AFP data on a PostScript or PCL printer using IP PrintWay extended mode

These examples show how to print line data and AFP data to a PostScript or PCL printer. These examples assume that your administrator has 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 using the IP PrintWay basic mode resubmit for filtering function

These examples show how to print line data and AFP data to a PostScript or PCL printer. These examples assume that your administrator has 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 will be `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 will also be `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 using 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 has created two IP PrintWay printer definitions 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 named `AOP1` transforms 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 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 named `AOP1` transforms data to PostScript format and writes the PostScript data to an output data set on the JES spool. The subsystem uses options 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 transforms data to PostScript format and writes the PostScript data to an output data set on the JES spool. The subsystem uses options 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 IBM AFP printer using the Print Interface subsystem

These examples show how to print PostScript, PCL, and PDF data on an IBM AFP printer that PSF controls. These examples assume that your administrator has created two PSF printer definitions 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 named `AOP1` transforms 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 specified in printer definition `myafpprinter`. PSF then prints the data sets on the AFP printer whose CLASS and DEST values match those 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 transforms data to AFP format and writes the AFP data to an output data set on the JES spool. The subsystem uses options 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 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 named `AOP1` transforms data to AFP format and writes the AFP data to an output data set on the JES spool. The subsystem uses options 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)
```

Chapter 6. Printing using the AOPPRINT JCL procedure

The AOPPRINT Job Control Language procedure, provided in SYS1.PROCLIB, lets you submit print requests from z/OS. This procedure lets you take advantage of all the features of Infoprint Server:

- You can specify job attributes.
- If Infoprint Server Transforms or another optional 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 (which appear in the examples in this chapter), see *z/OS MVS JCL Reference*.

Sending a file to an e-mail destination

With the AOPPRINT procedure, you can send the file to an e-mail destination instead of to a printer. You can specify the e-mail addresses of the primary and secondary recipients in one of these ways:

- Your administrator can specify the e-mail address list of the recipients in the printer definition in the Printer Inventory.
- You can specify the e-mail addresses of the recipients using these job attributes:

Use this attribute:	To specify the e-mail addresses of the:
mail-bcc-addresses	"Blind copy (bcc)" recipients of an e-mail. A *bcc* means that other recipients of the e-mail do not see the bcc recipient listed.
mail-cc-addresses	"Copy (cc)" recipients of an e-mail. A *cc* means that other recipients of the e-mail can see the cc recipient listed.
mail-to-addresses	Primary recipients of an e-mail.

You can specify an address list in an alias file that your administrator defines to z/OS UNIX sendmail. For information, see "Specifying the e-mail address list in an alias file" on page 133. Your administrator can specify the name of the alias file in the printer definition, or you can specify it in a job attribute.

The e-mail has these characteristics:

- The file is an e-mail attachment. The name of the attachment is the name 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 an extension that indicates the type of data in the file. For example, `txt` indicates text format and `pdf` indicates PDF format.

- The subject of the e-mail is the value specified in the **title-text** job attribute or the default title 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 e-mail unless a firewall prevents the z/OS system from receiving replies from the sending system. To receive replies, use the z/OS UNIX **mail** or **mailx** command. To use these commands, your ID must be a valid z/OS UNIX user ID. You can specify the e-mail address that recipients of an e-mail 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 14. 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 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 "Attribute listing" on page 99. 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 (such as an HFS file) or in an MVS data set. Use the attribute called `attributes` to specify the file or DD name from which attributes are to be read, as in this example:

   ```
   OPTIONS='attributes=bigjob.att'
   ```

   If the attributes are stored in an MVS data set, you must specify four single quotation marks before the data set name and four single quotation marks after it.

   For how to create an attributes file, see "Creating an attributes file" on page 98.

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 specified by your administrator.

PRINTER=*printer_definition_name*
> Specifies the name of a printer definition created by your administrator. The printer definition identifies a printer or an e-mail 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 specified by your administrator.

AOPPRINT DD statements

The AOPPRINT JCL procedure lets you 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 can help the system operator find your job on the JES spool. The job ID field of the data set that Infoprint Server allocates on the JES spool contains the same Infoprint Server job ID. The Infoprint Server job ID is different, however, 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.

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: VTAM-controlled printers (IP PrintWay basic mode only) and 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.PCL`. 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
//*
//         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 e-mail destination

This example shows how to send a file to an e-mail destination.

This example assumes that:

- The administrator has set up a printer definition `mail` in the Printer Inventory.
- The e-mail protocol is selected and an e-mail address is specified in the printer definition `mail` for the primary recipient. However, the e-mail address you specify in the **mail-to-addresses** job attribute overrides the e-mail 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 from 4 through 16.

Results:

- The recipient of the e-mail is `user1@xyz.com`.
- The "copy (cc)" recipient of the e-mail is `user2@xyz.com`. A *cc* means that other recipients of the e-mail can see the cc recipient listed.
- The "blind copy (bcc)" recipient of the e-mail is `user3@xyz.com`. A *bcc* means that other recipients of the e-mail do not see the bcc recipient listed.
- The sender of the e-mail is `John Q. Sender<JOHN@SYSTEM1>`. JOHN is the user ID of the user who ran the job, and SYSTEM1 is the system where z/OS UNIX sendmail is running.
- The e-mail address that recipients of an e-mail can reply to is `secretary@xyz.com`.
- File `FILE1.AFP` is attached to the e-mail. 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.

- The subject of the e-mail is `Monthly Report`.

AOPPRINT exit values

0   Infoprint Server accepted the request.

>0   An error occurred.

Chapter 7. Transforming data with the AOPBATCH program

Infoprint Server provides the AOPBATCH program in SYS1.LINKLIB. The AOPBATCH program lets you submit a batch job to transform data to and from the Advanced Function Presentation data format using the Infoprint transform products or another optional transform product, such as IBM Infoprint XML Extender for z/OS (5655-J66) or IBM Infoprint XT Extender for z/OS (5655–J65). XT is the IBM Xerox Transform technology.

The Infoprint transform products are:
- Infoprint Server Transforms V1.1 (5697-F51)
- Infoprint Transforms V2.1, which replace the equivalent features of Infoprint Server Transforms V1.1:
  - Infoprint Transforms to AFP V2.1 for z/OS (5655-N60)
  - Infoprint Transform for AFP to HP PCL V2.1 for z/OS (5655-P19)
  - Infoprint Transform for AFP to Adobe PDF V2.1 for z/OS (5655-P20)
  - Infoprint Transform for AFP to Adobe PostScript V2.1 for z/OS (5655-P21)
  - Infoprint Coaxial Printer Support V2.1 for z/OS (5655-N62)

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++ run-time 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 resides in an HFS file. The name of the transform program is case-sensitive. You can specify one of these Infoprint Server Transforms command names: **afp2pcl, afp2pdf, afp2ps, pcl2afp, pdf2afp, ps2afp**, and **sap2afp**. If you have XML Extender, you can also use **xml2afp** and **xml2pdf**. If you have XT Extender, you can also use **x2afp**. For information, see *Infoprint XT Extender for z/OS: Customization and Usage*.

    If the transform program does not reside in one of the directories specified in the PATH environment variable, also specify the pathname. 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 "AOPBATCH DD statements" on page 188.

transform_options
:   Options and arguments accepted by the transform. For a description of the transform command options and arguments, see the transform description in Chapter 3, "Transforming files using transform commands," on page 49.

    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

187

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 already 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 examples" on page 189.

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 JCL, 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 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.

Note: Do *not* specify the _BPX_SHAREAS environment variable. AOPBATCH will set it appropriately.

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 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:

- If the output data set is an MVS data set, these requirements apply:
  - 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.
  - 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. If you run the PCL to AFP, PDF to AFP, or PostScript to AFP transform, the type of image compression you select in the **-a** option also affects the size of the output data stream. Typically, an output AFP data stream is several times as large as the input data stream.
  - If the output data set is to contain an AFP data stream, allocate a data set with these characteristics:
    - Record format: VBM
    - Record length: 8192 (8K) or larger
  - 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 recommended
  - 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.
- If you have not added the Language Environment® run-time library (CEE.SCEERUN) or the C++ run-time library (CBC.SCLBDLL) to the system LNKLST, specify these data sets in a STEPLIB DD statement.
- 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**.

```
//AOPBATCH JOB  ...
//TRANSFRM EXEC PGM=AOPBATCH,
// PARM='/afp2pdf -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 6, "Printing using the AOPPRINT JCL procedure," on page 181.

```
//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
```

Exit values

AOPBATCH returns the exit code of the spawned process. If AOPBATCH cannot execute the program, it returns RC=4. If a transform command fails, it returns RC=1.

Chapter 8. Printing from VTAM applications

The NetSpool component of Infoprint Server lets you 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 should 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
- E-mail 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.

NetSpool converts the input data stream into one of these types of output data streams, according to the type of NetSpool formatting and transform filter (optional) that the administrator selects in the printer definition in the Printer Inventory:

Table 11. 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 starting 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 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 lets you replace Graphic Escape characters with other printable characters. For more information about the Graphic Escape exit, 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 227 describes the code points that NetSpool supports for the SCS data stream.
- Appendix D, "NetSpool support for 3270 data streams code points," on page 237 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 should treat 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 227.

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 237.

NetSpool rejects other orders in a 3270 data stream with an SNA sense code of function error (X'10030000'), indicating an unsupported function. Note that 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 unencrypted and uncompressed 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 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 has been printed successfully. However, when you send output to NetSpool, a positive response from NetSpool means only that NetSpool has 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 starting a session with a printer gains exclusive control of that printer for the duration of 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 retry succeeds, two successive data sets from the same application could even be printed in reverse order. Therefore, to guarantee that data belonging 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 should end and the next one should begin. 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 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 has been 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 hard-coded 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 227.

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 additional 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 from 1 through 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, ..._**)** | <u>0</u>

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 through 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 additional 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 "Attribute listing" on page 99.

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 the instructions in "Rules for coding text strings" on page 199. 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 and 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 "Attribute listing" on page 99.

Examples:

```
owner=murphy
owner=smith copies=3
department-text=Purchasing
```

Rules for coding text strings

- 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 using the bracket and chaining of the data, and using the end-of-file rules specified for the LU in the printer definition.
- 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').

- 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.
- In data streams that contain double-byte character set (DBCS) data, code the text string as single-byte data.
- IBM recommends 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 e-mail destination

You can send VTAM application output to an e-mail destination instead of to a printer. Or, you can send output to *both* an e-mail 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 e-mail addresses:

- Your administrator can specify the e-mail addresses of the primary and secondary recipients in the printer definition for the e-mail destination in the Printer Inventory.
- You can specify an address list in an alias file that your administrator defines to z/OS UNIX sendmail. See "Specifying the e-mail address list in an alias file" on page 133.
- 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 198.

The e-mail has these characteristics:

- Each output data set is an e-mail attachment in a separate e-mail. The name of the attachment is the VTAM PLU name of the application that sent the data.

  Tip: 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 e-mail is the member name of the NetSpool startup procedure.

  Tip: To specify a subject, ask your administrator to specify a title in the printer definition, or embed the **title-text** job attribute in the print data. The job attribute overrides other values.
- The sender is the ID of the user who started the Infoprint Server daemons.

  Tip: To specify a descriptive name for the sender, ask your administrator to specify the descriptive name in the printer definition, or embed the **mail-from-name** job attribute in the print data. The job attribute overrides other values.
- The reply address is the sender of the e-mail. However, e-mail recipients should not reply to the sender because typically that user ID cannot receive mail.

  Tip: To specify a reply address, ask your administrator to specify the reply address in the printer definition, or embed the **mail-reply-address** job attribute in the print data. The job attribute overrides other values.

Chapter 9. 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, the Server Message Block (SMB) protocol, or the Internet Printing Protocol (IPP). See "Determining the print submission protocol."
- Windows **print** command (available on Windows 2000 and XP). See "Using the print command" on page 210.
- Windows LPR command (available on Windows 2000 and XP). See "Using the LPR command" on page 210.
- IBM **lprafp** command. See Chapter 11, "Printing using the lprafp command," on page 221.

To use the LPR or **lprafp** command, you do not need to install the Infoprint Port Monitor or configure z/OS for SMB or IPP processing.

Table 12 summarizes the tasks 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 12. Printing from Windows systems

Task	Condition	See page
Determining the print submission protocol	Optional: To print from a Windows application or with the **print** command	201
Installing Infoprint Port Monitor	Optional: To use the Infoprint Port Monitor	202
Adding a z/OS printer to your Windows system	Optional: To print from a Windows application or with the **print** command	203
Customizing the AFP Printer Driver	Optional: To use the AFP driver and change driver options	207
Sending a file to an e-mail destination	Optional: To send files to an e-mail destination instead of to a printer	208
Printing files	Required	209
Uninstalling Infoprint Port Monitor	Optional: To remove the Infoprint Port Monitor	211

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. It lets you 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.

  The Infoprint Port Monitor runs on Windows 2000, Windows Server 2003, and XP. Support for Windows 98, NT, and Millennium Edition (Me) has been removed because Microsoft no longer supports those operating systems. For information about the Infoprint Port Monitor on those operating systems, see *z/OS V1R2 Infoprint Server User's Guide* in www.ibm.com/servers/eserver/zseries/zos/bkserv/.

- Server Message Block (SMB) protocol:

  The standard printing protocol provided with Windows systems. Infoprint Server supports the SMB protocol on Windows systems.

- Internet Printing Protocol (IPP):

  Lets you print over the Internet from a Windows IPP client. Windows 2000, Windows Server 2003, and XP provide an IPP client.

These protocols support different print functions and have different limitations as summarized in Table 13.

Table 13. Comparison of Windows printing protocols

Function supported	Infoprint Port Monitor	SMB	IPP
Specify job attributes during printing	Yes[1]	No	Yes[2]
Obtain print job status	Yes[3]	Yes[4]	Yes[5]
Define a Windows shared printer	Yes	Yes	No

1. You can specify any job attributes described in Chapter 4, "Using job attributes," on page 97.
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. When the Windows job status window is open, z/OS system performance might be degraded.
5. 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 as long as 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

Note: The installation instructions in this chapter are current as of publication. If the product files are subsequently updated, the installation instructions might change. For the latest installation instructions, see the IBM Printing Systems Web site: www.ibm.com/printers

Before you begin

Make sure that these software requirements are met:

- Microsoft Windows 2000, Windows Server 2003, or XP is required.

- TCP/IP protocol is operational on your Windows system.
- If Windows Internet Explorer is not 3.x or later, download the latest Internet Explorer (http://www.microsoft.com/ie/) so that you can view the online help for the Infoprint Port Monitor.
- If Infoprint Manager Select is installed on your Windows system, it should be at the latest level.

Steps for installing Infoprint Port Monitor

To install the Infoprint Port Monitor:

1. Be sure you have Windows administrator authority on your Windows system.

   _____

2. If you are currently using an earlier version of the Infoprint Port Monitor, do **not** uninstall it.

   _____

3. Download the Infoprint Port Monitor from one of these locations:
   - Download this z/OS file: `/usr/lpp/Printsrv/win/En_US/aopwin.exe`.
     Use a file transfer program, such as `ftp`, and download the file in binary. To do this, you need an account on the z/OS system where Infoprint Server is installed.
   - Download from the Web: `http://www.ibm.com/printers/download.html`.
     If you use the Internet Explorer browser, when you download, 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:
   a. Run **aopwin**. For example, if you downloaded the Infoprint Port Monitor to folder `c:\zostemp`, in the Run dialog box type:

      `c:\zostemp\aopwin`

      You might need to restart your Windows system.
   b. Delete file the setup file that you downloaded to your workstation. For example, delete file `c:\zostemp\aopwin.exe`.

   _____

5. Define z/OS printers to your Windows system. For instructions, see "Adding and configuring a local printer for Infoprint Port Monitor" on page 204 or the Infoprint Port Monitor online help. A shortcut to the help, located in the Windows folder "IBM Infoprint Port Monitor", was put on your desktop during the installation of the Port Monitor.

   _____

Note: Windows printers that you added for the earlier version of the Infoprint Port Monitor are still defined. You do not need to change them.

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," or, if your Windows administrator has already defined the printer as a Windows shared printer, see "Adding a network printer" on page 206.
- Server Message Block (SMB) protocol, see *z/OS Distributed File Service SMB Administration*.
- Internet Printing Protocol (IPP), see "Adding an Internet printer" on page 206.

Adding and configuring a local printer for Infoprint Port Monitor

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 your administrator used to define the printer in the Infoprint Server Printer Inventory.
- The name of the printer driver. The printer driver converts your documents to a format that the printer understands. For example, to AFP format (for IBM AFP printers) or to PostScript format (for IBM or other PostScript printers). If the printer driver is the IBM AFP Printer Driver, before you continue download it from the Web (`http://www.ibm.com/printers/download.html`) or from the z/OS system.
- If you use the IBM AFP Printer Driver, 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 **Refresh Printer Selection 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, separated with spaces. For valid job attributes, see Chapter 4, "Using job attributes," on page 97.

   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 APF 240**.

d. Select **Next** or **Continue Anyway**.

_____

9. If the next window says that the printer driver already 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 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 either **Do not share this printer** or **Share as** or **Share name**. If you chose the share the printer, enter information to describe it to other users. Then select **Next**.

_____

13. (Optional) Print a test page. Select **Next**.

_____

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 has defined the z/OS printer as a shared printer in your Windows network:

1. Ask your Windows administrator for the name 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 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.

printer_definition_name
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 converts your documents to AFP format, which lets you print on IBM AFP printers. You can download the AFP Printer Driver at no charge from the Web: `http://www.ibm.com/printers/download.html`. If you want to 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, which you can download from `http://www.ibm.com/printers/download.html`, creates AFP output for printing on IBM AFP printers. If you use the AFP Printer Driver, you can change default printing options and specify printer characteristics.

To configure 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 2 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 the option off causes the driver to create a smaller output file. First, make sure that your printer can do font substitution. Also, note that 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 e-mail destination

When you submit a print request, you can send the file to an e-mail destination instead of to a printer. You can specify the e-mail addresses of the primary and secondary recipients in one of these ways:

- Your administrator can specify the e-mail address list of the recipients in the printer definition in the Printer Inventory.
- You can specify the e-mail addresses of the recipients using these job attributes:

Use this attribute:	To specify the e-mail addresses of the:
mail-bcc-addresses	"Blind copy (bcc)" recipients of an e-mail. A *bcc* means that other recipients of the e-mail do not see the bcc recipient listed.
mail-cc-addresses	"Copy (cc)" recipients of an e-mail. A *cc* means that other recipients of the e-mail can see the cc recipient listed.
mail-to-addresses	Primary recipients of an e-mail.

You can specify an address list in an alias file that your administrator defines to z/OS UNIX sendmail. For information, see "Specifying the e-mail address list in an alias file" on page 133. Your administrator can specify the name of the alias file in the printer definition, or you can specify it in a job attribute.

The e-mail has these characteristics:

- The file is an attachment to the e-mail. The name of the attachment is the name specified in one of these:

  IP PrintWay extended mode:
  1. The **mail-file-name** job attribute
  2. The file name

  IP PrintWay basic mode:

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 an extension that indicates the type of data in the file. For example, `txt` indicates text data and `pdf` indicates PDF data.

- The subject of the e-mail is the value specified to the Port Monitor in the **title-text** job attribute. If none is specified, the subject is the title your administrator specified 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 you specify in the **mail-reply-address** job attribute. To receive replies from the e-mail, 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 sendmail 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."
- Windows **print** command. See "Using the print command" on page 210.
- Windows LPR command. See "Using the LPR command" on page 210.
- IBM **lprafp** command. See Chapter 11, "Printing using the lprafp command," on page 221.

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 203.

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 described in Chapter 4, "Using job attributes," on page 97, 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 IBM AFP printers support the **duplex** attribute. VTAM-controlled printers (IP PrintWay basic mode only) and some IPP-enabled printers do not support the **copies** attribute. If you send the file to an e-mail 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 203. To use the **print** command, you or your Windows administrator must define the z/OS printer as a Windows shared printer. The **print** command lets you print a file directly without using a Windows application that supports printing.

You can specify this command and these options when you print using 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 defined to Infoprint Server in the Printer Inventory. The LPR command lets you print a file directly without using a Windows application that supports printing.

To use the LPR command, the administrator must have configured 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 using 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 has configured the printer's separator page. If the file is sent to an e-mail destination, this job name is used as the subject of the e-mail.

file
> Specifies the name of the file you want to print or send to an e-mail 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 recommends 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

Note: This section explains how to uninstall the Infoprint Port Monitor Version 2.0.0 or later versions. For information about uninstalling earlier versions of the Infoprint Port Monitor, including versions that ran on Windows 98, NT, and Millennium Edition (Me), see *z/OS V1R2 Infoprint Server User's Guide* in www.ibm.com/servers/eserver/zseries/zos/bkserv/.

To uninstall the Infoprint Port Monitor (Version 2.0.0 or later versions), use the Windows procedure:

1. Select **Control Panel --> Add/Remove Programs**.

   _____

2. Select **Infoprint Port Monitor**.

   _____

3. Follow the instructions in the Add/Remove Programs Wizard to remove the Infoprint Port Monitor.

   _____

Chapter 10. Printing from remote non-Windows systems

This chapter describes how to print from non-Windows workstations where TCP/IP is installed. For detailed information about the syntax of the commands described in this chapter, 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 has not configured the separator pages to show this information.

2. Infoprint Server accepts commands that are sent from any port on the sending host.

3. If Infoprint Server Transforms or another transform product is installed on the z/OS system, your data streams can be automatically transformed into the format accepted by the printer. PCL, PDF, PostScript, and SAP data streams can be transformed to AFP format. AFP data streams can be transformed to PCL, PDF, or PostScript format. If XML Extender is installed, your XML data streams can be automatically transformed to AFP or PDF format.

4. To submit print requests from Windows systems and UNIX systems, see Chapter 11, "Printing using the lprafp command," on page 221.

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 created for the printer. This name is case-sensitive. You must specify this name as the name of the printer or print queue.

The OS/400 LPR command and the AIX **enq** command let you specify Infoprint Server job attributes, which are described in Chapter 4, "Using job attributes," on page 97.

For more information about how to submit an LPR or **enq** command from a particular system, see:

- "Printing from an AIX workstation" on page 215
- "Printing from a remote z/OS system" on page 216
- "Printing from a VM or z/VM system" on page 216
- "Printing from an OS/400 system" on page 217

After receiving a print request, Infoprint Server returns either an error message or a job identifier. The job identifier indicates that Infoprint Server has 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 e-mail destination

When you use the LPR or **enq** command, you can send the file to an e-mail destination instead of to a printer. You can specify the e-mail addresses of the primary and secondary recipients in one of these ways:

- Your administrator can specify the e-mail address list of the recipients in the printer definition in the Printer Inventory.
- You can specify the e-mail addresses of the recipients using these job attributes:

Use this attribute:	To specify the e-mail addresses of the:
mail-bcc-addresses	"Blind copy (bcc)" recipients of an e-mail. A *bcc* means that other recipients of the e-mail do not see the bcc recipient listed.
mail-cc-addresses	"Copy (cc)" recipients of an e-mail. A *cc* means that other recipients of the e-mail can see the cc recipient listed.
mail-to-addresses	Primary recipients of an e-mail.

You can specify an address list in an alias file that your administrator defines to z/OS UNIX sendmail. For information, see "Specifying the e-mail address list in an alias file" on page 133. Your administrator can specify the name of the alias file in the printer definition, or you can specify it in a job attribute.

The e-mail has these characteristics:

- The file is an attachment to the e-mail. The name of the attachment is the name specified in one of these:

  IP PrintWay extended mode:
  1. The **mail-file-name** job attribute
  2. The file name

  IP PrintWay basic mode:
  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 an extension that indicates the type of data in the file. For example, txt indicates text data and pdf indicates PDF data.

- The subject of the e-mail is the title specified in the **title-text** job attribute or the title specified on the LPR command. If none is specified, the title is the value 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 you specify in the **mail-reply-address** job attribute. To receive replies from the e-mail, 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 concatenated with the system where sendmail 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 listed in "lpstat—Show printer names and locations and status of print jobs" on page 43.

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. The -X option lets you specify Infoprint Server job attributes in the **-o** option on the **enq** command.

   If you print large files, especially files that will be transformed from one format to another on the z/OS system, also specify the -T option to increase the time-out value. The default time-out value is 90 seconds. Depending on the size of your files, you might need to specify a time-out value of a few minutes. For extremely 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.

   This **backend** option specifies a time-out 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 4, "Using job attributes," on page 97. 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 an HFS 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 has configured the separator page to do so. If the file is sent to an e-mail destination, the title becomes the subject of the e-mail.

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 OS/400 system

The most convenient way to print from an OS/400 system is to do these steps:

1. Define a remote print queue for a printer that your administrator has defined to Infoprint Server, if the administrator has not already done so. To do this:

   a. Enter the CRTOUTQ command on the OS/400 command line.

   b. Fill in the panels:

   Output queue
   > The name 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 has 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 4, "Using job attributes," on page 97. 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 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 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 4, "Using job attributes," on page 97. 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 OS/400 system 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 OS/400 system inserts an initial null byte into the print file before sending 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 source statements below 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 *OS/400 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 11. Printing using the lprafp command

The **lprafp** command lets you submit print requests from Windows systems and UNIX systems (such as HP-UX and SunOS) and specify 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:

- IBM does not provide support for the **lprafp** command.
- Some Windows and UNIX print commands might let you specify Infoprint Server job attributes. If so, you do not need to use the **lprafp** command.
- On AIX systems, IBM recommends that you use the AIX **enq** command instead of the **lprafp** command. The AIX **enq** command lets you specify Infoprint Server job attributes and IBM supports the **enq** command. For information about the **enq** command, see "Printing from an AIX workstation" on page 215.
- To use the **lprafp** command, you must install PTF UA12485.

You can download the **lprafp** command from the Web:
`http://www.ibm.com/printers/download.html`

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 4, "Using job attributes," on page 97.

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 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 retries. The default is 10 seconds.

-r *retries*
> Specifies the number of times the **lprafp** command retries the transmission 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` using form definition `F1FORM`, enter:

```
lprafp -o"XAOP form-definition=f1form copies = 2" -p myprinter -s systema.xyz.com file1 file2
```

Usage notes

- IBM does not provide support for the **lprafp** command.
- The LPRAFP Readme file describes how to use the **lprafp** command to send print requests to Infoprint Manager, not to z/OS Infoprint Server.

Appendix A. Job attributes and JCL parameters valid for different printer types

Table 14 shows which job attributes and JCL parameters Infoprint Server can validate for a selected printer. Infoprint Server checks the value you specify in these job attributes and JCL parameters against the supported values the administrator specifies in the printer definition.

Table 14. Job attributes and JCL parameters validated for the printer

Job attribute	JCL parameter	Value validated for printer
address-text	ADDRESS	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
filter-options	none	No
form-definition	FORMDEF	No
forms	FORMS	Yes
hold	HOLD OUTDISP (JES2 only)	No
input-tray	none	Yes
input-tray-number	INTRAY	No
jes-priority	PRTY	No
mail-bcc-addresses	MAILBCC	No
mail-cc-addresses	MAILCC	No
mail-file-name	MAILFILE	No
mail-from-name	MAILFROM	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 **overlay-front**	OVERLAYB OVERLAYF	No
owner	USER	No
page-definition	PAGEDEF	No
pdf-encryption-level	none	No
pdf-owner-identifier	none	No
pdf-protect	none	No

Table 14. Job attributes and JCL parameters 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-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
x-image-shift-back **x-image-shift-front**	OFFSETXB OFFSETXF	No
y-image-shift-back **y-image-shift-front**	OFFSETYB OFFSETYF	No

Appendix B. JCL parameters and corresponding job attributes

Table 15 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 Table 15). You can specify job attributes in a batch application
when you use the AOPPRINT JCL procedure and when you use the Print Interface
subsystem.

Table 15. JCL parameters and corresponding job attributes

JCL parameter	Job attribute	See page
ADDRESS	**address-text**	99
AFPSTATS	**save-afp-statistics**	122
BUILDING	**building-text**	100
CHARS	**chars**	101
COPIES	**copies**	102
DATACK	**print-error-reporting**	119
DCB OPTCD=J	**table-reference-characters**	125
DEPT	**department-text**	102
DEST=IP:	**printer-ip-address**	120
DSNAME	**sysout-dataset-name**	123
DUPLEX	**duplex**	105
FORMDEF	**form-definition**	107
FORMS	**forms**	107
HOLD[1] OUTDISP (JES2 only)	**hold**	108
INTRAY	**input-tray** **input-tray-number**	108
job name (on JOB statement)	**sysout-job-name**	125
MAILBCC	**mail-bcc-addresses**	110
MAILCC	**mail-cc-addresses**	111
MAILFILE	**mail-file-name**	111
MAILFROM	**mail-from-name**	112
MAILTO	**mail-to-addresses**	113
NAME	**name-text**	113
OFFSETXB	**x-image-shift-back**	126
OFFSETXF	**x-image-shift-front**	127
OFFSETYB	**y-image-shift-back**	128
OFFSETYF	**y-image-shift-front**	128
OUTBIN	**output-bin** **output-bin-number**	114
OVERLAYB	**overlay-back**	115
OVERLAYF	**overlay-front**	115
PAGEDEF	**page-definition**	116

Table 15. JCL parameters and corresponding job attributes (continued)

JCL parameter	Job attribute	See page
PRMODE	**shift-out-shift-in**	123
PRTQUEUE	**print-queue-name**	119
PRTY	**jes-priority**	110
RECFM	**carriage-control-type**	100
REPLYTO	**mail-reply-address**	112
ROOM	**room-text**	122
SYSAREA	**restrict-printable-area**	122
TITLE	**title-text**	126
TRC	**table-reference-characters**	125
USER	**owner**	116
USERLIB	**resource-library**	121
none	**document-codepage**	103
none	**document-format**	103
none	**document-type**	104
none	**filter-options**	105
none	**pdf-encryption-level**	117
none	**pdf-owner-identifier**	117
none	**pdf-protect**	118
none	**pdf-user-identifier**	118
none	**sysout-job-id**	124

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.

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 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.

NetSpool returns these SNA sense codes for errors 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 16 describes the SCS code points that are supported and unsupported when NetSpool creates line data or PCL data streams.

Table 16. SCS code points

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

Table 16. SCS code points (continued)

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 17 on page 231)	Yes	Yes
PPM	X'2BD2...'	Page presentation media (see Table 18 on page 232)	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 25 on page 233)	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 26 on page 234 and Table 27 on page 235)	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 16. SCS code points (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 28 on page 235 and Table 29 on page 236)	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 two 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 Platen - ignore • Other - error	Vertical channel select	Yes	Yes

Control code	EBCDIC	Name	Line support	PCL support
VT	X'0B'	Vertical tab	Yes	Yes
WUS	X'23'	Word underscore	Yes	Yes
• 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				

Notes:

1. The NetSpool Graphic Escape exit lets you replace 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.

Table 17. Presentation Position X'34xxnn'

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 denoting 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	

Presentation Page Media control

The Presentation Page Media control (X'2BD2') lets you select paper sources and specify simplex or duplex printing. NetSpool supports this control only when it converts the input data stream to a PCL data stream.

Table 18. Presentation Page Media (2BD2)

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12
X'2B'	X'D2'	NN count byte	X'48'	X'00'	X'00'	FC forms control	SD source drawer	DDO offset	DD destination drawer	X'00'	DX simplex or duplex

Table 19. 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 20. 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 21. 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 22. Presentation Page Media (2BD2) DDO (destination drawer offset)

DDO (destination drawer offset)	Description	PCL command
X'00'	Ignore	

Table 22. Presentation Page Media (2BD2) DDO (destination drawer offset) (continued)

DDO (destination drawer offset)	Description	PCL command
other values	Offset	<ESC>&l1T

Table 23. Presentation Page Media (2BD2) SD (destination drawer byte)

SD (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 24. Presentation Page Media (2BD2) DX (destination drawer duplex)

DX (destination drawer duplex)	Description	PCL command
X'00'	Ignore	
X'01'	Simplex	<ESC>&l0S
X'02'	Duplex	<ESC>&l1S
X'03'	Tumble duplex	<ESC>&l2S

Tip: The "l" in the PCL commands above is actually a lowercase "L".

SCS Set Attribute control

Table 25. SCS Set Attribute (X'28xxyy')

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

Table 25. SCS Set Attribute (X'28xxyy') (continued)

Byte 1	Byte 2 function parameter	Function description	Byte 3 value	Line data support	PCL support
	X'43'	Character Set	X'00'	Reset character set to single-byte character set.	Error
			X'F8'	Start of double-byte character set data.	Error
			other values	Error	Error
	X'C2'	Field Outlining	any value	NetSpool ignores this function	NetSpool ignores this function

Table 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)

Table 26 describes the parameters that can be used with the SHF code point.

Table 26. Set Horizontal Format parameters

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.)
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.)

Table 26. Set Horizontal Format parameters (continued)

SHF parameter	Name	Range	NetSpool default
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, will be saved for use with the SCS Horizontal Tab control.

The definition in the Content column of Table 27 explains what values you should use in the corresponding column positions.

Table 27. Set Horizontal Format

Bytes	Content
1–2	X'2BC1'
3	Count of bytes after byte 2. It must be in range of 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)

Table 28 describes the parameters that can be used with the SVF code point.

Table 28. 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.)

Table 28. Set Vertical Format parameters (continued)

SVF parameter	Name	Range	NetSpool default
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, will be saved for use with the SCS Vertical Tab or Vertical Channel Select control.

The definition in the Content column of Table 29 explains what values you should use in the corresponding column positions.

Table 29. Set Vertical Format convert to PCL

Bytes	Content
1–2	X'2BC2'
3	Count of bytes after byte 2. It must be in range of 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
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, 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 30, Table 31, and Table 32 on page 238 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 30 describes the code points that are supported for 3270 data streams.

Table 30. 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 31 describes the code points that are supported for 3270 data streams and also explains if it is fully supported.

Table 31. 3270 data stream control codes

Control code	EBCDIC	Name	Line support	PCL support
CR	X'0D'	Carriage Return	Yes	Yes
EM	X'19'	End of Message	Yes	Yes
EUA	X'12'	Erase Unprotected to Address	Yes	Yes

Table 31. 3270 data stream control codes (continued)

Control code	EBCDIC	Name	Line support	PCL support
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 32)	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 32)	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 32)	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

Explanation of NetSpool support:
- 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'.

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, a NL control, or a CR control. The FF is printed as a space character.
2. The NetSpool Graphic Escape exit lets you replace Graphic Escape characters with other printable characters.

Attribute types

Table 32 describes the attribute types that are supported for 3270 data streams.

Table 32. 3270 data stream attribute types

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).

Table 32. 3270 data stream attribute types (continued)

Attribute type	EBCDIC	SFE, MF orders	SA order	Comments
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'.
N/A	The attribute type does not apply to the order.			
X	The attribute type does apply to the order.			

Appendix E. Accessibility

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, use software products successfully. The major accessibility features in z/OS let users:

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

Using assistive technologies

Assistive technology products, such as screen readers, work with the user interfaces found in z/OS. Consult the assistive technology documentation for specific information when using such products to access z/OS interfaces.

Keyboard navigation of the user interface

Users can access z/OS user interfaces using TSO/E or ISPF. For information about accessing TSO/E and ISPF interfaces, see *z/OS TSO/E Primer*, *z/OS TSO/E User's Guide*, and *z/OS ISPF User's Guide*. These books describe how to use TSO/E and ISPF, including the use of keyboard shortcuts or function keys (PF keys). Each book includes the default settings for the PF keys and explains how to modify their functions.

Additional accessibility features

Users can also use Infoprint Central. For information about Infoprint Central, see its online help.

z/OS information

Most z/OS information is accessible using screen readers with the BookServer/Library Server versions of z/OS books in the Internet library:

`www.ibm.com/servers/eserver/zseries/zos/bkserv/`

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Bibliography

This section lists books that might help you to configure and use Infoprint Server.

Infoprint Server

Title	Order number
Infoprint Server Transforms Licensed Program Specifications	G544-5797
z/OS Infoprint Server Customization	S544-5744
z/OS Infoprint Server Introduction	S544-5742
z/OS Infoprint Server Messages and Diagnosis	G544-5747
z/OS Infoprint Server Operation and Administration	S544-5745
z/OS Infoprint Server User's Guide	S544-5746
Infoprint Server for z/OS Implementation Redbook	SG24-6234

Infoprint transforms

Title	Order number
Infoprint Transforms to AFP for z/OS	G550-0443
Infoprint Transforms from AFP for z/OS	G550-0444
Infoprint XML Extender for z/OS	S544-5855
Infoprint XT Extender for z/OS: Customization and Usage	S544-5879

Print Services Facility™ (PSF)

Title	Order number
AFP Conversion and Indexing Facility: User's Guide	S544-5285
PSF for z/OS: Customization	S544-5622
PSF for z/OS: Diagnosis	G544-5623
PSF for z/OS: Download for z/OS	S544-5624
PSF for z/OS: Introduction	G544-5625
PSF for z/OS: Messages and Codes	G544-5627
PSF for z/OS: User's Guide	S544-5630

Advanced Function Presentation (AFP)

Title	Order number
IBM Printing Systems: Printer Information	S544-5750
IBM Printing Systems: Printer Summary	S544-5749
AFP: Programming Guide and Line Data Reference	S544-3884
IBM AFP Fonts: Font Summary for AFP Font Collection	S544-5633

Title	Order number
IBM Data Stream and Object Architectures: Bar Code Object Content Architecture Reference	S544-3766
IBM Data Stream and Object Architectures: IOCA Reference	SC31-6805
IBM Page Printer Formatting Aid: User's Guide	S544-5284

Infoprint Manager for AIX and Windows

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IBM Infoprint Color 130 Plus: Installation Planning Guide	G544-5772
IBM Infoprint Manager: Reference	S544-5475
IBM Infoprint Manager for AIX: Administrator's Guide	S544-5595

z/OS Version 1 Release 6

Title	Order number
z/OS C/C++ Programming Guide	SC09-4765
z/OS C/C++ Run-Time Library Reference	SA22-7821
z/OS Communications Server: IP and SNA Codes	SC31-8791
z/OS Communications Server: IP Application Programming Interface Guide	SC31-8788
z/OS Communications Server: IP Configuration Guide	SC31-8775
z/OS Communications Server: IP Configuration Reference	SC31-8776
z/OS Communications Server: New Function Summary	GC31-8771
z/OS Communications Server: IPv6 Network and Application Design Guide	SC31-8885
z/OS Communications Server: SNA Diagnosis Vol 1, Techniques and Procedures	LY43-0088
z/OS Communications Server: SNA Diagnosis Vol 2, FFST Dumps and the VIT	LY43-0089
z/OS Communications Server: SNA Messages	SC31-8790
z/OS Communications Server: SNA Network Implementation Guide	SC31-8777
z/OS Communications Server: SNA Operation	SC31-8779
z/OS Communications Server: SNA Programming	SC31-8829
z/OS Communications Server: SNA Resource Definition Reference	SC31-8778
z/OS Distributed File Service SMB Administration	SC24-5918
z/OS HTTP Server Planning, Installing, and Using	SC34-4826
z/OS Information Roadmap	SA22-7500
z/OS JES2 Commands	SA22-7526
z/OS JES2 Initialization and Tuning Guide	SA22-7532
z/OS JES2 Initialization and Tuning Reference	SA22-7533
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z/OS Language Environment Debugging Guide	GA22-7560

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z/OS MVS Diagnosis: Tools and Service Aids	GA22-7589
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CICS Diagnosis Reference	LY33-6102
CICS Resource Definition Guide	SC34-6228
CICS Supplied Transactions	SC34-6230

IMS/ESA® Version 6

Title	Order number
IMS Version 8: Administration Guide: System	SC27-1284
IMS Version 8: Administration Guide: Transaction Manager	SC27-1285

3270 and SNA data streams

Title	Order number
IBM 3270 Information Display System Data Stream Programmer's Reference	GA23-0059
IBM 3270 Information Display System 3274 Control Unit Description and Programmer's Reference	GA23-0061
IBM 3270 Information Display System Reference Summary	GX20-1878
IBM 3270 Kanji Data Streams	GA18-2980
IPDS and SCS Technical Reference	S544-5312
Systems Network Architecture: Sessions Between Logical Units	GC20-1868

Index

Special characters

/etc/Printsrv/aopd.conf file   32, 41, 47, 78, 87, 93
/etc/Printsrv/aopdxfd.conf   78
(Information Management System (IMS)
   See IMS (Information Management System)
$HOME/.aopconf file   32, 41, 47, 78, 87, 93
%filter-options option   107

Numerics

3270 data stream
   Character Set attribute   194
   DBCS support   194
   MF order   194
   SA order   194
   SFE order   194
   Shift In control   194
   Shift Out control   194
   WSF order   195
3270 data stream support in NetSpool   14
3270 data streams, attributes   238
3270 data streams, command codes   237
3270 data streams, control codes   237

A

ABAP (Advanced Business Application Programming)
  data format, SAP
   See SAP ABAP (Advanced Business Application
    Programming) data format
accessibility   241
Acrobat Reader considerations for viewing and printing
  transformed PDF files   62
ADDRESS parameter (JCL)   169
   equivalent job attribute   99
address-text attribute   99
Advanced Business Application Programming (ABAP)
  data format, SAP
   See SAP ABAP (Advanced Business Application
    Programming) data format
Advanced Function Presentation (AFP) files
   printing or viewing from Windows   209
AFP
   transforming to PCL   52
   transforming to PDF   59
   transforming to PostScript   67
AFP (Advanced Function Presentation) files
   printing or viewing from Windows   209
AFP data
   printing on non-AFP printer   177, 178
AFP files
   printing from Windows   209
AFP Printer Driver
   configuring   207
AFP Printer Driver for Windows, overview   5
AFP printers
   configuring on Windows   207

AFP printers *(continued)*
   JCL parameters used by   170
   submitting jobs from Windows   209
AFP resources, using   170
AFP to PCL transform JCL parameters   156
AFP to PDF transform JCL parameters   156
AFP to PostScript transform JCL parameters   156
AFP Viewer plug-in for Windows, overview   5
afp2pcl transform
   environment variables   58
   examples   57
   exit values   58
   files   58
   limitations   56
   operand   54
   options   52
   supported objects   55
afp2pdf transform
   environment variables   66
   examples   65
   exit values   66
   files   66
   limitations   64
   operand   61
   options   59
   supported objects   63
afp2ps transform
   environment variables   73
   examples   72
   exit values   73
   files   73
   limitations   71
   operand   69
   options   67
   supported objects   70
AFPSTATS parameter (JCL)   123
AIX
   increasing time-out value   215
   printing from   213, 215
   querying jobs and printers from   215
AOP_SAP2AFP_RESOURCES environment
  variable   91, 92
AOPBATCH JCL procedure
   DD names   188
   examples   189
   exit values   191
AOPBATCH program   187
AOPCONF environment variable   31, 41, 46, 58, 66,
  73, 78, 87, 92
AOPOPTIONS environment variable   41
AOPPATH environment variable   41
AOPPRINT JCL procedure   181
   DD statements   183
   examples   183
   exit values   186
aopwin.exe, downloading   203
APIPPTD1 exit   194
APIPPTD2 exit   194

251

FS45 image object   86, 92
FS45, limitation in AFP transform   56, 64, 71
FSSDATA='printer' parameter (JCL)   145
   example   171
Function Management (FM) header   195

H
Historical Inventory, overview   4
hold attribute   108
HOLD parameter (JCL)   156
holding jobs   108
horizontal tab parameter (NetSpool)   197
host name
   See also IP (Internet Protocol) address
   specifying in JCL   142
   specifying with job attribute   120
HT parameter (NetSpool)   197

I
image.tab file   91, 93
IMS (Information Management System)
   printing from   193
Infoprint Central, holding jobs   156
Infoprint Central, overview   23
Infoprint Port Monitor
   description   201
   downloading   203
   installing   203
   uninstalling   211
Infoprint Port Monitor, overview   5
Infoprint Server Transforms
   AOPBATCH JCL procedure examples   189
   parameters   156
Infoprint Server Transforms, overview   20
Infoprint XML Extender   94, 95
Infoprint XT Extender   96
informational messages
   AOPPRINT JCL procedure
      class   182
      sysout name   183
   English   27
   Japanese   27
inline form definitions   159
inline page definitions   162
inline resources
   fonts   157
   form definitions   159
   page definitions   162
input data streams
   AFP
      transforming to PCL   52
      transforming to PDF   59
      transforming to PostScript   67
   PCL
      transforming to AFP   74
   supported
      Print Interface   103
   VTAM
      restrictions   195

input data streams *(continued)*
   VTAM *(continued)*
      supported   193
input data streams, types supported   13
input tray   108
input-tray attribute   108
input-tray number attribute   109
Internet printers
   defining   206
Internet Printing Protocol (IPP), using from
 Windows   206
Internet Protocol (IP) address
   See IP (Internet Protocol) address
intray
   specifying in JCL   159
INTRAY parameter (JCL)   159
   equivalent job attribute   109
IOCA FS45, limitation in AFP transform   56, 64, 71
IP (Internet Protocol) address
   See also 'host name'
   example of specifying in JCL   171
   specifying in JCL   130, 142
   specifying with job attribute   120
IP PrintWay
   basic mode transforms   138
   extended mode JCL considerations   155
   extended mode transforms   138
   printing batch jobs   129
IP PrintWay printers
   printing batch jobs   129
IP PrintWay, overview   15
IPP (Internet Printing Protocol), using from
 Windows   206

J
Japanese messages   27
JCL (job control language)
   ADDRESS parameter   169
      equivalent job attribute   99
   AFPSTATS parameter   123
   BUILDING parameter   169
      equivalent job attribute   100
   CHARS parameter   157
      equivalent job attribute   102
      transmitted to remote system   170
   CLASS parameter   140
   COPIES parameter   141
      equivalent job attribute   102
   DATACK parameter
      equivalent job attribute   119
      transmitted to remote system   170
   DCB=OPTCD parameter   158
   DD statement   129
   DEPT parameter   169
      equivalent job attribute   102
   DEST parameter   142
   DEST=IP: parameter   142
      equivalent job attribute   120
   DSNAME parameter   144
   DUPLEX parameter   158

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