z/OS

# Infoprint Server User's Guide

S544-5746-00

z/OS

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**Note**
Before using this information and the product it supports, be sure to read the general information in “Notices” on page 181.

**First Edition (March 2001)**

This edition applies to z/OS Version 1 Release 1, Program Number 5694-A01; to Infoprint Server Transforms Version 1 Release 1 Modification Level 1, Program Number 5697-F51; and to all subsequent releases and modifications until otherwise indicated in new editions or technical newsletters. Be sure to use the correct edition for the level of the product.

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# About This Publication

This publication describes how to print jobs using the following products:

- Infoprint® Server for OS/390, an element of z/OS Version 1 Release 1, hereafter called Infoprint Server
- Infoprint Server Transforms Version 1 Release 1 Modification Level 1 for OS/390, a separate IBM program product (5697-F51), hereafter called Infoprint Server Transforms

With these products, you can perform the following tasks:

- Submit jobs to Infoprint Server from the following operating systems:
  - z/OS UNIX® System Services
  - z/OS, using Job Control Language (JCL)
  - z/OS, using Virtual Telecommunications Access Method (VTAM®) applications

    **Note:** The term VTAM refers to the z/OS Communications Server SNA Services element of z/OS.
  - Windows® 95, 98, NT, or 2000, using the Infoprint Port Monitor for Windows
  - The following remote systems with Transmission Control Protocol/Internet Protocol (TCP/IP) installed:
    - Windows 3.1, 95/98, NT, or 2000
    - Advanced Interactive Executive (AIX®)
    - IBM® Operating System/2® (OS/2®)
    - OS/390® or z/OS
    - Virtual Machine (VM) or z/VM®
    - Application System/400® (AS/400®)
  - Any client of a Novell NetWare 3.x, 4.x, or 5.x server that is connected to z/OS by z/OS LANRES
- 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 Advanced Function Presentation (AFP) data stream using z/OS UNIX System Services commands

## Who Should Use This Publication

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

## How This Publication is Organized

This publication is divided into the following parts:

- **Part 1. Introduction**
  - “Chapter 1. Introducing Infoprint Server” on page 3 gives an overview of Infoprint Server.
- **Part 2. Printing from z/OS UNIX System Services**

  - "Chapter 2. Printing from z/OS UNIX System Services Using Infoprint Server Commands" on page 25 describes the commands that are used to perform the following tasks:
    - Submit jobs to Infoprint Server from z/OS UNIX System Services
    - Query jobs and printers
    - Cancel jobs
    - Transform jobs to the AFP data stream
    - Transform jobs from the AFP data stream
  - "Chapter 3. Using Job Attributes" on page 79 lists the Infoprint Server attributes that describe jobs and the documents in them and explains how to use these attributes.
- **Part 3. Printing and Transforming Batch Jobs from z/OS**
  - "Chapter 4. Printing Batch Jobs from z/OS Using the AOPPRINT JCL Procedure" on page 103 describes a simple and powerful JCL procedure for submitting batch print jobs to Infoprint Server from z/OS.
  - "Chapter 5. Printing Batch Jobs from z/OS to IP PrintWay Using z/OS JCL" on page 107 describes how to use standard JCL to submit batch jobs to the IP PrintWay™ component of Infoprint Server from z/OS.
  - "Chapter 6. Transforming Batch Jobs from z/OS Using the AOPBATCH Program" on page 135 describes how to use standard JCL to submit batch transform jobs to Infoprint Server.
- **Part 4. Printing from VTAM Applications**
  - "Chapter 7. Printing from VTAM Applications" on page 141 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.
- **Part 5. Printing from Remote Systems**
  - "Chapter 8. Printing from Windows" on page 149 describes how to install print programs on Windows 95, Windows 98, Windows NT®, or Windows 2000 and how to submit jobs to Infoprint Server from a Windows workstation.
  - "Chapter 9. Printing from Remote Systems in a TCP/IP Network" on page 161 describes how to submit and query jobs from remote Windows 3.1, AIX, OS/2, OS/390, z/OS, VM, and z/VM systems.
  - "Chapter 10. Printing from Remote Systems in a Novell Netware Network" on page 169 describes how to be sure that your system is configured for printing from Novell Netware clients.
- **Part 7. Appendixes**
  - "Appendix A. Job Attributes Valid for Different Printer Types" on page 173 shows whether job attributes are valid for each printer type that Infoprint Server supports. It also shows whether job attributes are validated for individual printers.
  - "Appendix B. JCL Parameters and Corresponding Job Attributes" on page 175 lists parameters of the OUTPUT and DD JCL statements and the Infoprint Server job attributes that correspond to them.
  - "Appendix C. SCS Code Points" on page 177 and "Appendix D. 3270 Data Streams Code Points" on page 179 list the code points in VTAM data streams that Infoprint Server supports.

This publication also contains a glossary, bibliography, and index.

## Where to Find More Information

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

## Web Sites

These Web sites contain related information:

- `http://www.ibm.com/printers/`

  This site contains information about printing products, including:

  – Downloads for Windows systems, including the Infoprint Port Monitor for Windows, the AFP Viewer, the AFP Printer Driver, and Network Printer Manager (NPM) for the Web.

  – Infoprint Server publications and other publications related to printing. These publications are in PDF format.

- `http://www.ibm.com/servers/eserver/zseries/zos/`

  This site contains information about z/OS, including:

  – All z/OS publications. These publications are in both PDF and BookManager format.

  – Documentation updates that result from APARs and PTFs.

- `http://www.ibm.com/servers/eserver/zseries/zos/unix/`

  This site contains information about z/OS UNIX System Services.

## Accessing Licensed Books on the Web

z/OS licensed documentation in PDF format is available on the Internet at the IBM Resource Link Web site at:

`http://www.ibm.com/servers/resourcelink/`

Licensed books are available only to customers with a z/OS license. Access to these books requires an IBM Resource Link Web userid and password, and a key code. With your z/OS order you received a memo that includes this key code.

To obtain your IBM Resource Link Web userid and password log on to:

`http://www.ibm.com/servers/resourcelink/`

To register for access to the z/OS licensed books:

1. Log on to Resource Link using your Resource Link userid and password.
2. Click on **User Profiles** located on the left-hand navigation bar.
3. Click on **Access Profile.**
4. Click on **Request Access to Licensed books.**
5. Supply your key code where requested and click on the **Submit** button.

If you supplied the correct key code you will receive confirmation that your request is being processed. After your request is processed you will receive an e-mail confirmation.

**Note:** You cannot access the z/OS licensed books unless you have registered for access to them and received an e-mail confirmation informing you that your request has been processed.

To access the licensed books:

1. Log on to Resource Link using your Resource Link userid and password.
2. Click on **Library**.
3. Click on **zSeries**.
4. Click on **Software**.
5. Click on **z/OS**.
6. Access the licensed book by selecting the appropriate element.

## LookAt Online Facility for Message Explanations

LookAt is an online facility that allows you to look up explanations for z/OS messages and system abends. Using LookAt to find information is faster than a conventional search because LookAt goes directly to the explanation.

LookAt can be accessed from the Internet or from a TSO command line.

You can use LookAt on the Internet at:

`www.ibm.com/servers/eserver/zseries/zos/bkserv/lookat/lookat.html`

To use LookAt as a TSO command, LookAt must be installed on your host system. You can obtain the LookAt code for TSO from the LookAt Web site by clicking on the **News and Help** link or from the *z/OS Collection*, SK3T-4269.

To find a message explanation from a TSO command line, simply enter: **lookat** *message-id* as in the following:

```
lookat iec192i
```

This results in direct access to the message explanation for message IEC192I.

To find a message explanation from the LookAt Web site, simply enter the message ID and select the release you are working with.

**Note:** Some messages have information in more than one book. For example, IEC192I has routing and descriptor codes listed in *z/OS MVS Routing and Descriptor Codes*. For such messages, LookAt prompts you to choose which book to open.

## 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: ZOSV1R1; 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.

## Publications

See “Bibliography” on page 195 for a list of the publications referred to in this book and publications that contain additional information about related products.

For titles and order numbers of the books for *all* products that are part of z/OS, refer to *z/OS Information Roadmap*.

Table 1 summarizes the publications in the Infoprint Server library.

*Table 1. Summary of Infoprint Server Publications*

| Publication | Form number |
|---|---|
| *z/OS Infoprint Server Introduction*<br><br>Introduces all components of Infoprint Server, including IP PrintWay, NetSpool™, and Print Interface. It also introduces Infoprint Server Transforms. This publication contains printing scenarios that show how you can use Infoprint Server in your installation. | S544-5742 |
| *z/OS Infoprint Server Migration*<br><br>Summarizes the new function in Infoprint Server and Infoprint Server Transforms and describes the migration tasks required to implement each new function in your installation. It also describes the Infoprint Server migration program, which converts IP PrintWay, NetSpool, and Print Interface printer information to the format required by Infoprint Server for OS/390 V2R8 and higher. | G544-5743 |
| *z/OS Infoprint Server Customization*<br><br>Describes customization tasks for all components of Infoprint Server, including IP PrintWay, NetSpool, and Print Interface. It also describes customization tasks for Infoprint Server Transforms. This publication describes required 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*<br><br>Describes operator procedures and administrative tasks for all components of Infoprint Server, including IP PrintWay, NetSpool, and Print Interface. This publication describes how to start and stop Infoprint Server and how the operator can manage the IP PrintWay transmission queue. It describes how the administrator can create entries in the Printer Inventory using either ISPF panels or the Printer Inventory Definition Utility (PIDU) program, define NetSpool printer LUs to VTAM, and use accounting records written by IP PrintWay. | S544-5745 |
| *z/OS Infoprint Server User's Guide*<br><br>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 these z/OS UNIX commands: **afp2pcl**, **afp2pdf**, **afp2ps**, **cancel**, **lp**, **lpstat**, **pcl2afp**, **pdf2afp**, **ps2afp**, and **sap2afp**; the AOPPRINT JCL procedure; the AOPBATCH utility; OUTPUT JCL parameters supported by IP PrintWay; and how to download and install the Infoprint Server Windows client. | S544-5746 |
| *z/OS Infoprint Server Messages and Diagnosis*<br><br>Describes messages issued by all components of Infoprint Server, including IP PrintWay, NetSpool, and Print Interface. It also describes Infoprint Server Transforms messages and how to use Infoprint Server tracing facilities to diagnose and report errors. | G544-5747 |

## Conventions Used in This Publication

This section explains the conventions that this publication uses for the following:

- Highlighting
- Format notation
- Examples

## Highlighting

This publication uses the following highlighting conventions:

**Bold** Bold highlighting identifies z/OS UNIX System Services and Windows commands, attributes, files, directories, and other items whose names the system predefines, such as **lp** and **/etc/Printsrv/aopd.conf**. In syntax diagrams, it identifies keywords that you must enter exactly as they appear, such as **CLASS**.

UPPERCASE Uppercasing identifies OS/390, z/OS, VM, z/VM, and OS/400 commands, statements, parameters, files, libraries, and other items whose names the system predefines, such as OUTPUT JCL and PRMODE.

**Note:** There is one exception: the JCL subparameter printer. This subparameter appears in lower case because you should enter it in lower case.

*Italic* Italic highlighting identifies a variable item whose actual name or value you supply, such as *userid* or *filename*. Italics also identify publication titles.

`Monospace` Monospacing identifies an example.

## Format Notation

Format notation uses symbols to show specific conditions. Do not enter the following symbols, unless specifically instructed to do so:

| | |
|---|---|
| **Brackets** | [ ] |
| **Brackets and vertical bar** | [ \| ] |
| **Braces and vertical bar** | { \| } |
| **Underlining** | _ |
| **Ellipsis** | ... |

These symbols have the following meanings:

- Brackets, [ ], around values indicate that they are optional. For example:

  [**-d**]

  means that you do not have to enter the **-d** option.
- A vertical bar within brackets, [ | ], indicates an optional choice between values. For example:

  [**PORTNO=***portnumber* | **PRTQUEUE=***printqueue*]

  means that you can enter the **PORTNO** parameter, the **PRTQUEUE** parameter, or neither, but not both.

- A vertical bar within braces, { | }, indicates a required choice between values. For example:

  {'*hhhh:mm:ss*' | **FOREVER**}

  means that you must enter either a time in hours, minutes, and seconds or the keyword **FOREVER**, but not both.

  **Note:** A vertical bar that does *not* appear within brackets or braces is the UNIX pipe symbol. Enter it as it appears. For example:

  ```
  ls | lp
  ```

  means that the output of the **ls** command becomes the input to the **lp** command.
- Underlined text identifies the default value that is used if you do not specify a value. For example:

  **document**

  means that not specifying an output type is equivalent to specifying **document**.
- An ellipsis, ... , means that you can supply more than one occurrence of a keyword or value with the command. For example:

  *filename* ...

  means that you can enter more than one file name.

## Examples

For ease of reading, long examples are broken into several lines. When you enter a command, enter it all on one line. Do not press the ENTER key until you have typed the entire command.

# Part 1. Introduction

# Chapter 1. Introducing Infoprint Server

Infoprint Server and Infoprint Server Transforms provide support for LAN and host printing on your z/OS system. Infoprint Server and Infoprint Server Transforms consist of components that work together to provide printing services. Figure 1 shows some of these components and how they fit into your system. The components of Infoprint Server and Infoprint Server Transforms are shaded in the figure. (If you are viewing the PDF file, the components of Infoprint Server are yellow, while the components of Infoprint Server Transforms are blue.) Following the figure is a description of each component.

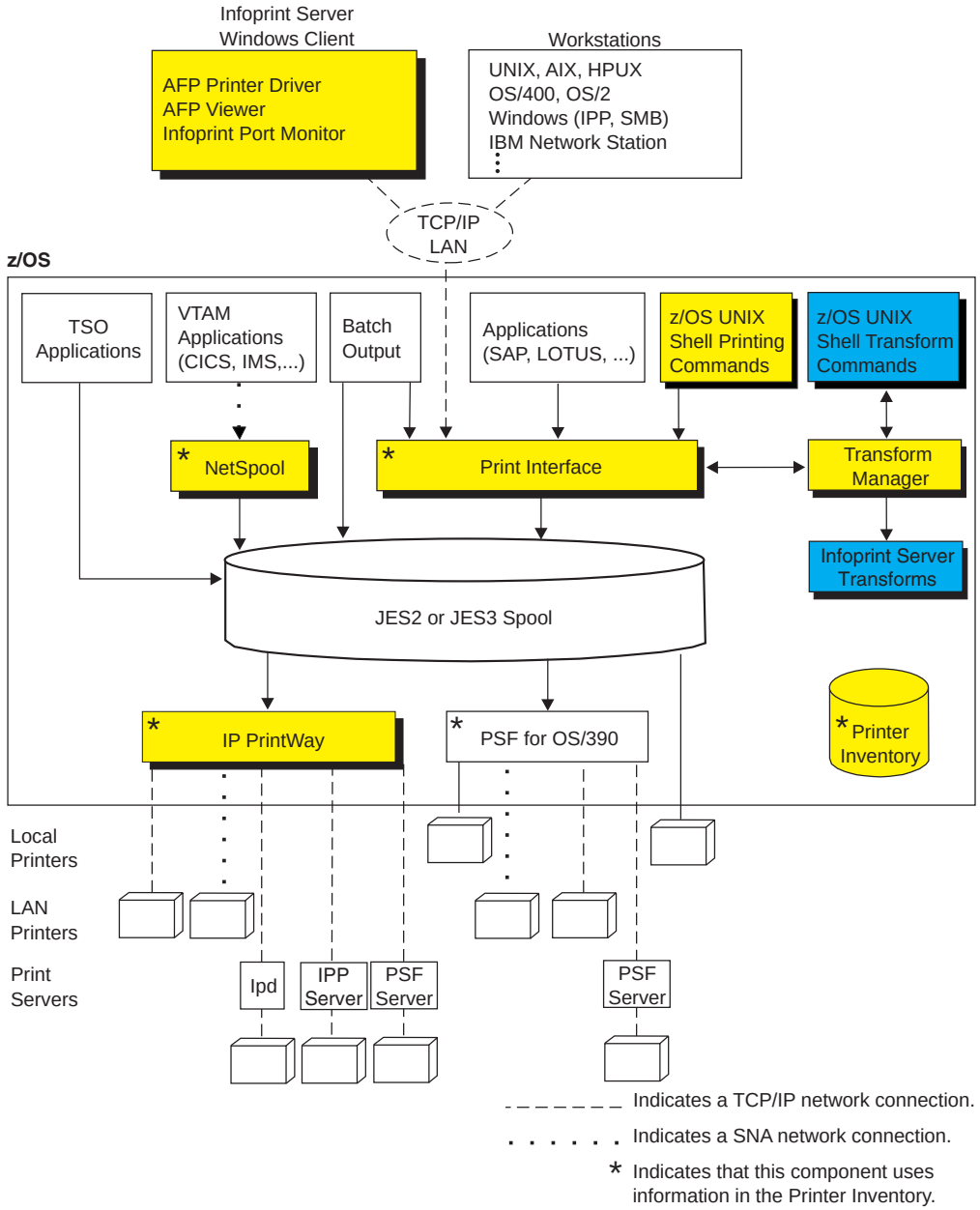


*Figure 1. Components of Infoprint Server and Infoprint Server Transforms*

**Printer Inventory and Printer Inventory Manager**

The Printer Inventory Manager controls the Printer Inventory, a set of files in the hierarchical file system (HFS) that contain information about each printer to which NetSpool, Print Interface, and IP PrintWay can print. The Printer Inventory also contains system configuration information for IP PrintWay and, optionally, for PSF for OS/390.

**Infoprint Server Windows client**

The Windows client provides (1) an AFP printer driver, (2) an AFP viewer plug-in, and (3) an Infoprint port monitor that sends print requests to the Print Interface component.

**Print Interface**

Print Interface processes print requests from remote clients that use any of the following TCP/IP printing protocols:

- Line printer requester (LPR) to line printer daemon (LPD)
- Internet Printing Protocol (IPP)
- Server Message Block (SMB) protocol

Print Interface also provides:

- z/OS UNIX shell commands (**lp**, **lpstat**, and **cancel**), which let z/OS UNIX users submit print requests to Print Interface.
- The AOPPRINT JCL procedure, which lets z/OS users submit batch print jobs to Print Interface.
- The SAP Output Management System (OMS), which lets SAP R/3 users submit jobs using the SAP R/3 Application Server for z/OS.

Print Interface accepts any data format the target printer can print, converts data to EBCDIC or ASCII as required by the target printer, and allocates output data sets on the JES spool.

**Infoprint Server Transforms and the Transform Manager**

Infoprint Server Transforms is a licensed program product (5697-F51). It provides transforms that convert data from one format to another on the z/OS system. The following transforms and features are available at no extra cost to Infoprint Server customers:

- Printer Control Language (PCL) to AFP transform
- Portable Data Format (PDF) to AFP transform
- PostScript to AFP transform
- SAP OTF and ABAP to AFP transform
- AFP Kanji Print feature

The following transforms are separate, priced features of Infoprint Server Transforms:

- AFP to PCL transform
- AFP to PDF transform
- AFP to PostScript transform
- Coax Printer Support feature

The Infoprint Server Transform Manager component of Infoprint Server manages the transforms, except for the SAP to AFP transform and the Coax Printer Support feature.

**NetSpool**

NetSpool processes print requests from VTAM applications, such as CICS and IMS. NetSpool accepts SCS, 3270, and binary data and allocates output data sets on the JES spool.

**IP PrintWay**

IP PrintWay transmits data sets from the JES spool to printers or print servers using one of the following protocols:

- TCP/IP line printer requester (LPR) to line printer daemon (LPD)
- TCP/IP Internet Printing Protocol (IPP)
- TCP/IP direct sockets printing
- Virtual Telecommunication Access Method (VTAM)

**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 controlled by PSF for OS/390 that do not have internal SNMP agents or are not TCP/IP-attached to PSF.

**PSF for OS/390 (a separate product)**

PSF for OS/390 (5655–B17) is a separate product that is required to print output from Infoprint Server to IBM AFP printers. PSF for OS/390 is *not* part of Infoprint Server; however, the PSF system programmer can specify PSF printer configuration information in the Infoprint Server Printer Inventory and can customize PSF to use this printer information when it starts a printer. For information about how to customize PSF to use the Printer Inventory and specify PSF information in the Printer Inventory, refer to *PSF for OS/390: Customization*. Also see “Bibliography” on page 195 for a complete list of PSF publications.

The following sections describe each of these components in more detail.

## Printer Inventory Manager

The Printer Inventory Manager controls the Printer Inventory, which consists of HFS 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 any Infoprint Server components running at the *same* or *different* levels on other systems.

The administrator can create the following objects in the Printer Inventory:

- Printer definitions, which contain information about printers to which Print Interface, NetSpool, or IP PrintWay can print.
- Printer pool definitions, which contain information about groups of printers to which NetSpool can broadcast data.
- FSS definitions, which contain configuration information for IP PrintWay functional subsystems (FSSs). Optionally, the administrator can also create FSS definitions for PSF for OS/390 FSSs.
- FSA definitions, which contain configuration information for IP PrintWay functional subsystem applications (FSAs). Optionally, the administrator can also create FSA definitions for PSF for OS/390 FSAs.

Figure 2 shows how the administrator can create definitions in the Printer Inventory and which components of Infoprint Server use the Printer Inventory.

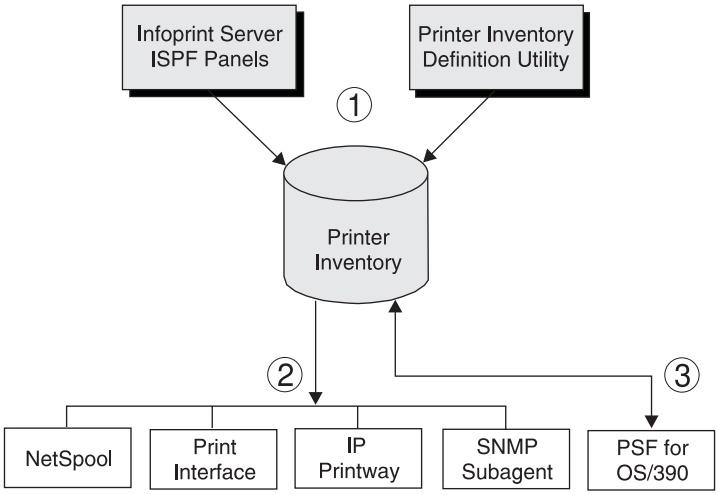


*Figure 2. Printer Inventory Manager*

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. The following 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. IP PrintWay also uses IP PrintWay configuration information in FSS and FSA definitions.

- The SNMP subagent uses printer information that PSF for OS/390 stores in the Printer Inventory about PSF printers.

3. PSF for OS/390, a separate product, can optionally 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, however, the PSF system programmer can change it without restarting all PSF printers in the PSF functional susbsystem (FSS); only the PSF printers with changed configuration information need to be restarted. For information about how the PSF system programmer can customize PSF for OS/390 to use the Printer Inventory, refer to *PSF for OS/390: Customization*.

Additional functions provided by the Printer Inventory Manager are:

- **Migration program**

  The Infoprint Server migration program helps the administrator migrate from earlier releases of IP PrintWay, NetSpool, and the OS/390 Print Server. The migration program merges printer information currently specified in NetSpool print characteristics data sets, NetSpool tables, NetSpool startup procedures, IP PrintWay routing and options data sets, and the Print Interface printer inventory to create entries (such as printer definitions and printer pool definitions) in the new Infoprint Server Printer Inventory.

  The migration program can also move printer information located in PSF startup procedures to FSS and FSA definitions in the Printer Inventory.

- **Security**

  The administrator must restrict access to the Printer Inventory and to the operator commands that start and stop the Printer Inventory Manager, the Print Interface LPD, the Print Interface IPP server, the Transform Manager, and the SNMP subagent.

## Windows Client

The Infoprint Server Windows client consists of the following programs that run on Windows 95/98, NT, and 2000 systems:

**AFP Printer Driver for Windows**

The AFP Printer Driver creates output files in AFP format, so that users can print documents to IBM AFP printers. The AFP Printer Driver can create output files containing 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**

The AFP Viewer plug-in lets users view documents in AFP format, for example documents downloaded from the z/OS system or documents on the Web. The AFP Viewer plug-in also lets users print AFP documents to AFP as well as non-AFP printers.

**Infoprint Port Monitor for Windows**

The Infoprint Port Monitor for Windows lets users print documents using standard print-submission methods from any Windows application that supports printing. After the Infoprint Port Monitor for Windows is installed and configured on the Windows system, the Port Monitor automatically sends documents to the Print Interface component of Infoprint Server.

**Note:** Infoprint Server also supports printing from a Windows system using the SMB protocol and the IPP protocol. To use these protocols, Windows users do not need to install the Printer Port Monitor.

## Print Interface

Print Interface 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.

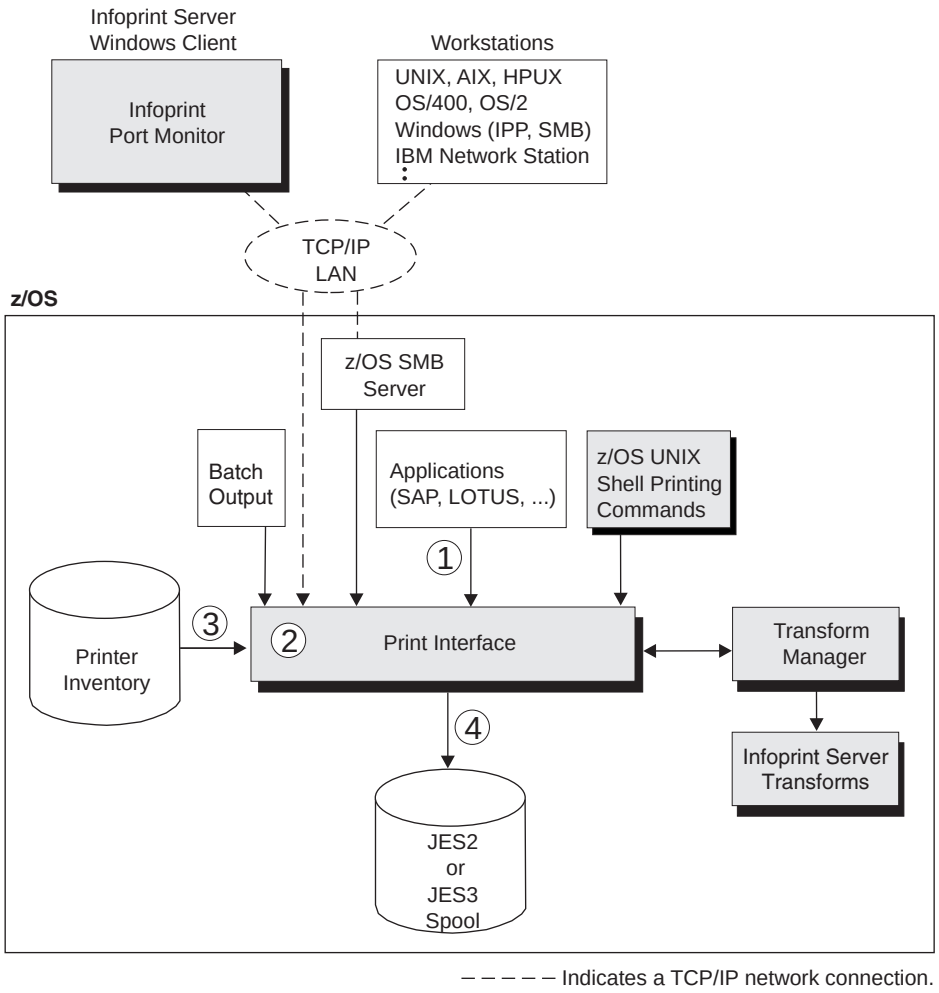


*Figure 3. Print Interface System Diagram*

1. Users can submit print requests and query job status from remote clients in the TCP/IP network, using one of the following TCP/IP protocols:
   - LPR protocol: The LPR protocol is defined by RFC 1179. Clients that use this protocol include:
     – The Infoprint Port Monitor for Windows. This client is provided by Infoprint Server.
     – TCP/IP commands such as **lpr** and **lpq**.
   - 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 used by Windows systems. 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.

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

- z/OS UNIX shell printing commands (**lp**, **lpstat**, and **cancel**). These commands, which adhere to the XPG4.2 standard, let users print HFS files and traditional MVS data sets, query the status of a print job, and cancel a print job. These commands are provided by Infoprint Server.
- The AOPPRINT JCL procedure, which lets users print HFS files and traditional MVS data sets. AOPPRINT is provided by Infoprint Server.

SAP R/3 users can also submit jobs using the SAP R/3 Application Server for z/OS and the Infoprint Server SAP Output Management System (OMS).

2. 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 the following formats: line data, MO:DCA-P (also known as AFP), PostScript, PDF, PCL, SAP, and text. Print Interface automatically detects the data format of the inut data and can validate that the printer accepts that data format.

   Print Interface can convert data to EBCDIC or ASCII, and it can also call transforms provided by Infoprint Server Transforms to convert data from one format to another.
3. Each print request specifies the name of a printer definition for the target printer in the Printer Inventory. Print Interface uses information in the printer definition to determine how to process the data, whether or not to transform the data, and so on.
4. Print Interface 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 JES output writer or functional subsystem application (FSA), such as PSF for OS/390 or IP PrintWay.
   - Advanced Function Presentation (AFP) parameters, such as the name of a form definition and page definition. PSF for OS/390 uses these parameters when printing data on IBM AFP printers.

Some additional functions provided by Print Interface include:

- **Validation of print requests**

  Before accepting 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.
- **Data Transforms**

  Print Interface can transform data if requested in the printer definition in the Printer Inventory:

  – Print Interface can transform line data (for example, in a sequential data set or a partitioned data set) into text data for printing on a printer such as an IBM network printer.

  - Print Interface can transform text data into line data for printing on an IBM AFP printer.
  - Print Interface can use transforms provided by Infoprint Server Transforms to convert data from one format to another.
  - Print Interface can transform data to AFP format remotely on AIX and Windows systems. It can transform PCL, PDF, and PostScript data to AFP format on an AIX that runs Infoprint Manager V2R1 or higher, and on a Windows NT or Windows 2000 system that runs Infoprint Manager for Windows. It can also transform PCL and PostScript data to AFP format on an AIX system that runs PSF for AIX V2R1.

- **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.

- **Status reporting**

  Print Interface can report the status of its data sets that are still on the JES spool. It can report if the data set has been selected for processing, held by the system, retained due to a failed transmission to a LAN printer, or deleted before printing.

- **Identification of printed 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 view 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.

- **Filter support**

  An installation can write a filter program to modify data before Print Interface writes the data to an output data set. A filter can be used to add a separator page or modify data. For example, an installation can write a filter to 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 provided in Print Interface 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 the SAP R/3 Application Server for z/OS” on page 11 describes this support.

  The Print Interface LPD can also print documents received from an SAP R/3 application server running on a non-z/OS system, such as AIX or Windows NT. “Print Interface With an SAP R/3 Application Server Running on a Remote System” on page 12 describes this support.

## Print Interface with the SAP R/3 Application Server for z/OS

Figure 4 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 z/OS, 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 the SAP spool work process runs on the z/OS system.

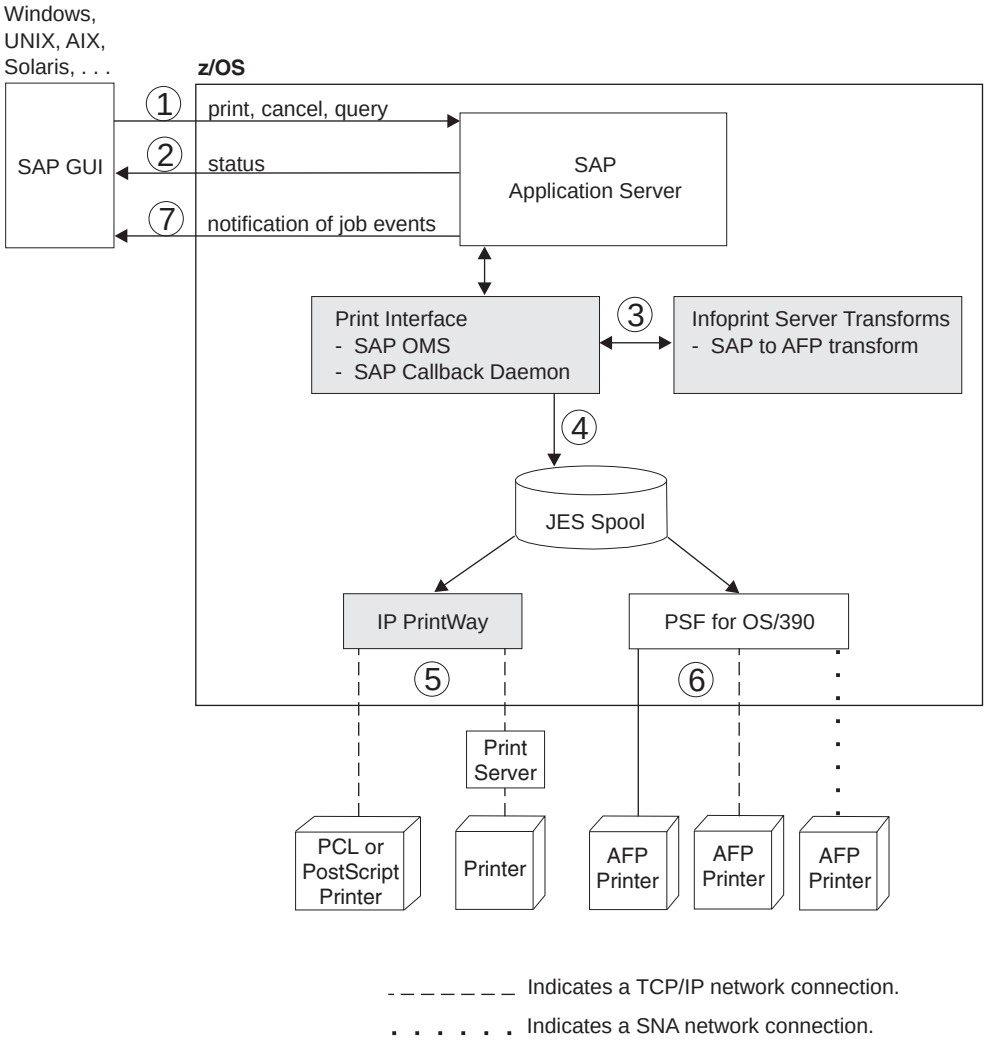


*Figure 4. Printing SAP R/3 Documents with the SAP R/3 Application Server Running on a z/OS System*

1. From an SAP 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 performs 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 Infoprint Server Transforms to transform the data to AFP format. The SAP to AFP transform uses transform options specified in the printer definition. The administrator must configure the printer definition to use transforms and specify transform options.
   - If PCL or PostScript data is to be printed on an IP PrintWay printer, the data is not modified.
4. Print Interface creates an output data set on the JES spool. From the JES spool, IP PrintWay, PSF for OS/390, or JES can print the document.
5. IP PrintWay selects data sets from the JES spool and transmits them to remote printers or print servers.
6. PSF for OS/390 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 Running on a Remote System

Figure 5 on page 13 shows how the Print Interface LPD and an SAP R/3 application server running on a remote system (such as AIX or Windows NT) 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.

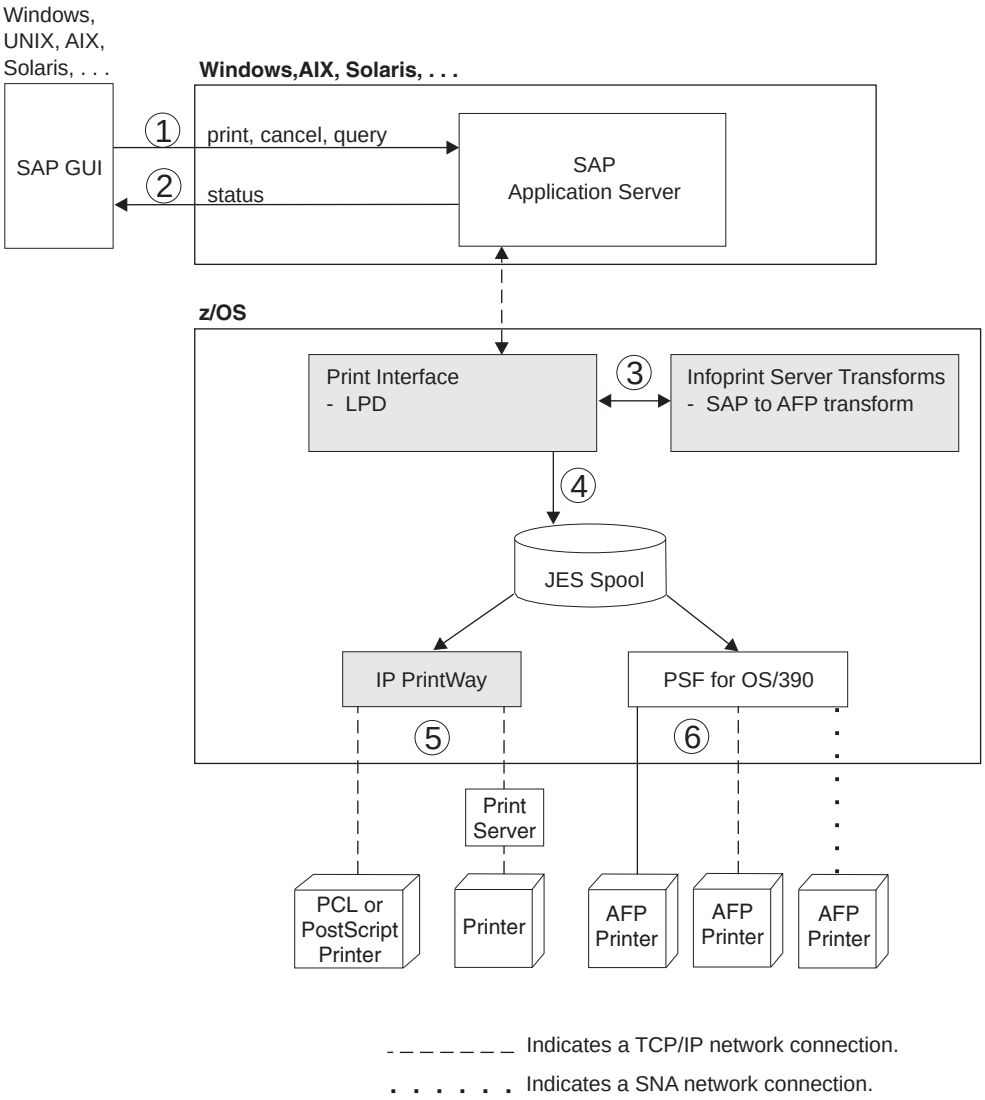


*Figure 5. Printing SAP R/3 Documents with the SAP R/3 Application Server Running on a Non-z/OS System*

1. From an SAP 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 NT, 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 performs 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 Infoprint Server Transforms to transform the data to AFP format. The SAP to AFP transform uses transform options specified in the printer definition. The administrator must configure the printer definition to use transforms and specify transform options.
   - If PCL or PostScript data is to be printed on an IP PrintWay printer, the data is not modified.

4. Print Interface creates an output data set on the JES spool. From the JES spool, IP PrintWay, PSF for OS/390, or JES can print the document.
5. IP PrintWay selects data sets from the JES spool and transmits them to remote printers or print servers.
6. PSF for OS/390 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.

## Infoprint Server Transforms and the Transform Manager

Infoprint Server Transforms is a licensed program product (5697-F51). It provides transforms that convert data from one format to another on the z/OS system. The following transforms are available at no extra cost to Infoprint Server customers:

- Printer Control Language (PCL) 5e to AFP transform
- Portable Data Format (PDF) 1.2 to AFP transform
- PostScript Language Level 3 to AFP transform
- SAP Output Text Format (OTF) versions 1 and 2 to AFP; and SAP Advanced Business Application Programming (ABAP) versions 1 and 2 to AFP transform

Each of the following transforms are priced features of Infoprint Server Transforms:

- AFP to PCL 5, 5e, or 5c (color) transform
- AFP to PDF 1.2 (monochrome or color) transform
- AFP to PostScript Language Level 2 (monochrome or color) transform

Each transform also provides a z/OS UNIX command that lets users transform data in an HFS file or MVS data set without printing it. The z/OS UNIX transform command creates an output file, which can be printed or transmitted to another system for viewing or printing. The z/OS UNIX commands are: **afp2pcl**, **afp2pdf**, **afp2ps**, **pcl2afp**, **ps2afp**, **pdf2afp**, and **sap2afp**.

The Transform Manager, a component of Infoprint Server, controls the transform daemons provided with Infoprint Server Transforms. 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 6 shows how Infoprint Server Transforms and the Transform Manager fit into your system. An explanation of each step follows:

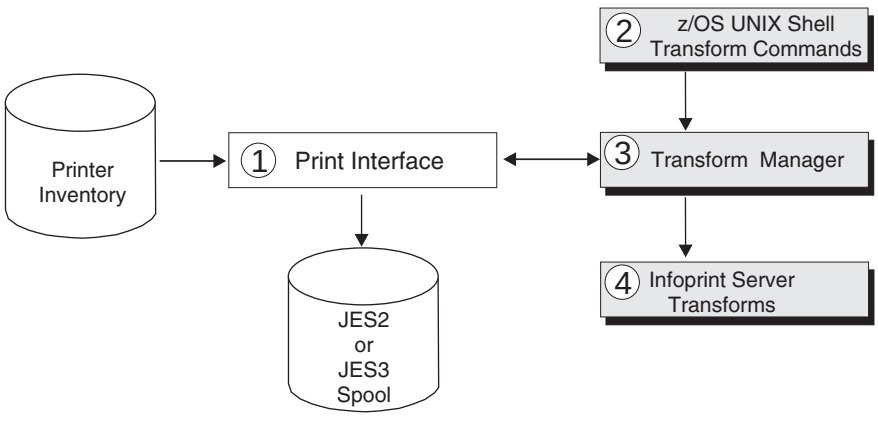


*Figure 6. Transform Manager and Infoprint Server Transforms*

1. Print Interface uses transform filters provided by Infoprint Server Transforms to transform data on the z/OS system. The administrator must configure the printer definitions to use the transform filters because, by default, Print Interface does not transform data. The administrator and users can also specify transform options to control the transforms.
2. The z/OS UNIX transform commands provided with Infoprint Server Transforms let users transform data without printing it.
3. The Transform Manager manages the transform daemons and controls how many transform daemons are active at one time. The Transform Manger does not manage the SAP to AFP transform, because the SAP to AFP transform is not implemented as a daemon.
4. Transforms provided with Infoprint Server Transforms perform the data transform.

Additional features provided by Infoprint Server Transforms are:

- **Kanji AFP Print Feature**

  The Kanji AFP Print feature, free to Infoprint Server customers, 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.

  The PCL to AFP transform does not support printing double-byte character set data streams.

- **Coax Printer Support Feature**

  The Coax Printer Support feature, a priced feature, drives VTAM-controlled coax printers defined to VTAM as LU0, LU1, or LU3 from the IP PrintWay component of Infoprint Server. The supported output data streams are Data Stream Compatibility/Data Stream Extended (DSC/DSE) and SNA Character String (SCS).

## NetSpool

NetSpool intercepts print data from VTAM applications, such as CICS and IMS, converts the data into line data, 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 7 on page 16 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.

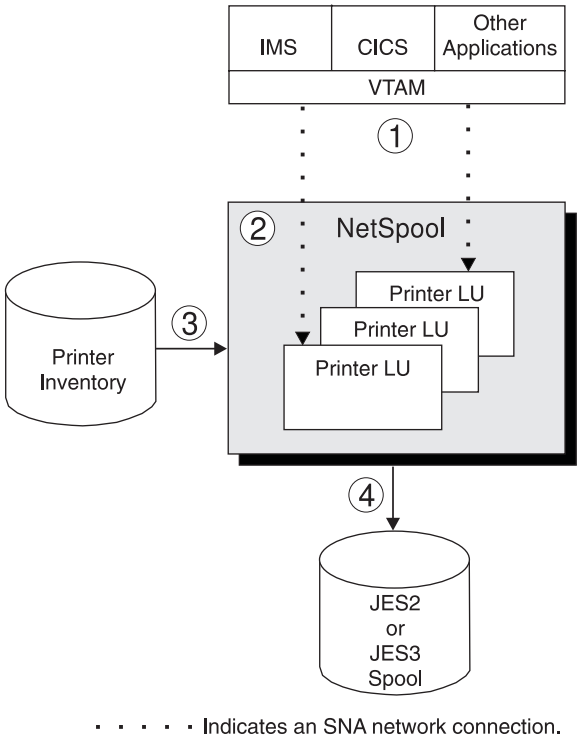


*Figure 7. NetSpool System Diagram*

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 the following 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. Multiple instances of NetSpool can run simultaneously in separate address spaces; each instance of NetSpool can process VTAM print requests sent to different NetSpool printer LUs.
3. Each NetSpool printer LU must be defined in a printer definition in the Printer Inventory. NetSpool converts the data stream into line-data format and groups the data into output data sets using information in the printer definition.
4. 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 JES output writer or functional subsystem application (FSA), such as PSF for OS/390 or IP PrintWay.
   - Advanced Function Presentation (AFP) parameters, such as the name of a form definition and page definition. PSF for OS/390 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

   NetSpool can also broadcast the same data to several different printers.

Additional functions provided by NetSpool are:

- **Operator control**

  The system operator can control NetSpool processing from the system console and from extended MCS consoles by issuing NetSpool commands while NetSpool is running. The operator can start and stop individual printer LUs and display the status of printer LUs. To assist in managing data sets from the console, the names of the output data sets created by NetSpool identify the VTAM application that generated the print request.

- **SCS data stream support**

  NetSpool converts an SCS data stream into variable-length records, each starting with an ASA carriage-control character. Refer to the appendices in *z/OS Infoprint Server Customization* for information about how NetSpool supports SCS code points and commands.

- **Transparent data support for SCS data**

  NetSpool supports the Transparent (TRN) control in SCS data, which identifies the start of a transparent data stream. NetSpool provides two installation exits that let you add transparent data to the beginning of a data set and modify or delete transparent data whenever it occurs in the data stream.

- **3270 data stream support**

  NetSpool converts a 3270 data stream into variable-length print records, each starting with an ASA carriage-control character. Refer to the appendices in *z/OS Infoprint Server Customization* for information about how NetSpool supports code points for the 3270 data stream.

- **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.

## IP PrintWay

IP PrintWay transmits output data sets from the JES spool to remote printers or print servers using one of the following transmission protocols:

- 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 printing: 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 supports printing to any printer that is 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 Compatibile/Data Stream Extended (DSC/DSE). The Coax Printer Support feature of Infoprint Server Transforms is required to print to VTAM-controlled printers.

**Note:** IP PrintWay cannot transmit data sets larger than two gigabytes to a remote LPD. Also, depending on the IP PrintWay options the administrator selects in

the printer definition, IP PrintWay might not be able to transmit data sets larger than two gigabytes to a remote printer that uses the IPP or direct-sockets printing protocol.

Figure 8 shows the steps that occur from the time IP PrintWay selects output data sets from the JES spool until IP PrintWay transmits the data sets to the target printer or print server and deletes the data sets from the JES spool. An explanation of each step follows.

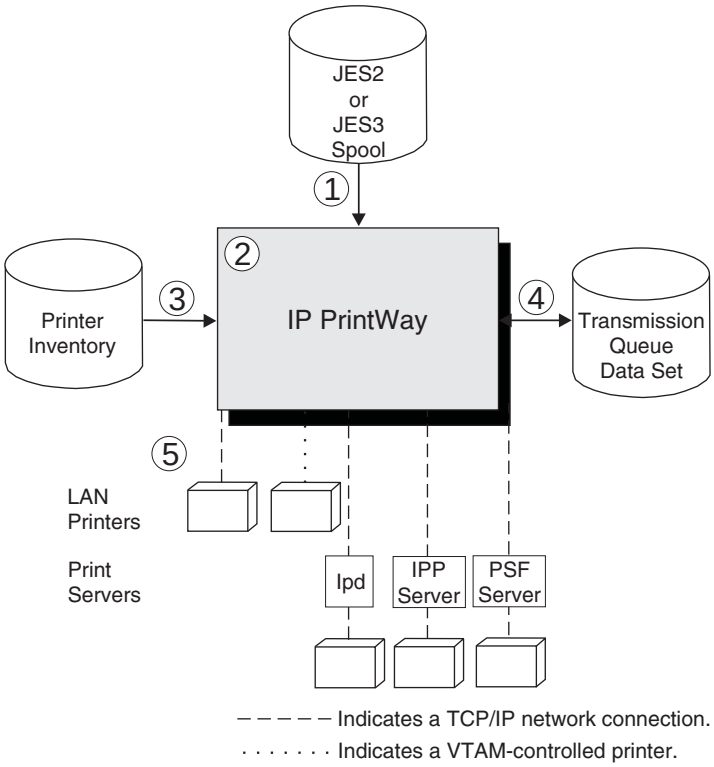


*Figure 8. IP PrintWay System Diagram*

1. IP PrintWay selects output data sets from the JES spool according to the JES work-selection parameters defined for the IP PrintWay FSA. For example, IP PrintWay might select all data sets in JES output class P.

   IP PrintWay can select data sets that were allocated on the JES spool by NetSpool or Print Interface, or submitted from TSO or batch applications. 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 runs as a functional subsystem application (FSA) of JES2 or JES3. Several IP PrintWay FSAs can run in one functional subsystem address space (FSS) to handle a high volume of data; however, one PrintWay FSA can transmit data sets to multiple printers or print servers.
3. IP PrintWay uses information in the printer definition in the Printer Inventory to process data sets, select the transmission protocol (LPR, direct sockets, IPP, or VTAM), and obtain the address of the target printer. IP PrintWay can also use the IP address of a target printer specified directly on the OUTPUT JCL statement.

   IP PrintWay recognizes data sets allocated on the JES spool by Print Interface and does not convert data from EBCDIC to ASCII or format the data; this is because Print Interface has already converted data to ASCII if necessary. For

other data sets, IP PrintWay can convert data from EBCDIC to 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.

IP PrintWay can use transforms provided by Infoprint Server Transforms to convert data from one format to another. IP PrintWay might call Print Interface to perform the data transform. Refer to *z/OS Infoprint Server Operation and Administration* for information about how IP PrintWay calls Print Interface when the printer definition requests data transforms.

4. IP PrintWay maintains a transmission queue to keep track of data sets being processed. This transmission queue contains the status of each transmission, routing information, and so on. Using Infoprint Server ISPF panels, the system operator can monitor the status of transmissions, reroute data sets to another print queue or port, and change the transmission options.
5. IP PrintWay transmits data sets to remote printers or print servers using the protocol selected in the printer definition (LPR, direct sockets, IPP, or VTAM). IP PrintWay can also transmit LPD options and IPP job attributes to the target LPDs and IPP servers. For example, IP PrintWay can transmit information that the LPD prints on a separator page.

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

Additional functions provided by IP PrintWay include:

- **Retaining 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.
- **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 target 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.
- **Accounting**

  For each data set processed, IP PrintWay writes a System Management Facility (SMF) type-6 record, which includes the number of bytes transmitted and the IP address of the target system.
- **Installation exits**

  IP PrintWay supports exits written by an installation to customize IP PrintWay processing. For example, an exit can change the IP address of the remote printer, add separator pages, modify SMF accounting records, and notify users of processing events.
- **Maintaining 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 job contains more than one output data set, IP PrintWay acquires all of the data sets in the job before transmitting any of them

and can transmit the data sets to the remote printer as a single file. Although the data sets are a single file, each data set starts printing on a new page.

- **Transmitting 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, for example, change fonts or switch between simplex and duplex printing.

## SNMP Subagent

The Infoprint Server SNMP subagent, in conjunction with support provided by PSF for OS/390 and the z/OS SNMP agent, lets administrators monitor printer characteristics (such as the printer resolution) and printer status (such as paper jams) for any printer controlled by PSF for OS/390. 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. Refer to the documentation for your printers to determine if they have internal SNMP agents.

Figure 9 on page 21 shows how the SNMP subagent fits into your system. An explanation of each step follows:

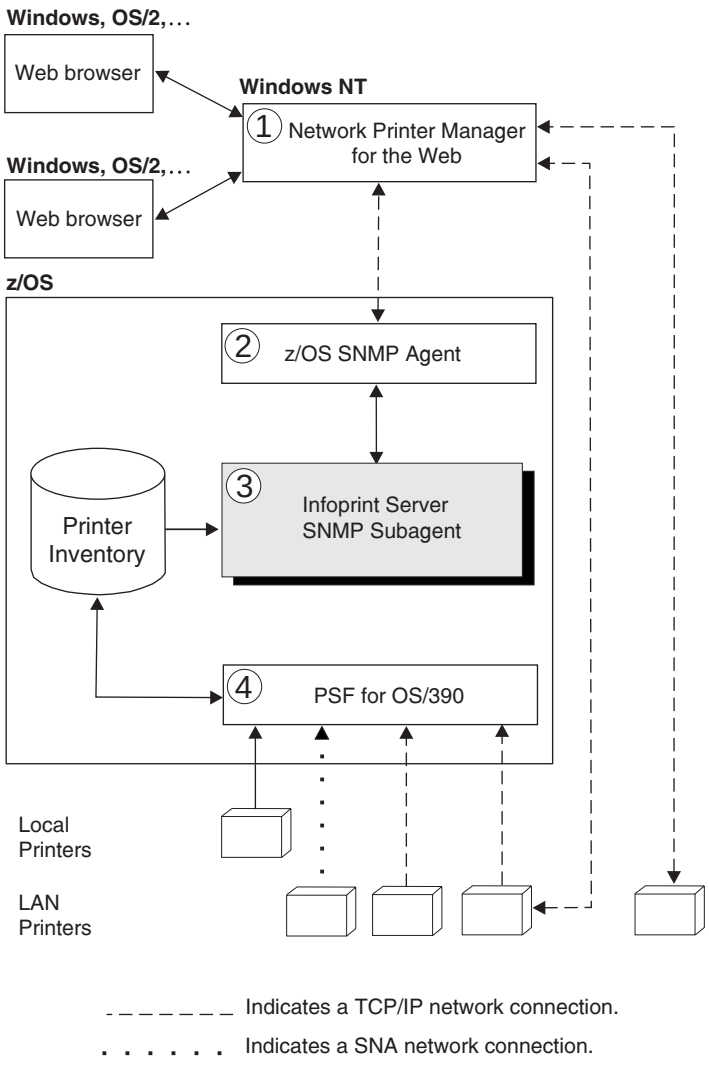


*Figure 9. SNMP Subagent System Diagram*

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 Company 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 NT 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; this printer can be controlled by PSF, but this is not necessary.
2. The SNMP agent, part of the z/OS SecureWay® Communications Server, communicates with the SNMP manager and with the Infoprint Server SNMP subagent.

3. The Infoprint Server SNMP subagent communicates with PSF for OS/390 through the Printer Inventory. PSF for OS/390 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 for OS/390 to the SNMP manager through the z/OS SNMP agent. The SNMP subagent also notifies the SNMP manager immediately when PSF for OS/390 detects a change to printer characteristics or printer status.
4. PSF for OS/390 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 OS/390 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.

# Part 2. Printing from z/OS UNIX System Services

# Chapter 2. Printing from z/OS UNIX System Services Using Infoprint Server Commands

This chapter describes the following commands:



Using these commands, you can print jobs on any printer that your system administrator has defined to Infoprint Server. You can print on local printers that are attached directly to z/OS, or on remote printers in a TCP/IP LAN network.

These 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 printing on Advanced Function Presentation (AFP) 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. These printing commands adhere to the UNIX standards in XPG4.2. You do not need to change your UNIX applications when you port them to z/OS.

## Online Help for Infoprint Server Commands

To get online help about Infoprint Server commands, use the **man** command. You can view man pages in English or Spanish. If the man pages do not appear in the language you desire, specify one of the following paths on the **-M** option of the **man** command. Alternatively, you can add one of the following values to your **MANPATH** environment variable. Add the value ahead of other values in the environment variable.

| | |
|---|---|
| **English** | **/usr/lpp/Printsrv/man/C** or**/usr/lpp/Printsrv/man/En_US** |
| **Spanish** | **/usr/lpp/Printsrv/man/Es_ES** |

## Messages Issued by Infoprint Server Commands

The Infoprint Server commands issue messages to your console. These commands can issue messages in English, Japanese, or Spanish. If the messages do not appear in the language you desire, add one of the following values to your **NLSPATH** environment variable. Add the value ahead of other values in the environment variable.

| | |
|---|---|
| **English** | **/usr/lpp/Printsrv/En_US/%N** |
| **Japanese** | **/usr/lpp/Printsrv/Ja_JP/%N** |
| **Spanish** | **/usr/lpp/Printsrv/Es_ES/%N** |

## Transforming Jobs to AFP Format

While Infoprint Server allows you to submit jobs in many different formats, Advanced Function Presentation (AFP) printers print the AFP data stream. You can submit other data streams to AFP printers because an optional product, Infoprint Server Transforms (5697-F51), converts jobs to AFP format.

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

Usually, you do not have to worry about transforming your jobs. If the Infoprint Server Transforms are installed, Infoprint Server automatically calls the appropriate transform when you send a job to a printer that your system administrator has configured for transformation. You might, however, want to transform a job before printing in these situations:

- You want to verify that the job can be transformed without errors.
- You intend to print a job many times. In this case, it is more efficient to transform the job once and print the output than to transform the job every time you print.

## Transforming Jobs from AFP Format

Three features of Infoprint Server Transforms convert jobs from AFP format into PCL, PDF, and PostScript. This allows you to submit host applications in AFP format to PCL and PostScript printers, and to transform an AFP file to PDF format.

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

Usually, you do not have to worry about transforming your jobs. If the Infoprint Server Transforms are installed, Infoprint Server automatically calls the appropriate transform when you send a job to a printer that your system administrator has configured for transformation. You might, however, want to transform a job before printing in these situations:

- You want to verify that the job can be transformed without errors.
- You intend to print a job many times. In this case, it is more efficient to transform the job once and print the output than to transform the job every time you print.
- You want to present your document on the Worldwide Web.

## How Do You...

This section is a guide to 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.

## Send a Job to Print?

To send one or more files to print, use the **lp** command. For example, to print three copies of `myfile1` and `myfile2` on `Printer2`, enter:

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

For more information, see “lp—Send a Job to a Printer” on page 51.

## Print a Job with Special Requirements?

Infoprint Server uses *attributes* to describe jobs. 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

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

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

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

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

For a list of job attributes and a description of the use and values of each one, see “Attribute Listing” on page 81. For information about attributes files, see “Attributes Files” on page 80. For information about the **-o** option of the **lp** command, see “lp—Send a Job to a Printer” on page 51.

## Find Out Where the Printers Are?

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

```
lpstat -a
```

For more information, see “lpstat—Show Printer Names and Locations and Status of Print Jobs” on page 58.

## Find Out if a Job Is Printing?

You can also use the **lpstat** command to display the status of a job. For example, you submitted several jobs 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 sent a job 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 58.

## Cancel a Job?

Use the **cancel** command to cancel a job. 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 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 49.

## Transform a Job to AFP Format?

Infoprint Server automatically transforms jobs in other formats to the Advanced Function Presentation (AFP) data stream when you submit them to a printer that the print administrator has configured to do so. You can also use the **pcl2afp**, **pdf2afp**, **ps2afp**, and **sap2afp** commands to transform jobs in the following formats without printing them:

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

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 5.5i -w 4i myfile.ps
```

To submit the PCL file `sample.pcl` to the printer named `Printer1` and transform it automatically, enter:

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

**Note:** This example assumes that your administrator has configured the `printer1` printer definition in the Infoprint Server Printer Inventory to use the PostScript to AFP or PCL to AFP transform.

For more information, see the following topics:

- “pcl2afp—Transform PCL Data to AFP Data” on page 62
- “pdf2afp and ps2afp—Transform PDF or PostScript Data to AFP Data” on page 66
- “sap2afp—Transform SAP OTF or ABAP Data to AFP Data” on page 75

## Transform a Job from AFP Format?

Your system administrator can set up your printers so that if you submit a job in AFP format to a printer that does not support AFP but supports PCL, PDF, or PostScript, Infoprint Server can automatically transform the AFP job to the appropriate format. You can also use the **afp2pcl**, **afp2pdf**, and **afp2ps** commands to transform AFP jobs into the following formats without printing them:

- Printer Control Language (PCL)
- Portable Document Format (PDF)
- PostScript

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
```

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
```

**Note:** This example assumes that your administrator has configured the `printer1` printer definition in the Infoprint Server Printer Inventory to use the AFP to PostScript or AFP to PCL transform.

For more information, see the following topics:

- “afp2pcl—Transform AFP or Line Data to PCL Data” on page 30
- “afp2pdf—Transform AFP or Line Data to PDF Data” on page 36
- “afp2ps—Transform AFP or Line Data to PostScript Data” on page 43

# afp2pcl—Transform AFP or Line 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) or line data file into a Printer Control Language (PCL) 5e or 5c (color) data stream file. This command is part of the Infoprint Server Transforms product.

## Options

**Note:** 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 PCL to AFP transform.

**-c** *transformclass*

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

- The characteristics of the output printer device, such as whether it supports color
- The size of paper in each input tray, which affects how much data is printed on each page
- 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 system 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. Refer to *z/OS Infoprint Server Messages and Diagnosis* for information about this option.

**-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 a code page provided by IBM and supported by the iconv utility; refer to *z/OS C/C++ Programming Guide* for valid code page names. To find the PSF code page ID for each character set, refer to *IBM AFP Fonts: Font Summary for AFP Font Collection*. The PSF code page ID and the names of the code pages provided by IBM are different. Be careful to specify the IBM code page value. For example, if you specify one of the following coded fonts in the **chars** job attribute, specify `-i IBM-500`:

| Coded Font | PSF Code Page ID | IBM Code Page |
|---|---|---|
| 40D0, 40F0, 40E0, 4100 | T1V10500 | IBM-500 |
| 60D9 (default font) | T1V10500 | IBM-500 |

**Note:** When you specify this option, also ensure 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 **$**, **&**, **(**, **)**, **>**, **<**, **|**, **'**, **"**, and so on, 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, refer to *z/OS UNIX System Services User's Guide*.

- If both value and option require quotation marks, do either of these things:
  - 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 the following attributes to describe the job and all the files in it:

| | | |
|---|---|---|
| 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 |

See “Attribute Listing” on page 81 for more information about the attributes.

**-o** *outputfile*
Specifies the output path and file into which the transformed PCL files are to be written. If you do not specify an output file, the result is written to standard output.

To specify a z/OS 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"`.

**-T** *traceoptions*
Specifies the trace options. This should only be used as instructed by service personnel. Refer to *z/OS Infoprint Server Messages and Diagnosis* for information about this option.

## 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 the file name as **-**, **afp2pcl** uses standard input.

To specify a z/OS 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 system administrator sets up this file.
- If you specify multiple values of the same option, except for **-j**, **afp2pcl** uses the last value that you specified.
- All AFP resources are transformed into PCL and are included in the output data stream. This guarantees resource availability.
- IBM recommends that you print transform output on printers that support PCL 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 HFS files with ANSI or no carriage control characters, **document-format=line** must be specified. 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 system 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 system 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.
- Any library that the transform needs to access must have universal read access.

## Supported MO:DCA-P Objects, AFP Resources, and Line Data Controls

The following list describes what the AFP to PCL transform supports.

**MO:DCA-P obects**:

- BCOCA: Bar codes
- FOCA:
  - SBCS: 300-pel raster fonts, fixed and relative metrics. AFP outline fonts are mapped to equivalent raster fonts.
  - DBCS: 300-pel raster fonts, fixed 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 JPEG, JFIF and TIFF image objects
- PTOCA1, PTOCA2

**AFP resources**

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

**Line data controls**

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

## Limitations

- The AFP transform for PCL does not support outline fonts. If outline fonts are included in the input data stream, they can be mapped to the equivalent AFP raster fonts. The font mapping uses a mapping table designed for the single-byte

fonts in IBM AFP Font Collection (Program Number 5648–B33). Refer to *z/OS Infoprint Server Customization* for information about font mapping.

- Output is generated using a resolution of 300 dpi. If the input includes resources (for example, fonts) which are not 300 pel, then the resulting output will be degraded.
- Printers that support PCL5 and compatible data streams can be used for printing; however; GOCA (graphic) printing is not supported by PCL 5.
- Enhanced N_UP printing is not supported. Documents that request Enhanced N_UP processing are processed as N_UP.
- The transform does not support internal copy groups.

## Examples

### Transform an AFP Job, 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™ AFP Job, Specifying a Form Definition

To transform the MVS data set `AFP(MYFILE)` into a PCL file, using the form definition `f1cp0110`, and write a file called `myfile.pcl`, enter the following command:

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

### Transform an AFP Job, 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 the following command on one line:

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

### Transform and print an AFP Job, Specifying a Form Definition and a Resource Library

To transform the AFP file `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 the following command on one line:

```
afp2pcl -j "form-def=f1cp0110 res-lib={lib1.pseglib lib3.privatelib}"
"//'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 only use redirection operators with HFS 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 an HFS File to an MVS Dataset

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

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

### Transform an MVS Dataset, Writing the Output to an HFS File

To transform the line data file `HLQ.INPUT.LINE(MYDOC)` into a PCL output file called `output.pcl` enter:

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

### Transform a Line Data Job, Specifying a Form Definition and a Page Definition

To transform the line data file `myfile.line` containing 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 the following 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 a line data Job, 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 the following command:

```
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 the following 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, refer to *z/OS Infoprint Server Customization*.

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

For information about setting and using environment variables, refer to *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.

Refer to *z/OS Infoprint Server Customization* for the format of the configuration file.

## Exit Values

**0** The data were transformed successfully.

**>0** An error occurred.

# afp2pdf—Transform AFP or Line 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) or line data file into an Adobe Portable Document Format (PDF) 1.2 data stream file. This command is part of the Infoprint Server Transforms product.

## Options

**Note:** 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 AFP to PDF transform.

**-c** *transformclass*

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

- The characteristics of the output printer device, such as whether it supports color
- The size of paper in each input tray, which affects how much data is printed on each page
- 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 system 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. Refer to *z/OS Infoprint Server Messages and Diagnosis* for information about this option.

**-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. When 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 a code page provided by IBM and supported by the iconv utility; refer to *z/OS C/C++ Programming Guide* for valid code page names. To find the PSF code page ID for each character set, refer to *IBM AFP Fonts: Font Summary for AFP Font Collection*. The PSF code page ID and the names of the code pages provided by IBM are different. Be careful to specify the IBM code page value. For example, if you specify one of the following coded fonts in the **chars** job attribute, specify: `-i IBM-500`

| Coded Font | PSF Code Page ID | IBM Code Page |
|---|---|---|
| 40D0, 40F0, 40E0, 4100 | T1V10500 | IBM-500 |
| 60D9 (default font) | T1V10500 | IBM-500 |

**Note:** When you specify this option, also ensure 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 **$**, **&**, **(**, **)**, **>**, **<**, **|**, **'**, **"**, and so on, 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, refer to *z/OS UNIX System Services User's Guide*.

- If both value and option require quotation marks, do either of these things:
  - 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 the following attributes to describe the job and all the files in it:

| | | |
|---|---|---|
| carriage-control-type | chars | document-codepage |
| document-format | duplex | form-definition |
| input-tray-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 | |

See “Attribute Listing” on page 81 for more information about the attributes.

**-o** *outputfile*
Specifies the output path and file into which the transformed PDF files are to be written. If you do not specify an output file, the result is written to standard output.

To specify a z/OS 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"`.

**-T** *traceoptions*
Specifies the trace options. This should only be used as instructed by service personnel. Refer to *z/OS Infoprint Server Messages and Diagnosis* for information about this option.

## 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 the file name as **-**, **afp2pdf** uses standard input.

To specify a z/OS 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 and color, are defined in the configuration file **aopxfd.conf**. Your system administrator sets up this file.
- If you specify multiple values of the same option, except for **-j**, **afp2pdf** 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 within 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.
- By default, all AFP resources are transformed into PDF and are included in the output data stream. 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 signifcantly reduce the size of the output PDF file.

- When transforming line data in HFS files with ANSI or no carriage control characters, **document-format=line** must be specified. If the data has ANSI control characters, you must also specify **carriage-control-type=ansi**.
- The IBM Document Composition Facility (DCF) program, by default, produces AFP documents that contain BookMaster fonts. 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 the following 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.
- Any library that the transform needs to access must have universal read access.
- You can use Adobe Acrobat Reader 3.0 or later to view and print the PDF output. The following 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 the Acrobat Reader Print Dialog box. To solve this problem, deselect the Fit To Page option. The Fit To Page option is selected by 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 PDF 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. In order to correct this problem, in the Reader click **File**and select **Preferences**. On the **General** page, ensure 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 MO:DCA-P Objects, AFP Resources, and Line Data Controls

The following lists describe what the AFP to PDF transform supports.

**MO:DCA-P obects**:

- BCOCA: Bar codes
- FOCA:
  - SBCS: 300-pel raster fonts, fixed and relative metrics. AFP outline fonts are supported.
  - DBCS: 300-pel raster fonts, fixed 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 JPEG, JFIF and TIFF image objects
- PTOCA1, PTOCA2

**AFP resources**

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

**Line data controls**

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

## Limitations

- Enhanced N_UP printing is not supported. Documents that request Enhanced N_UP processing are processed as N_UP.
- DBCS outline fonts are not supported
- The AFP to PDF transform formats all output for the size of the paper in the first input tray selected.
- Limitations of searching with Adobe Acrobat Reader:
  - Text that has been generated using AFP GOCA output graphic characters cannot be found.
  - In order to preserve the output fidelity of a document, corresponding placement of characters is performed in the PDF output document, which can result in additional ″space″ characters within 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.

– The transform does not support internal copy groups.

## Examples

### Transform an AFP Job, 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 AFP Job, Specifying a Form Definition

To transform the MVS AFP file `AFP(MYFILE)` into a PDF file, using the form definition `f1c10110`, and write a file called `myfile.pdf`, enter the following command:

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

### Transform an AFP Job, 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 the following command on one line:

```
afp2pdf -j "form-def=f1c10110 res-lib={lib1.pseglib lib3.privatelib}"
        -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 only use redirection operators with HFS files.

### Transform an HFS File to an MVS Dataset

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

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

### Transform an MVS Dataset, Writing the Output to an HFS File

To transform the line data file `HLQ.INPUT.LINE(MYDOC)` into a PDF output file called `output.pdf` enter:

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

### Transform a line data Job, Specifying a Form Definition and a Page Definition

To transform the line data file `myfile.line` containing 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 the following 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 a line data Job, 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 `p1p06362`, and write a file called `myfile.pdf`, enter the following 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 a line data Job, 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 the following command:

```
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 the following 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, refer to *z/OS Infoprint Server Customization*.

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

For information about setting and using environment variables, refer to *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.

Refer to *z/OS Infoprint Server Customization* for the format of the configuration files.

## Exit Values

**0** The data were transformed successfully.

**>0** An error occurred.

# afp2ps—Transform AFP or Line 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) or line data file into a PostScript level 2 data stream file. This command is part of the Infoprint Server Transforms product.

## Options

**Note:** 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 AFP to PostScript transform.

**-c** *transformclass*

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

- The characteristics of the output printer device, such as whether it supports color
- The size of paper in each input tray, which affects how much data is printed on each page
- 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 system 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. Refer to *z/OS Infoprint Server Messages and Diagnosis* for information about this option.

**-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. When 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 a code page provided by IBM and supported by the iconv utility; refer to *z/OS C/C++ Programming Guide* for valid code page names. To find the PSF code page ID for each character set, refer to *IBM AFP Fonts: Font Summary for AFP Font Collection*. The PSF code page ID and the names of the code pages provided by IBM are different. Be careful to specify the IBM code page value. For example, if you specify one of the following coded fonts in the **chars** job attribute, specify `-i IBM-500`:

| Coded Fonts | PSF Code Page ID | IBM Code Page |
|---|---|---|
| 40D0, 40F0, 40E0, 4100 | T1V10500 | IBM-500 |
| 60D9 (default font) | T1V10500 | IBM-500 |

**Note:** When you specify this option, also ensure 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 **$**, **&**, **(**, **)**, **>**, **<**, |, ', ", and so on, 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, refer to *z/OS UNIX System Services User's Guide*.

- If both value and option require quotation marks, do either of these things:
  - 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 the following attributes to describe the job and all the files in it:

| | | |
|---|---|---|
| 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 |

See “Attribute Listing” on page 81 for more information about the attributes.

**-o** *outputfile*
Specifies the output path and file into which the transformed PostScript files are to be written. If you do not specify an output file, the result is written to standard output.

To specify a z/OS 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"`.

**-T** *traceoptions*
Specifies the trace options. This should only be used as instructed by service personnel. Refer to *z/OS Infoprint Server Messages and Diagnosis* for information about this option.

## 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 the file name as **-**, **afp2ps** uses standard input.

To specify a z/OS 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 IDs, and color, are defined in the configuration file **aopxfd.conf**. Your system administrator sets up this file.
- If you specify multiple values of the same option, except for **-j**, **afp2ps** uses the last value that you specified.
- The AFP transform for PostScript converts the document formatting options to corresponding PostScript commands (e.g. paper size, input tray, duplexing). The interpretation of these commands is dependent 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 HFS files with ANSI or no carriage control characters, **document-format=line** must be specified. 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 system 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 system 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.
- Any library that the transform needs to access must be defined to RACF with universal read access.

## Supported MO:DCA-P Objects, AFP Resources, and Line Data Controls

The following lists describe what the AFP to PostScript transform supports.

**MO:DCA-P obects**:

- BCOCA: Bar codes
- FOCA:
  - SBCS: 300-pel raster fonts, fixed and relative metrics. AFP outline fonts are supported.
  - DBCS: 300-pel raster fonts, fixed 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 JPEG, JFIF and TIFF image objects
- PTOCA1, PTOCA2

**AFP resources**

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

**Line data controls**

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

## Limitations

- Enhanced N_UP printing is not supported. Documents that request Enhanced N_UP processing is processed as N_UP.
- The transform does not support internal copy groups.

## Examples

### Transform an AFP Job, 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 AFP Job, Specifying a Form Definition

To transform the MVS AFP file `AFP(MYFILE)` into a PostScript file, using the form definition `f1cp0110`, and write a file called `myfile.ps`, enter the following command:

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

### Transform an AFP Job, 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 the following command on one line:

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

### Transform and print an AFP Job, Specifying a Form Definition and a Resource Library

To transform the AFP file `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 the following command on one line:

```
afp2ps -j "form-def=f1cp0110 res-lib={lib1.pseglib lib3.privatelib}"
"//'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 only use redirection operators with HFS 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 an HFS File to an MVS Dataset

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

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

### Transform an MVS Dataset, Writing the Output to an HFS File

To transform the line data file `HLQ.INPUT.LINE(MYDOC)` into a PostScript output file called `output.ps` enter:

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

### Transform a Line Data Job, Specifying a Form Definition and a Page Definition

To transform the line data file `myfile.line` containing 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 the following 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 a Line Data Job, 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 the following command:

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

### Transform a Line Data Job, 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 the following command:

```
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 the following 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, refer to *z/OS Infoprint Server Customization*.

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

For information about setting and using environment variables, refer to *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.

Refer to *z/OS Infoprint Server Customization* for the format of the configuration files.

## Exit Values

**0** The data were transformed successfully.

**>0** An error occurred.

# 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 may not be able to cancel a job that is held on the Job Entry Subsystem (JES) spool.

## Operand

*jobid* **...**
: The job ID of the print job you want to cancel. By default, the **lp** command returns the job ID when a job is accepted for printing. You can also determine the job ID by using the **lpstat** command to query all the jobs that you submitted.

## Examples

### 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 job ID. Enter:

```
lpstat
```

**lpstat** returns information about all your jobs, including the 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 the following 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, refer to *z/OS Infoprint Server Customization*.

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

For information about setting and using environment variables, refer to *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—Send a Job to a Printer

## Format

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

## Description

The **lp** command sends a job containing one or more files to a printer. If you do not specify any files on the command line, or if you specify a filename of **-**, **lp** prints from standard input.

The files can be:

- z/OS data sets, such as partitioned data sets or sequential data sets
- Hierarchical file system (HFS) files
- Lists of printable files

If the Infoprint Server Transforms are installed, you can automatically transform jobs to and from the Advanced Function Presentation (AFP) data stream.

## Options

**-c** Makes a copy of the file and prints that copy. Copying files allows you to 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. Contact your system administrator for the names of available printers.

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 system administrator can also define a default printer. If you do not specify a printer and there is no default, the **lp** command issues 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. You may receive notification before the file has finished printing, or even though a transmission error may have occurred.

  If your administrator has requested that Infoprint Server retain files on the system spool after transmission, you receive notification after the retain time expires.
- The operator has deleted the file.

**Note:** Notification may be delayed to improve system performance.

**-n** *copies*
Prints the specified number of copies of each file. The default is one copy.

**Note:** The line printer daemons (LPDs) for some IP PrintWay printers do not support printing more than one copy of the same file. In this case, only one copy prints.

**-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 may be interpreted by the shell, such as **$**, **&**, **(**, **)**, **>**, **<**, **|**, **'**, **" #**, and so on, 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, refer to *z/OS UNIX System Services User's Guide*.

- If both value and option require quotation marks, do either of these things:
  - 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'"
```

See "Attribute Listing" on page 81 for a list of the attributes you can specify to describe the job and all the files in it.

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. See "Creating an Attributes File" on page 80 for how to create an attributes file and "Specify Attributes Files for a Job" on page 55 for an example of specifying one.

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. See "Specify the AOPOPTIONS Environment Variable" on page 55 for an example of using the **AOPOPTIONS** environment variable.

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 job for printing. This message contains the job identifier. You must know the job ID to query or cancel the job.

**-t** *title* Prints the title on the separator page, a page that may be printed before or after the file. You can specify a title of up to 60 characters. If the title contains spaces or characters that the shell may interpret, enclose it in single or double quotation marks.

**Note:** Whether the title is printed depends on how the system administrator has configured the separator page.

**-w** Writes a message to the terminal 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. You may receive notification before the file has finished printing, or even though a transmission error may have occurred.

  If your administrator has requested that Infoprint Server retain files on the system spool after transmission, you receive notification after the retain time expires.
- The operator has deleted the file.

**Note:** Notification may be delayed to improve system performance.

## Operand

*filename*

The path name of each file that you want to print. To print from standard input (keyboard data or the output from another command), omit the file name or specify **-** as the file name. To print a z/OS data set, specify **//** before the file name.

## Examples

### Print a File on the Default Printer

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

```
lp File1
```

### Print a File on a Specified Printer

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

```
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 system administrator has not defined this printer. You must specify:

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

Enter the command:

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

### Print a z/OS Data Set

To submit the z/OS data set `USERID.FILE1.LISTPS` to your default printer, enter the command:

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

To submit the z/OS data set `FILE2.LISTPS` to your default printer, enter the command:

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

### Print a Multi-Document Job

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

```
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 the command:

```
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, you can submit a job in a format different from the ones the printer accepts. Infoprint Server Transforms will transform the data to a format the printer accepts. For data to be transformed, your administrator must configure the printer definition to use transforms. For more information about the Infoprint Server Transforms product, see "Transform a Job to AFP Format?" on page 28 and "Transform a Job from AFP Format?" on page 28.

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

```
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 the command:

```
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 the command:

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

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

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

### Print Multiple Copies of Each Document in a Job

To submit a job to the default printer and to specify two copies of each file in the job, enter one of these commands:

```
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.

**Note:** The line printer daemons (LPDs) for some IP PrintWay printers do not support printing more than one copy of the same file. In this case, only one copy prints.

### Print a Job on Both Sides of the Paper

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

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

### Specify Attributes Files for a Job

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

```
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.

**Note:** 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 submit the file `File1` to the default printer and override the value of **yes** for the **duplex** attribute specified in the `default.att` attributes file, enter the command:

```
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 the following 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 issue includes this values. For example, the following 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 submit the file `File1` to the default printer and to receive a message when the file is printed, enter the command:

```
lp -w File1
```

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

### Submit and Hold a Job

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

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

### Specify a Code Page for ASCII Jobs

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

```
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 system 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 87.

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 the command:

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

## Environment Variables

The **lp** command uses the following 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, refer to *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.

**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 catalogues.

For information about setting and using environment variables, refer to *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.
- 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 XPG4.2 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 the names and locations of printers or the status of print jobs to standard output.

For printers defined in the Infoprint Server Printer Inventory, the **lpstat** command returns the following information:

- The name of the printer
- The number of jobs submitted to the printer using Infoprint Server
- The location of the printer
- A description of the printer

For jobs that were submitted through the Print Interface component of Infoprint Server, the **lpstat** command returns the following information:

- The job ID
- The user ID of the person who submitted the job
- The state of each file in the job:

  **pending** The file is waiting to print.

  **Note:** Because JES3 cannot distinguish job states, in a JES3 environment **lpstat** may 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 may be:
  - Being transmitted to a local area network (LAN) printer or to a print server
  - Printing

  **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.

    **Note:** JES3 does not recognize a job that is held for this reason and returns **pending**.
  - The operator held the job.

  **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 system 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 or to a print server has failed. Your system 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.

**purged** The file was deleted before printing.

- The data format of the job, as specified by the **document-format** job attribute or as determined by Infoprint Server
- The number of bytes in each file in the job
- The name of each file or file-reference document in the job

When **lpstat** returns information about multiple jobs, the order is not significant. The first job listed may 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.

**-d** Displays the name and location of the default printer that the system administrator has defined. If there is no default printer, **lpstat** returns an error message.

**Note:** 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 **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 the Print Interface component of Infoprint Server.

**-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.

**-t** Displays information about all printers defined in the Printer Inventory and all jobs submitted to them through the Print Interface component of 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.

## Operand

*jobid* **...**

Identifies the job you want to display information about. By default, the **lp** command returns the job ID when a job is accepted for printing.

## Examples

### Display the Names and Locations of All Printers

To display the names and locations of all printers known to the Print Interface, 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 job IDs are `14` and `16`, enter:

```
lpstat 14 16
```

### Display Information about All Jobs that You Submitted to Any Printer

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

```
lpstat
```

### Display Information about All Jobs that a User Submitted to Any Printer

To display the status of all the jobs that user `MARTHA` submitted to any printer, 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 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 the following 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, refer to *z/OS Infoprint Server Customization*.

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

For information about setting and using environment variables, refer to *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.

# pcl2afp—Transform PCL Data to AFP Data

## Format

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

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

## Description

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

If you specify multiple values of the same option, **pcl2afp** uses the last value that you specified, with the exception of the **-p** option. Up to 20 values of the **-p** option accumulate.

When using the **pcl2afp** command, you can specify one or more input files to be transformed. If you do not specify an input file name, or if you specify **-** 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

**Note:** You can use the **filter-options** job attribute with the **lp** command to pass any of these options except **-o** *outputfile* to the AFP to PCL transform.

**-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.

**Notes:**

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 system administrator has defined. The transform class determines the following 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 system administrator for the name of a transform class suitable for the printer and the type of job.

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

**-o** *outputfile*
Specifies the output path and file into which the transformed PCL files are to be written. 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.

You cannot use **-o** *outputfile* on the command line with the **lp** command. You can only use **-o** *outputfile* with the **pcl2afp** command.

**-p** *pagerange*
Specifies that the output should contain only selected pages. Up to 20 values of the **-p** option accumulate.

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.

**-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.

**Note:** When generating overlays or page segments from multiple-page documents, you might want to use the **-p** option to select pages. Otherwise, one overlay or page segment is created for each page of the input file.

## 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.

In addition, you can specify PCL inline resource files as input files to the **pcl2afp** command. The file name of the inline resource file must precede the file name of the PCL printable file so that **pcl2afp** concatenates the files in the correct order.

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

## Limitations

- 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 a form definition resource, the **pcl2afp** 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 the print command when you print the job.
- Resolution conversion algorithms may produce a degraded appearance when used to reduce the resolution of a data stream. For this reason, **pcl2afp** may degrade the appearance of higher-resolution data streams when used with 240-pel printers. You should verify that print fidelity is satisfactory.
- There are subtle differences between PCL4 and PCL5e when it comes to handling fonts. While many PCL4 files work with **pcl2afp**, some may not produce the expected output.

## Examples

### Transform a Job, 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 Job, 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 Job 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 only use redirection operators with HFS 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 an HFS File to an MVS Dataset

To transform the HFS PCL file `input.pcl` into an MVS AFP output file called `HLQ.OUTPUT.AFP(member)` enter:

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

### Transform an MVS Dataset, Writing the Output to an HFS File

To transform the PCL file `HLQ.INPUT.PCL(member)` into an AFP output file called `output.afp` enter:

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

## Environment Variables

The **pcl2afp** command uses the following 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, refer to *z/OS Infoprint Server Customization*.

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

For information about setting and using environment variables, refer to *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.

Refer to *z/OS Infoprint Server Customization* for the format of the configuration files.

## Exit Values

**0** The data were transformed successfully.

**>0** An error occurred.

# 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 stream file into an Advanced Function Presentation (AFP) data stream file. These commands are part of the Infoprint Server Transforms product.

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 multiple values of the same option, **ps2afp** uses the last value, with the exception of the **-g** and **-p** options. Up to 20 values of the **-p** option, or any number of values of the **-g** option, accumulate.

When using the **ps2afp** or **pdf2afp** command, you can specify one or more input files to be transformed. If you do not specify an input file name, or if you specify **-** as the file name, **ps2afp** reads 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

**Note:** 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 PostScript or PDF to AFP transform.

**-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.

**Notes:**

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 supported by these printers. 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 system administrator has defined. The transform class determines the following options:

- The initial transform configuration
- The fonts used in the transformed files

Ask your system 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. Any number of values of the **-g** option accumulate. 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`.

**Note:** 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 prepended to 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. See “Usage Notes” on page 72 for more information about this option. Specify a number followed by one of the following 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:

| | |
|---|---|
| **11i** | 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
```

**Note:** 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 transformed files are to be written. 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.

You cannot use **-o** *outputfile* on the command line with the **lp** command. You can only use **-o** *outputfile* with the **pdf2afp** command or the **ps2afp** command.

**-p** *pagerange*

Specifies that the output should contain only selected pages. Up to 20 values of the **-p** options accumulate.

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 Hewlett-Packard printers)

**480** 480 pels per inch

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

**Note:** 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.

**Note:** When generating overlays or page segments from multiple-page documents, you might want to use the **-g** or **-p** option to select pages. Otherwise, one overlay or page segment is created for each page of the input file.

**-w** *width*

Specifies the maximum width of the generated image. In general, specify the width of the physical page. See “Usage Notes” on page 72 for more information about this option. Specify a number followed by one of the following 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 |
| **0.0534n** 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
```

**Note:** 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. See “Usage Notes” on page 72 for more information about this option. Specify a number followed by one of the following 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

**Notes:**

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, then 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 clipped if it is defined to print in the left or right margin.

**-y** *margin*
Specifies a vertical margin or border around the generated image to avoid the non-printable areas of some printers. See "Usage Notes" on page 72 for more information about this option. Specify a number followed by one of the following 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

**Notes:**

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, then 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 clipped if it is defined to print in the top or bottom margin.

## 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.

In addition, you can specify PostScript inline resource files as input files to the **ps2afp** command. The file name of the inline resource file must precede the file name of the PostScript or PDF print file so that **ps2afp** concatenates the files in the correct order.

If you do not specify an input file, or if you specify a file name of **-**, **ps2afp** uses standard input.

## Usage Notes

- The PostScript or PDF file may contain the commands **letter** and **legal**. If these commands are present in the PostScript or PDF file, the size of the transformed image may not be what you expect. The **letter** and **legal** commands override the length and width values specified for the transform.
- If the **letter** and **legal** commands are not used, 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. In general, to position data on the page:
  - Use **-l** and **-w** to set the physical page dimensions.
  - 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.
- Use **-x** and **-y** to avoid any areas that your printer cannot print. These options do not shift the image on the page. If the image is defined to print in the unprintable areas, it is clipped.

## Limitations

- 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 **ps2afp** 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 may produce a degraded appearance when used to reduce the resolution of images imbedded in a data stream. For this reason, **ps2afp** may degrade the appearance of higher-resolution images when used with 240-pel printers. You should verify that print fidelity is satisfactory.

## Examples

### Transform a Job, 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 Job, 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
```

**Note:** 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 Job, 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 a Job, 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 HFS 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 an HFS File to an MVS Dataset

To transform the HFS file `input.ps` into an MVS AFP output file called `HLQ.OUTPUT.AFP(member)` enter:

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

### Transform and Print a Job, 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 and Print a Job, 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 an MVS Dataset, Writing the Output to an HFS File

To transform the PDF file `HLQ.INPUT.PDF(member)` into an AFP output file called `output.afp` enter:

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

## Environment Variables

The **pdf2afp** and **ps2afp** commands use the following 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, refer to *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, refer to *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.

Refer to *z/OS Infoprint Server Customization* for the format of the configuration files.

## Exit Values

**0** The data were transformed successfully.

**>0** An error occurred.

# sap2afp—Transform SAP OTF or ABAP Data to AFP Data

## Format

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

[*inputfile ...*]

## Description

The **sap2afp** command transforms an SAP Output Text Format (OTF) or SAP Advanced Business Application Programming (ABAP) Version 1 or Version 2 data stream file into an Advanced Function Presentation (AFP) Presentation Text Object Content Architecture (PTOCA) data stream file. This command is part of the Infoprint Server Transforms product.

If you specify multiple values of the same option, **sap2afp** uses the last value, with the exception of the **-p** option. Up to 20 values of the **-p** option accumulate.

When using the **sap2afp** command, you can specify one or more input files to be transformed. If you do not specify an input file name, or if you specify **-** 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.

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

## Options

**Note:** 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 SAP to AFP transform.

**-o** *outputfile*
Specifies the output path and file into which the transformed SAP files are to be written. 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.

You cannot use **-o** *outputfile* on the command line with the **lp** command. You can only use **-o** *outputfile* with the **sap2afp** command.

**-p** *pagerange*
Specifies that the output should contain only selected pages. Up to 20 values of the **-p** option accumulate.

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 system administrator. If the resolution has not been set, the transform fails with error message AOP2009E.

  **Note:** 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 service personnel. Refer to *z/OS Infoprint Server Messages and Diagnosis* for information about this option.

## 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.

  If you do not specify an input file, or if you specify a file name of **-**, **sap2afp** uses standard input.

## Customization

You can customize the **sap2afp** transform by modifying the following 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 **PJPAPER**.

*xxxx***0000.tab**
Maps a SAP code page to an AFP code page.

See your system administrator for help with any file that you need to change. Note that even if you change only one configuration file, you must perform these steps in order for **sap2afp** 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.

## Examples

### Transform a Job, 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 Job

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 Job 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 only use redirection operators with HFS 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 an HFS File to an MVS Dataset

To transform the HFS SAP file `input.sap` into an MVS AFP output file called `HLQ.OUTPUT.AFP(member)` enter:

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

### Transform an MVS Dataset, Writing the Output to an HFS File

To transform the SAP file `HLQ.INPUT.SAP(member)` into an AFP output file called `output.afp` enter:

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

## Environment Variables

The **sap2afp** command uses the following environment variables:

**AOP_SAP2AFP_RESOURCES**
Specifies the directory that contains resources for the **sap2afp** transform. 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, refer to *z/OS Infoprint Server Customization*.

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

For information about setting and using environment variables, refer to *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 **sap2afp** transform.

## Exit Values

**0** The data were transformed successfully.

**>0** An error occurred.

# Chapter 3. Using Job Attributes

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

Infoprint Server uses *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 2 shows how to specify job attributes for different job submission methods and refers you to the section that contains more information.

*Table 2. How to Specify Job Attributes*

| Job Submission Method | How To Specify Job Attributes | See Page: |
|---|---|---|
| **lp** command (z/OS UNIX system) | **-o** option | 51 |
| **afp2pcl**, **afp2pdf**, **afp2ps** commands (z/OS UNIX system) | **-j** option | 30, 36, 43 |
| AOPPRINT JCL procedure (z/OS system) | OPTIONS parameter | 103 |
| Infoprint Port Monitor for Windows (Windows system) | **Options** button on the Port Configuration panel | 154 |
| **enq** command (AIX system) | **-o** option | 163 |
| **LPR** command (AS/400 system) | DESTOPT option | 165 |
| Remote queue defined with **CRTOUTQ** (AS/400 system) | Destination options field | 165 |

Attributes are only one of the factors that determine how your job is printed. The following 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 allows the system administrator to specify printer characteristics for each printer.
  - The system administrator can limit the jobs that a printer can accept. For example, if the system 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 system administrator can specify default values for jobs that are printed on a printer. For example, the system 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 or not documents print on one or both sides of the paper.

## Abbreviations

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

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

## Attributes Files

You may want to predefine specific attribute and value pairs in permanent files. You can use the permanent attribute files when you need those specific attribute values within the **lp**, **afp2pcl**, **afp2pdf**, and **afp2ps** commands.

## Creating an Attributes File

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

  **Note:** If an attributes file calls itself, the command issues 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.

  For 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
```

  **Note:** 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 at 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 the following command:

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

## 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 (JCL) 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 JCL statement. For a list of OUTPUT and DD JCL parameters with corresponding job attributes, see “Appendix B. JCL Parameters and Corresponding Job Attributes” on page 175.

## Attribute Listing

This section lists job attributes in alphabetical order.

### address-text

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

#### Allowed Values

You can specify one to four 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 system administrator has defined for the printer.

#### Usage Guidelines

- Whether the text specified by this attribute is printed depends on how the system 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 system administrator has defined for the printer.

### Usage Guidelines
- Whether the text specified by this attribute is printed depends on how the system 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 non-HFS 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 HFS data sets, the default is **none**.

### Usage Guidelines
- This attribute is most useful for line data documents.
- Use this attribute when you print documents with carriage controls that are part of a hierarchical file system (HFS).
- For MVS data sets, Infoprint Server determines the carriage control type from the data set. When processing MO:DCA-P (including mixed mode) HFS files, Infoprint Server will normally determine the correct carriage control type. Infoprint Server may be able to properly detect HFS files containing line data with machine carriage controls, but for other types of line data in HFS files, it will probably be necessary to specify **document-format = line**, and if the carriage control type is ansi, **carriage-control-type = ansi**. For other formats being printed from the HFS, the default is correct.

## chars

This **multi-valued** attribute identifies from one to four 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 two-character prefix (X0 or XZ), followed by up to four alphanumeric

characters. X042B2 is an example of a coded font name. For more information about coded fonts, refer to *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 one to four characters long.

**Note:** Some coded fonts have six-character names, not counting the prefix. For these coded fonts, refer to *IBM AFP Fonts: Font Summary for AFP Font Collection* for the four-character alternate coded font name.

Omit the two-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 system 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 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..
- PSF for OS/390 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 and the AFP data does not reference a font.
- 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) in order 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.

  Refer to *AFP: Programming Guide and Line Data Reference* and *PSF for OS/390: User's Guide* for more information about using multiple coded fonts.
- Raster fonts are used unless the system 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 255.

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

### Usage Guidelines
- This attribute applies when you print to AFP printers, to remote line printer daemons (LPDs) that support printing more than one copy of the same file, or to Internet Printing Protocol (IPP) servers that support the **copies** IPP job attribute. Otherwise, only one copy prints.
- This attribute does *not* apply when you print to VTAM-controlled printers, or when IP PrintWay uses the direct-sockets printing protocol.
- The system administrator can limit the number of copies that a printer can print. 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 system administrator has defined for the printer.

### Usage Guidelines
- Whether the text specified by this attribute is printed depends on how the system 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.

### Allowed Values
You can enter the name of a code page. Refer to *z/OS C/C++ Programming Guide* for the valid code pages.

### Default Value
1. The default code page that the system administrator has defined for the printer.
2. The code page for the current locale of z/OS UNIX System Services. This is usually an extended binary-coded decimal interchange code (EBCDIC) code page.

### Usage Guidelines
- To print an American National Standard Code for Information Interchange (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 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.

**other**
: Any other data format.

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

### Usage Guidelines

- By default, PSF for OS/390 supports only the values **line data**, **text**, and **mo:dca-p**. The system administrator can define other supported values.
- Before accepting a job, Infoprint Server verifies that the printer can support the value of this attribute.

## 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. 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.

## 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 system administrator has defined for the printer.
2. The value in the form definition used to print the job.

### Usage Guidelines

- This attribute applies 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. This attribute also applies to documents printed to Internet Printing Protocol (IPP) printers that support the **sides** IPP job attribute.

- 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 the following filters:

- A transform filter provided by Infoprint Server Transforms
- 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 quotes, 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 2. Printing from z/OS UNIX System Services Using Infoprint Server Commands” on page 25.

For information about which options the remote transform filter (**aoprform.dll**) accepts, refer to *z/OS Infoprint Server Operation and Administration*.

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 the following 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 a FORTRAN carriage control. The FORTRAN 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 54 and "Paginate line data and print with a header on each page" on page 56.

### Default Value

The default filter options that the system administrator has defined for the printer. If the system administrator has not defined a filter option, then the default value for the option is used.

### Usage Guidelines

- The filter options you specify in this attribute take effect only if the system administrator specifies the filter for the printer in the Printer Inventory. The system administrator can also specify filter options in the Printer Inventory.
- The system administrator can control whether or not the filter options that you specify with this attribute are used. For information about how the administrator can control whether or not your filter options take effect, refer to 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. See *z/OS Infoprint Server Operation and Administration* for more information about this filter.

## 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 eight 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 system 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, do the following:
  - Reference 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.
- 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 eight characters.

### Default Value
1. The default form that the system administrator has defined for the printer.
2. The default form that the system 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 system 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 system administrator has defined. Some typical values are the following:

**alternate**
**bottom**
**envelope**
**large-capacity**
**main**
**manual**
**middle**
**side**
**top**

### Default Value

1. The default input tray that the system 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 you use this attribute with the **lp** command and 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.

  See “Usage Guidelines” on page 91 for the default input-tray-number mapping. 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.
- 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 the following:

**1–255**

### Default Value

1. The default input tray that the system 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.
- The following guidelines only apply to the AFP to PCL, AFP to PDF, and AFP to PostScript transforms.
  - Your system 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. By default, this is 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 to 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 3. For example, if you want to print from input tray 4 on a PCL printer, specify `input-tray-number=2`. Contact your system administrator to confirm this mapping is valid for the transform you are using.

*Table 3. 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 |

**Note:** ″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 system 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.

## 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 system administrator has defined for the printer.

### Usage Guidelines
- Whether the text specified by this attribute is printed depends on how the system 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 system administrator has defined. Some typical values are the following:

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

### Default Value
1. The default output bin that the system 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.
- 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 the following:

**1–16**

### Default Value

1. The default output bin that the system 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 to a PCL or PostScript printer, instead of to 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 eight 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 system 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 eight 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 system 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.

## 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 eight characters. You can specify the page definition name either with or without the **P1** prefix.

### Default Value
The default page definition that the system 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.

## 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 system 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 long.

### Default Value
The default print queue that the system administrator has defined for the printer.

### Usage Guidelines
- The value in this attribute overides the print queue name specified in the printer definition. You must use this attribute for local area network (LAN) printers not defined by your system 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 within 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
```

### Default Value
The IP address that the system administrator has defined for the printer.

### Usage Guidelines
- The value in this attribute overides the IP address specified in the printer definition. Use this attribute when you submit jobs to LAN printers not defined by your system administrator.
- If the printer definition does not specify the LPR or direct sockets printing protocol, IP PrintWay ignores this parameter.
- When you specify this attribute, you must also specify the **print-queue-name** attribute.
- 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-library

This **multi-valued** attribute defines the location for document-specific resources: fonts, form definitions, overlays, and page definitions.

### Allowed Values

You can enter up to eight names of z/OS cataloged data sets. Each name can be up to 44 characters long. 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 system 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.
- All libraries used with the AFP to PCL, AFP to PDF, or AFP to PostScript transform must be defined to RACF with universal read access.
- This attribute is equivalent to the USERLIB 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 system administrator has defined for the printer.

### Usage Guidelines

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

### Default Value

The default value that the system 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.

## 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 system 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, refer to *AFP: Programming Guide and Line Data Reference*.

## title-text

This **single-valued** attribute specifies title information that can be printed in the title 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 "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

The default text that the system administrator has defined for the printer.

### Usage Guidelines

- Whether the text specified by this attribute is printed depends on how the system administrator configures the printer's separator sheet.
- 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, optionally followed by the unit of measure. The default unit of measure is millimeters. No blank spaces are allowed. The following 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 the following 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 system 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, optionally followed by the unit of measure. The default unit of measure is millimeters. No blanks are allowed. See “x-image-shift-back” on page 98 for information about the allowed values.

### Default Value

1. The default X offset that the system 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, optionally followed by the unit of measure. The default unit of measure is millimeters. No blanks are allowed. See “x-image-shift-back” on page 98 for information about the allowed values.

### Default Value

1. The default Y offset that the system 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, optionally followed by the unit of measure. The default unit of measure is millimeters. No blanks are allowed. See “x-image-shift-back” on page 98 for information about the allowed values.

### Default Value

1. The default Y offset that the system 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.

# Part 3. Printing and Transforming Batch Jobs from z/OS

There are many ways to submit batch jobs to Infoprint Server from z/OS.

- Chapter 4. Printing Batch Jobs from z/OS Using the AOPPRINT JCL Procedure describes how to submit batch print jobs to the Print Interface component of Infoprint Server. When you submit a batch print job to Print Interface, Print Interface can transform the data format to a format supported by the printer (if requested in the printer definition in the Printer Inventory) before writing an output data set to the JES spool, and then IP PrintWay, Print Services Facility™ (PSF) for OS/390, or some other program can print the output data set.
- Chapter 5. Printing Batch Jobs from z/OS to IP PrintWay Using z/OS JCL describes how to use an OUTPUT JCL statement to submit a batch print job directly to the IP PrintWay component of Infoprint Server.
- Chapter 6. Transforming Batch Jobs from z/OS Using the AOPBATCH Program describes how to submit batch transform jobs to Infoprint Server.
- “Chapter 7. Printing from VTAM Applications” on page 141 describes how to submit batch jobs from Virtual Telecommunications Access Method (VTAM) applications to the NetSpool component of Infoprint Server . This chapter is in a separate part of this manual because not all VTAM jobs are batch jobs.

For information about how to use an OUTPUT JCL statement to submit a batch job use to PSF for OS/390, refer to *PSF for OS/390: User's Guide*. When you use an OUTPUT JCL statement, Infoprint Server does *not* process the job and PSF for OS/390 does not use information that the administer specifies in the printer definition in the Printer Inventory. This means, for example, that data submitted to PSF with an OUTPUT JCL statement *cannot* be transformed to AFP format using transforms provided by Infoprint Server Transforms. To transform data to AFP format, use the AOPPRINT JCL procedure to submit the print job.

# Chapter 4. Printing Batch Jobs from z/OS Using the AOPPRINT JCL Procedure

The AOPPRINT Job Control Language (JCL) procedure, provided in SYS1.PROCLIB, lets you submit data sets to print from z/OS. This procedure allows you to take advantage of all the features of Infoprint Server and of the optional Infoprint Server Transforms (5697-F51).

- Because the AOPPRINT JCL procedure provides the full spooling capabilities of Infoprint Server, you can specify job attributes.
- If the Infoprint Server Transforms are installed, you can automatically transform jobs to and from the Advanced Function Presentation (AFP) data stream.
- Infoprint Server validates jobs that are submitted with the AOPPRINT JCL procedure.

**Notes:**

1. Your system administrator can customize the AOPPRINT procedure. For information, refer to *z/OS Infoprint Server Customization*.
2. The AOPPRINT JCL procedure makes more effective use of Infoprint Server than the procedures described in “Chapter 5. Printing Batch Jobs from z/OS to IP PrintWay Using z/OS JCL” on page 107 and in *PSF for OS/390: User's Guide*. Use the AOPPRINT procedure except in these circumstances:
   - You have to update and print a job that is already coded.
   - Your system administrator tells you that no printer definition corresponds to your job requirements; and the job attributes do not include the options you need. This should happen only if you have unusual job requirements.
3. For information about the JOB, EXEC, DD, and IF/THEN/ELSE/ENDIF JCL statements, which appear in the examples in this chapter, refer to *z/OS MVS JCL Reference*.

## AOPPRINT Parameters

**ERRCLASS=***class*
**OPTIONS='***attribute***=***value***'...**
**OUTCLASS=***class*
**PRINTER=***printerdefinition*

*Figure 10. 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 system 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 81. Enter the attributes and values in lower case.

You can store attributes and values in a hierarchical file system (HFS) file or in a data set. Use a special attribute called **attributes** to specify the file or DDname from which attributes are to be read, as in these examples:

```
OPTIONS='attributes=BIGJOB.ATT'
OPTIONS='attributes=//''''MVS.DATA.SET'''''
OPTIONS='attributes=//DD:ATTRS'
```

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.

See "Creating an Attributes File" on page 80 for how to create an attributes file.

**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 system administrator.

**PRINTER=***printerdefinition*
Specifies the name of a printer definition created by your system administrator. The printer definition identifies a printer 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 system administrator tells you.

**Default:** Infoprint Server uses the printer definition specified by your system administrator.

## DD Statements

The AOPPRINT JCL procedure lets you specify the following 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.

## Examples

The following 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 PROC=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 to specify two copies of the job:

```
//JOB3    JOB  ,'MARTHA'
//PRINT2  EXEC AOPPRINT,OPTIONS='copies=2'
//SYSIN   DD   DSNAME=MYJOB.PDF,DISP=SHR
```

**Note:** The line printer daemons (LPDs) for some IP PrintWay printers do not support printing more than one copy of the same file. In this case, only one copy prints.

## Specify Attributes Files for a Job

This example shows how to submit the file `FILE5.AFPDS` to the default printer, specifying the attributes file `DEPT.ATT` and a set of attributes in the DD statement `MYATTR`:

```
//JOB4      JOB  ,'MARTHA'
//PRINTATT  EXEC AOPPRINT,
//      OPTIONS='attributes="DEPT.ATT" attributes=//DD:MYATTR'
//SYSIN     DD   DSNAME=FILE5.AFPDS,DISP=SHR
//MYATTR    DD   *
input-tray=top
copies=5
title-text='Special Report'
/*
```

**Note:** 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.

Suppose that the file `DEPT.ATT` contains these lines:

```
document-format=modca-p
input-tray=bottom
duplex=yes
output-bin=collator
```

The value of **input-tray** in `MYATTR` overrides the value in `DEPT.ATT` because you specified `MYATTR` last.

## 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!
/*
```

---

## Exit Values

**0** Infoprint Server accepted the request.

**>0** An error occurred.

# Chapter 5. Printing Batch Jobs from z/OS to IP PrintWay Using z/OS JCL

This chapter describes some parameters of the OUTPUT and DD statements of the Job Control Language (JCL). It shows how to code these statements in order to use the IP PrintWay component of Infoprint Server to transmit an output data set to a remote printer or host system in your TCP/IP network or to a VTAM-controlled printer.

If the Infoprint Server Transforms are installed, you can print data sets on printers that do not natively accept the format of your data. Your data can be automatically transformed to a format that the printer accepts.

**Note:** The procedure described in this chapter makes less effective use of Infoprint Server than the AOPPRINT JCL procedure, which is described in “Chapter 4. Printing Batch Jobs from z/OS Using the AOPPRINT JCL Procedure” on page 103. Use the AOPPRINT procedure except in these circumstances:

- You have to update and print a job that is already coded.
- Your system administrator tells you that no printer definition corresponds to your job requirements; and the job attributes do not include the options you need. This should happen only if you have unusual job requirements.

## Directing Output to a Printer

To transmit your output to a printer, you must direct the output to the IP PrintWay output writer. To do this, specify the Job Entry Subsystem (JES) work-selection criteria that your system administrator has defined for the IP PrintWay output writer, for example, an output class. Consult your system administrator for the appropriate values to specify.

You can select a printer in one of these ways:

- By specifying the printer definition name
- By specifying the printer’s Internet Protocol (IP) address
- By specifying an output class, destination name, or form name

## Specifying the Printer Definition Name

You can specify a value for the FSSDATA=’printer’ parameter on the OUTPUT JCL statement. This value is the name of a printer definition created by your system administrator.

If you also specify an IP address, IP PrintWay uses that address to locate the printer. If not, it uses the address in the printer definition. Specify both an IP address and a printer definition when you want to send a job to a printer that the system administrator has not defined, using the values in the printer definition for another printer.

See “Direct Output to a Printer By Specifying the Printer Definition Name” on page 129 for an example.

## Specifying the Printer's IP Address

To submit a print data set to a printer for which your system administrator has not created a printer definition, specify a value for the DEST=IP parameter on the OUTPUT JCL statement. This value is the IP address or host name of the system to which the printer is attached.

When you specify DEST=IP, you must also specify a value for either the PRTQUEUE parameter or the PORTNO parameter.

See "Direct Output to a Printer By Specifying a Host Name or an IP Address" on page 130 for an example.

**Note:** You can specify an IP address, print queue name, and port number on the OUTPUT JCL statement only when the **Resubmit for filtering** option is *not* selected in the printer definition. If the **Resubmit for filtering** option is selected, IP PrintWay ignores the IP address, print queue name, and port number on the OUTPUT statment and instead uses the IP address, print queue name, and port number in the printer definition.

## Specifying Class, Destination, or Form

If you do not know the printer definition name or IP address, 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 whose printer definition matches the values that you specify.

You can select a printer using the CLASS, DEST, and FORMS parameters only if your administrator specifies the CLASS, DEST, and FORMS values and selects the Use DEST, CLASS, and FORMS for IP PrintWay printer selection option in the printer definition. Consult your system administrator to determine the values that you can specify.

See "Direct Output to a Printer by Specifying CLASS, FORMS, or DEST" on page 130 for an example.

# Transforming Data

IP PrintWay can transform your data to a format that the printer can accept before transmitting the data to the printer. This function lets you, for example, print AFP and line data to printers that can print PCL or PostScript data.

To use this function, you must have the Infoprint Server Transforms (Program Number 5697–F1) installed. Your administrator must also configure the appropriate data transforms in the printer definition in the Infoprint Server Printer Inventory and select the **Resubmit for filtering** option in the printer definition. Refer to *z/OS Infoprint Server Operation and Administration* for more information about how to configure the printer definition.

You can transform AFP and line data to any of the following data streams:

- Printer Control Language (PCL)
- Portable Data Format (PDF)
- PostScript

You can transform data in any of the following formats to AFP:

- PCL

- PDF
- PostScript
- SAP Output Text Format (OTF) and Advanced Business Application Programming (ABAP)

For more information about the Infoprint Server transforms, see “Infoprint Server Transforms and the Transform Manager” on page 14.

## Parameters

This section describes JCL parameters that have special considerations for use with IP PrintWay. You can find information on the following types of parameters:

- “Parameters For All Print Jobs” describes parameters that apply to all print jobs submitted with IP PrintWay.
- “Parameters for Printing AFP or Line Data on Non-AFP Printers” on page 120 describes parameters that apply to data sets that contain AFP data or line data printed on a PostScript or PCL printer.
- “Parameters for Distribution Information” on page 128 describes distribution parameters that can be printed on a separator sheet.
- “AFP Parameters for Printing Remotely with Infoprint Manager or Infoprint Server” on page 128 describes the parameters you can specify when you submit a job to Infoprint Manager for AIX or Windows NT.

For more information about JCL parameters, refer to *z/OS MVS JCL Reference*.

“Examples” on page 129 gives examples of JCL use.

## Parameters For All Print Jobs

This section describes JCL parameters that apply to all print jobs submitted with IP PrintWay. You can specify these JCL parameters on one or both of the following JCL statements:

- DD statement
- OUTPUT statement

The examples included with each parameter show on which JCL statements you can specify each parameter. If you specify the same parameter on both the DD and the OUTPUT JCL statements, the parameter on the DD statement is used.

**CLASS=***class*
**COPIES=***nnn*
**DEST=**{[*nodename***.**]*name* | '[*nodename***.**]**IP:***host*'}
**DUPLEX=**{NO | NORMAL | TUMBLE}
**FCB=***fcbname*
**FORMS=***formname*
**FSSDATA='printer=***printername*'
**NOTIFY=(**[*nodename***.**]*userid***,...)**
[**PORTNO=***portnumber* | **PRTQUEUE='***printqueue*']
**PRTOPTNS='***componentname*'
**RETAINF=**{'*hhhh***:***mm***:***ss*' | **FOREVER**}
**RETAINS=**{'*hhhh***:***mm***:***ss*' | **FOREVER**}
**RETRYL=***nnnnn*
**RETRYT='***hhhh***:***mm***:***ss*'
**SYSOUT=(***class***,,***formname***)**

*Figure 11. General OUTPUT and DD JCL Parameters: Format*

**CLASS=***class*
Specifies the 1-character alphanumeric output class of the data set. If you do not specify the FSSDATA='printer' parameter or the DEST=IP parameter, IP PrintWay sends the data set to a printer whose definition matches this class, in combination with the destination name and form name. Consult your system administrator to determine the correct class to specify.

**Notes:**

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 locate a printer, IP PrintWay uses the following priorities:
   a. The host name or address specified by the DEST=IP parameter
   b. The address in the printer definition specified by the FSSDATA='printer' parameter
   c. The address in the printer definition that matches the values of any combination of the DEST=*name*, CLASS, and FORMS parameters

**Example:** To specify a class on an OUTPUT statement, also enter a null class in the SYSOUT parameter of the DD statement:

```
//OUTDS  OUTPUT CLASS=E
//DD1    DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

**COPIES=***nnn*
Specifies the number of copies you want to print, from 1 to 255.

This parameter applies only when you print to AFP printers, to remote line printer daemons (LPDs) that support printing more than one copy of the same file, or to Internet Printing Protocol (IPP) servers that support the **copies** IPP job attribute. This parameter is ignored in other cases, for example when you print to VTAM-controlled printers and when IP PrintWay uses the direct sockets printing protocol.

**Notes:**

1.

If the printer does not support multiple copies, you can print them by specifying multiple values for the OUTPUT parameter of the DD statement, for example:

```
//DD1  DD SYSOUT=(,),OUTPUT=(*,OUTDS1,*,OUTDS1...)
```

This workaround creates multiple output data sets on the JES spool.

2. IP PrintWay ignores group values that you specify on this parameter.

**Examples:** You can specify the COPIES parameter on either a DD or OUTPUT JCL statement:

```
//DD1  DD COPIES=14
//OUTDS  OUTPUT COPIES=14
```

**DEST={[***nodename***.]***name* **| '[***nodename***.]IP:***host***'}**

Specifies either the destination name or the IP address of the printer's host system.

**DEST=[***nodename***.]***name*

Specifies the node name and destination name of the printer's host system.

*nodename*

Specifies the 1 to 8 character node name of the printer's host system. The node name is optional on an OUTPUT JCL statement. It is not permitted on a DD JCL statement. IP PrintWay ignores the node name, but JES may use it.

*name*

Specifies a 1 to 8 character alphanumeric destination name. If you specify the DEST=*name* parameter and do not specify the FSSDATA='printer' parameter, IP PrintWay sends the data set to a printer whose definition matches this destination name, in combination with the output class and form name. Consult your system administrator to determine the correct destination name to specify.

**Examples:** You can specify the DEST=*nodename.name* parameter only on an OUTPUT JCL statement. You can specify the DEST=*name* parameter, without the *nodename*, on either a DD or OUTPUT JCL statement. If you specify the DEST=*name* parameter on a DD statement, you must also specify the SYSOUT parameter. Otherwise, the system ignores the DEST=*name* parameter after checking it for syntax.

```
//DD1  DD SYSOUT=E,DEST=DEPT001
//OUTDS  OUTPUT DEST=BOULDER.DEPT001
```

**DEST='[***nodename***.]IP:***host***'**

Specifies the node name and the IP address of the printer's host system.

*nodename*

Specifies the 1 to 8 character node name of the printer's host system. The node name is optional. IP PrintWay ignores it, but JES may use the node name.

*host*

Specifies the 1 to 115 character IP address of the printer's host system in either of these formats:

**Dotted decimal address**

A series of integers within 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.IBM.com
```

Always enclose the IP keyword and value in single quotation marks.

**Examples:** You can specify the DEST=IP parameter only on an OUTPUT JCL statement:

```
//OUTDS  OUTPUT DEST='IP:99.153.123.232'
//OUTDS  OUTPUT DEST='IP:BOULDER.VNET.IBM.COM'
//OUTDS  OUTPUT DEST='NODE01.IP:BOULDER'
```

**Notes:**

1. JES does not use the host name or the IP address when determining whether the output data set meets its work-selection criteria. Therefore, if your system administrator has defined destination as a JES work-selection criterion, specify DEST=*name* rather than DEST=IP. If you specify DEST=IP, JES will not find a match.
2. If you specify more than one parameter that can be used to locate a printer, IP PrintWay uses the following priorities:
   a. The host name or address specified by the DEST=IP parameter
   b. The address in the printer definition specified by the FSSDATA='printer' parameter
   c. The address in the printer definition that matches the values of any combination of the DEST=*name*, CLASS, and FORMS parameters
3. If you also specify the FSSDATA='printer' parameter and the printer definition does not specify the LPR or direct sockets printing protocol, IP PrintWay ignores this parameter.
4. IBM recommends that you use the same method of identifying 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.
5. If the **Resubmit for filtering** option is selected in the printer definition, IP PrintWay does not use the IP address specified in the DEST parameter. Instead, IP PrintWay uses the IP address in the printer definition.

**DUPLEX={NO | NORMAL | TUMBLE}**

Specifies whether the data set is printed on one or both sides of each sheet.

This parameter applies 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. This parameter also applies to documents printed to Internet Printing Protocol (IPP) printers that support the **sides** IPP job attribute.

**NO** The data set is printed only on the front side of each sheet.

**NORMAL**

The data set is printed on both sides of the sheet so that the top of side 1 is the top of side 2 (for side binding).

**TUMBLE**

The data set is printed on both sides of the sheet so that the top of side 1 is the bottom of side 2 (for top binding).

**Default:** NORMAL

**Example:**

```
//OUTDS OUTPUT DUPLEX=NORMAL
```

**FCB=***fcbname*

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*fcbname*, then FCB2*fcbname*, then FCB3*fcbname* unless you are printing to a VTAM-controlled printer. In this case, IP PrintWay searches the SYS1.IMAGELIB library only for FCB2*fcbname*.

IP PrintWay can use the FCB to format the data set before transmitting it to the printer. Whether it does so depends on how your system administrator has defined the printer. For more information about FCB processing, refer to *z/OS Infoprint Server Operation and Administration*.

**Notes:**

1. The system administrator can specify a default FCB name in the JES initialization member of SYS1.PARMLIB.
2. For more information about the FCB parameter, see “AFP Parameters for Printing Remotely with Infoprint Manager or Infoprint Server” on page 128.

**Examples:** You can specify the FCB parameter on either a DD or an OUTPUT JCL statement:

```
//DD1    DD     FCB=STD2
//OUTDS  OUTPUT FCB=STD2
```

**FORMS=***formname*

Specifies the 1 to 8 character form name. If you do not specify the FSSDATA=’printer’ parameter or the DEST=IP parameter, IP PrintWay selects a printer whose definition matches this form name, in combination with the output class and destination name. Consult your system administrator to determine the correct form name to specify.

**Notes:**

1. You can also specify the form name in the SYSOUT parameter of a DD statement.
2. If you specify more than one parameter that can be used to locate a printer, IP PrintWay uses the following priorities:
   a. The host name or address specified by the DEST=IP parameter
   b. The address in the printer definition specified by the FSSDATA=’printer’ parameter
   c. The address in the printer definition that matches the values of any combination of the DEST=*name*, CLASS, and FORMS parameters

**Example:** You can specify the FORMS parameter only on an OUTPUT JCL statement.

```
//OUTDS  OUTPUT FORMS=WIDE
```

**FSSDATA=’printer=***printername***’**

Specifies data to pass to the functional subsystem (FSS) that controls printing. The printer subparameter specifies the 1 to 17 character name of a printer definition. The printer definition identifies a printer and supplies default values for other JCL parameters.

Because the FSS may be running on a case-sensitive system, enter the printer subparameter in *lower case*. Enter the printer definition name exactly as the system administrator tells you.

**Notes:**

1. If you specify more than one parameter that can be used to locate a printer, IP PrintWay uses the following priorities:
   a. The host name or address specified by the DEST=IP parameter
   b. The address in the printer definition specified by the FSSDATA='printer' parameter
   c. The address in the printer definition that matches the values of any combination of the DEST=*name*, CLASS, and FORMS parameters
2. If you do not specify the FSSDATA='printer' parameter, you must specify either the DEST=IP parameter or at least one of the following parameters: DEST=*name*, CLASS, FORMS.

**Example:** You can specify the FSSDATA='printer' parameter only on an OUTPUT JCL statement.

```
//OUTDS  OUTPUT FSSDATA='printer=Printer5'
```

**NOTIFY=([***nodename***.]*userid*,...)**

Specifies up to 4 userids that IP PrintWay is to notify when the data set has been successfully or unsuccessfully transmitted. Separate the userids with commas.

*nodename*
Specifies a 1 to 8 character node name. The node name is optional.

*userid*
Specifies a 1 to 8 character user ID.

IP PrintWay notifies the users when the transmission is successful, when the transmission fails, or when IP PrintWay deletes the data set from the JES spool.

**Example:** You can specify the NOTIFY parameter only on an OUTPUT JCL statement:

```
//OUTDS  OUTPUT NOTIFY=(SEATTLE.JOE,SEATTLE.MARY)
```

**PORTNO=***portnumber*

Specifies the number of the port to use for a direct socket printing connection. The valid range is 100 to 65535.

IP PrintWay uses the number of the port specified in this parameter instead of the port number in the printer definition.

**Notes:**

1. You can specify either PORTNO or PRTQUEUE, but not both.
2. If you specify DEST=IP, you must also specify a value for 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 specify the DEST=IP and PORTNO parameters, but do not specify the FSSDATA='printer' parameter, IP PrintWay uses the direct sockets printing protocol to transmit the data to the specified port number.

5. If the **Resubmit for filtering** option is selected in the printer definition, IP PrintWay does not use the port number specified in the PORTNO parameter. Instead, IP PrintWay uses the port number specified in the printer definition.

**Default:** IP PrintWay uses the port number defined by the system administrator:

- If you specify FSSDATA='printer', the default is the value in the specified printer definition.
- If you specify DEST=IP and do not specify FSSDATA='printer', there is no default value.
- If IP PrintWay matches the CLASS, DEST=*name*, or FORMS value in a printer definition, the default is the value in that printer definition.

**Example:** You can specify the PORTNO parameter only on an OUTPUT JCL statement:

```
//OUTDS  OUTPUT PORTNO=2501
```

**PRTOPTNS='***componentname* **'**

Specifies the 1 to 17 character name of an options component or components that your system administrator has defined. If multiple options components have the same name, they contain different sets of options. For example, one component might contain formatting options and another might contain options used by the line printer requester (LPR).

The formatting options and transmission options in these components override the formatting options and transmission options in the printer definition. Other options defined in these components are not used.

Some formatting options are:

- Whether to use the FCB to format the data set
- How many lines to print on a page
- Whether to print a header on each page
- The names of installation exit routines

Some transmission options are:

- Whether to translate a data set from extended binary-coded decimal interchange code (EBCDIC) to American National Standard Code for Information Interchange (ASCII)
- Whether to transmit multiple data sets in a job at the same time
- The names of installation exit routines

Consult your system administrator for the names of components suitable for your data set. The name is case-sensitive; enter it exactly as your system administrator tells you. Enclose a string of names or a name that contains lower-case letters in single quotation marks.

**Note:** If the **Resubmit for filtering** option is selected in the printer definition, IP PrintWay does not use the options specified in the components named in the PRTOPTNS parameter. Instead, IP PrintWay uses options specified in the printer definition.

**Default:** IP PrintWay determines the default formatting and transmission options as follows:

1. The values defined by the system administrator:

- If you specify FSSDATA='printer', the defaults are the values in the specified printer definition.
- If you specify DEST=IP and do not specify FSSDATA='printer', the defaults are the values in the default printer definition.
- If IP PrintWay matches the CLASS, DEST=*name*, or FORMS value in a printer definition, the defaults are the values in that printer definition.

2. Hard-coded default values.

**Example:** You can specify the PRTOPTNS parameter only on an OUTPUT JCL statement:

```
//OUTDS  OUTPUT PRTOPTNS='PostScript'
```

**PRTQUEUE='***printqueue***'**
Specifies the 1 to 127 character alphanumeric name of the target print queue.

This parameter may be case-sensitive. For example, on UNIX systems, `lp0` and `LP0` refer to different printers. Enclose a value that contains lower-case letters in single quotation marks.

IP PrintWay uses the print queue specified in this parameter instead of the print queue name in the printer definition.

**Notes:**

1. You can specify either PORTNO or PRTQUEUE, but not both.
2. If you specify DEST=IP, you must also specify a value for either PRTQUEUE or PORTNO.
3. If the printer definition does not specify the LPR printing protocol, IP PrintWay ignores this parameter.
4. If you specify the DEST=IP and PRTQUEUE parameters, but do not specify the FSSDATA='printer' parameter, IP PrintWay uses the LPR printing protocol to transmit the data to the specified print queue.
5. If the **Resubmit for filtering** option is selected in the printer definition, IP PrintWay does not use the print queue name specified in the PRTQUEUE parameter. Instead, IP PrintWay uses the print queue name specified in the printer definition.

**Default:** IP PrintWay uses the print queue name defined by the system administrator:

- If you specify FSSDATA='printer', the default is the value in the specified printer definition.
- If you specify DEST=IP and do not specify FSSDATA='printer', there is no default value.
- If IP PrintWay matches the CLASS, DEST=*name*, or FORMS value in a printer definition, the default is the value in that printer definition.

**Example:** You can specify the PRTQUEUE parameter only on an OUTPUT JCL statement:

```
//OUTDS  OUTPUT PRTQUEUE='lpd0'
```

**RETAINF={'***hhhh***:***mm***:***ss***' | FOREVER }**
Specifies the period of time for which IP PrintWay retains the data set on the JES queue after a transmission fails and all requested retries have been attempted.

Specify the time in the format *hhhh*:*mm*:*ss*, where:
*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, enter `FOREVER`. In this case, IP PrintWay never automatically deletes failed data sets from the JES spool. The system administrator must delete the data set from the JES spool or retransmit the data set.

IP PrintWay uses the retention value specified in this parameter instead of the value in the printer definition.

Note that the retention period for failed transmissions is separate from the retry limit and time. The retention period indicates the amount of time that IP PrintWay retains data sets on the JES spool *after* the last retry fails.

**Default:** IP PrintWay determines the default value as follows:

1. The value defined by the system administrator:
   - If you specify FSSDATA='printer', the default is the value in the specified printer definition.
   - If you specify DEST=IP and do not specify FSSDATA='printer', the default is the value in the default printer definition.
   - If IP PrintWay matches the CLASS, DEST=*name*, or FORMS value in a printer definition, the default is the value in that printer definition.
2. No retention.

**Examples:** You can specify the RETAINF parameter only on an OUTPUT JCL statement:

- The following OUTPUT statement specifies that IP PrintWay should retain the data set on the JES spool for 48 hours.

  ```
  //OUTDS  OUTPUT RETAINF='48:00:00'
  ```

- The following OUTPUT statement specifies that IP PrintWay should retain the data set on the JES spool until the system 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 queue after a successful transmission.

Specify the time in the format *hhhh*:*mm*:*ss*, where:
*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, enter FOREVER. In this case, IP PrintWay ever automatically deletes successfully-transmitted data sets from the JES spool. The system administrator must delete the data set from the JES spool.

IP PrintWay uses the retention time specified in this parameter instead of the value in the printer definition.

Note that the retention period for successful transmissions is separate from the retry limit and time. The retention period indicates the amount of time that IP PrintWay retains data sets on the JES spool *after* transmission succeeds.

**Default:** IP PrintWay determines the default value as follows:

1. The value defined by the system administrator:
   - If you specify FSSDATA='printer', the default is the value in the specified printer definition.
   - If you specify DEST=IP and do not specify FSSDATA='printer', the default is the value in the default printer definition.
   - If IP PrintWay matches the CLASS, DEST=*name*, or FORMS value in a printer definition, the default is the value in that printer definition.
2. No retention.

**Examples:** You can specify the RETAINS parameter only on an OUTPUT JCL statement:

- The following OUTPUT statement specifies that IP PrintWay should retain the data set on the JES spool for 4 hours.

  ```
  //OUTDS  OUTPUT RETAINS='04:00:00'
  ```

- The following 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 uses the retry limit specified in this parameter instead of the retry limit in the printer definition.

**Default:** See Table 4.

**Examples:** You can specify the RETRYL parameter only on an OUTPUT JCL statement:

```
//OUTDS  OUTPUT RETRYL=10
```

*Table 4. How the RETRYL and RETRYT Parameters Work Together*

| RETRYL | RETRYT | Result |
|---|---|---|
| Blank | Blank or 0 | IP PrintWay does not retry the transmission. |
| Blank | >0 but <5 seconds | IP PrintWay retries the transmission once after the specified interval. |
| Blank | ≥5 seconds | IP PrintWay retries the transmission several times immediately, then once after the specified interval. |
| 0 | Any value | IP PrintWay does not retry the transmission. |

*Table 4. How the RETRYL and RETRYT Parameters Work Together (continued)*

| RETRYL | RETRYT | Result |
|---|---|---|
| >0 | Blank or 0 | IP PrintWay retries the transmission the specified number of times immediately. |
| >0 | >0 but <5 seconds | IP PrintWay retries the transmission the specified number of times at the specified interval. |
| >0 | ≥5 seconds | IP PrintWay retries the transmission several times immediately, then the specified number of times at the specified interval. |

**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*, where:
*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 uses the retry time specified in this parameter instead of the retry time in the printer definition.

**Note:** Consider specifying a short retry time for these reasons:

- Transmission usually fails because the LPD is not receiving data. The LPD is likely to recover either quickly or not at all.
- If transmission fails for some other reason, IP PrintWay does not transmit any other data sets until transmission is successful or the specified number of retries has been attempted, even though the LPD is able to receive data.

**Default:** See Table 4 on page 118.

**Examples:** You can specify the RETRYT parameter only on an OUTPUT JCL statement. The following examples both specify that IP PrintWay should retry several times immediately, then wait 1 minute between subsequent retries:

```
//OUTDS  OUTPUT RETRYT='0000:01:00'
//OUTDS  OUTPUT RETRYT=1:00
```

**SYSOUT=(***class,,formname***)**
Specifies the class and the form name.

*class*
Specifies a 1 character alphanumeric class.

*formname*
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. See the description of the CLASS parameter and the FORMS parameter for more detail about these parameters.

**Example:** You can specify the SYSOUT parameter only on a DD JCL statement:

```
//DD1  DD SYSOUT=(E,,WIDE)
```

## Parameters for Printing AFP or Line Data on Non-AFP Printers

This section describes parameters that the AFP to PCL, AFP to PDF, and AFP to PostScript transforms use. These parameters apply to AFP or line data jobs submitted to a printer that does not support AFP data, typically a PostScript or PCL printer. The parameters are summarized in Figure 12.

**CHARS=***fontname1*[,*fontname2*][,*fontname3*][,*fontname4*]
**DUPLEX=**{NO | NORMAL | TUMBLE}
**FORMDEF=***fdefname*
**INTRAY=***nnn*
**OFFSETXB=***nnnn*[.*mmm*]*unit*
**OFFSETXF=***nnnn*[.*mmm*]*unit*
**OFFSETYB=***nnnn*[.*mmm*]*unit*
**OFFSETYF=***nnnn*[.*mmm*]*unit*
**OUTBIN=***1-65 535*
**OVERLAYB=***ovlyname*
**OVERLAYF=***ovlyname*
**PAGEDEF=***pdefname*
**PRMODE=**{SOSI1|SOSI2|SOSI3}
**TRC=**{YES|NO}

*Figure 12. Infoprint Server Transforms Parameters: Format*

If you do not specify one of these parameters, these transforms use the default value specified by your system administrator in the printer definition.

In most cases, the Infoprint Server Transforms interpret the parameters in the same way as PSF for OS/390, so that you can use the same JCL that you use to print on IBM AFP printers. The following 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 for OS/390, on the other hand, uses the font specified in the CHARS parameter.

- **INTRAY**

  If the INTRAY parameter is not specified, and the form definition does not specify an input tray, the transforms use a default of tray 1. PSF for OS/390, on the other hand, uses the printer's default source.

For more information about the limitations of each transform, see "afp2pcl—Transform AFP or Line Data to PCL Data" on page 30, "afp2pdf—Transform AFP or Line Data to PDF Data" on page 36, and "afp2ps—Transform AFP or Line Data to PostScript Data" on page 43.

**CHARS=(***fontname1***[,***fontname2***][,***fontname3***][,***fontname4***])**
Specifies the 4-character member name of the coded font that you want to use to print a data set. You can specify up to four fonts.

*fontname*
Specifies the name of a coded font (in a font library) containing four or fewer characters, not including the prefix.

**Note:** Some coded fonts have six-character names, not counting the prefix. For these coded fonts, refer to *IBM AFP Fonts: Font Summary for AFP Font Collection* for the four-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 JCL USERLIB parameter, or else they must be inline with the data set. For details about available fonts and the naming conventions, refer to *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.

For MO:DCA data, if no fonts are specified in the data stream, the transforms use the first coded font specified in the CHARS parameter for all font references. For line data, if the page definition specifies fonts, the transforms ignore the CHARS parameter.

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

**Examples:** CHARS can be specified on either a DD or OUTPUT statement:

```
//DD1 DD CHARS=(GT10, GT12)
//OUTDS OUTPUT CHARS=(GT10, GT12)
```

**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).

**Default:** NORMAL

**Example:**

```
//OUTDS OUTPUT DUPLEX=NORMAL
```

**FORMDEF=***fdefname*
Specifies the member name (from one to six 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.

If the FORMDEF parameter is not specified, the transforms use the form definition specified in the printer definition. If no form definition is specified in the printer definition, the transforms use the form definition in the Infoprint Server transform configuration file.

**Example:** To specify *F1USER10* as the form definition, enter the following:

```
//OUTDS OUTPUT FORMDEF=USER10
```

The form definition you use may be stored in any of the following places:

- In a system library assigned to these transforms
- In a user library referenced in the printer definition for your printer.
- In a user library referenced 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, do the following:

- Reference 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, do the following:

- Include the inline form definition in the print data set.
- If you specify the FORMDEF parameter, ensure 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.
- Ensure 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.

**INTRAY=***nnn*

Specifies the one to three 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. See “input-tray-number” on page 90 for more information about tray mapping.

The value you specify for this attribute overrides any input tray selection in the data stream or form definition.

**Default:** If no value is specified for this parameter and the input tray is not specified on the form definition, tray 1 is used.

**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. If OFFSETXB is not specified, the value specified in the form definition is used.

For unit, specify one of the following 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.

**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. If OFFSETXF is not specified, the value specified in the form definition is used.

For unit, specify one of the following:

**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.

**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. If OFFSETYB is not specified, the value specified in the form definition is used.

For unit, specify one of the following:

**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.

**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. If OFFSETYF is not specified, the value specified in the form definition is used.

For unit, specify one of the following:

**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.

**Example:**

The following JCL 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 output bin is not specified, the value specified in the form definition is used. However, 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 to a PCL or PostScript printer, instead of to 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 used to print the job specifies.

**Example:**

In this example, OUTBIN is specified in the OUTPUT statement:

```
//OUTDS OUTPUT OUTBIN=4
```

**OVERLAYB=***ovlyname*
Specifies the member name (from one to eight 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. The complete name of the overlay member must be given; these transforms do not add an O1 prefix.

**OVERLAYF=***ovlyname*

Specifies the member name (from one to eight 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. The complete name of the overlay member must be given; these transforms do not add an O1 prefix.

**Example:**

The following JCL requests the overlay O1FOVLY to be placed on the front side of each sheet and the overlay O1BOVLY to be placed on the back side of each sheet:

```
//OUTDS OUTPUT OVERLAYF=O1FOVLY,OVERLAYB=O1BOVLY
```

**PAGEDEF=***pdefname*

Specifies the member name (from one to six 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.

**Example:**

In the following example, P1USER10 is specified as the page definition in the OUTPUT statement:

```
//OUTDS OUTPUT PAGEDEF=USER10
//DD2 DD SYSOUT=class,OUTPUT=(*.OUT2)
```

The page definition you use may be stored in any of the following places:

- In a system library assigned to these transforms
- In a user library referenced in the printer definition for your printer.
- In a user library referenced 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, do the following:

- 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, do the following:

- Include the inline page definition in the print data set.
- If you specify the PAGEDEF parameter, ensure 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, ensure 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.

**PRMODE={SOSI1| SOSI2 | SOSI3}**

Specifies the type of data in the print data set and whether these transforms must perform optional processing of the data.

**SOSI1**

Specifies that each shift-out, shift-in code is to be converted to a blank and a Set Coded Font Local text control.

**SOSI2**

Specifies that each shift-out, shift-in code is to be converted to a Set Coded Font Local text control.

**SOSI3**

Specifies that the shift-in code is to be converted to a Set Coded Font Local text control and two blanks. A shift-out code is to be 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.

**Example:**

The following example specifies that the SOSI1 process mode is to be set up for a data set. PRMODE is specified in the OUTPUT statement.

```
//OUTDS OUTPUT CHARS=(fontname1,fontname2),PRMODE=SOSI1
```

Remember the following when you are using the SOSI process:

- For the process to work correctly two fonts must be specified in the CHARS parameter or in a page definition font list. The first font specified 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.

**TRC={YES|NO}**

Specifies whether the print data set contains table reference characters (TRCs).

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:**

In the following examples, an OUTPUT statement and a DD statement are used to specify that TRCs are present:

- This example shows the TRC parameter in an OUTPUT statement:

```
//OUTDS OUTPUT CLASS=name,
//       CHARS=(fontname1,fontname2),TRC=YES
//DD2 DD SYSOUT=(,),OUTPUT=(*.OUT2)
```

- This example shows the DCB subparameter in a DD statement:

```
//OUTDS OUTPUT CLASS=name
//DD2 DD SYSOUT=(,),OUTPUT=(*.OUT2),
//       CHARS=(fontname1,fontname2),DCB=OPTCD=J
```

When you use table reference characters, remember the following:

- If the value of this attribute is 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 *fontname1* and one for *fontname2*.
- If you do not specify TRC=YES in the JCL, 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=***fontname*

Serves as another way to select a font.

**Example:**

This example shows the UCS parameter in a DD statement:

```
//DD1 DD UCS=GT10
```

Consider the following:

- When a CHARS parameter is not specified in the output JCL, you can specify the universal character set (UCS) parameter to identify one font.
- If you specify a page definition on the OUTPUT statement that specifies fonts for your data set, the UCS parameter is ignored.

**USERLIB=(***'libname1','libname2',...'libname8'***)**

Specifies the name of one to eight cataloged MVS data sets (user libraries) containing AFP resources for processing this print data set. These transforms dynamically allocate these data sets and search for resources in them in the order specified on the USERLIB statement. If these transforms find no resources, these transforms 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.

**Note:** In order to be used with these transforms, all libraries specified must have universal read access.

**Example:**

In this example, the USERLIB parameter in the OUTPUT statement tells these transforms to search the library specified on the USERLIB statement for the specified data sets. If the data sets are not found, these transforms search the system libraries defined in the startup procedure.

```
//OUTDS OUTPUT USERLIB=('USER.IMAGES','USER.AFP.RESOURCES')
```

These transforms require all fonts to be 300 pel. If you are using fonts that have a different pel resolution, you must scale the fonts. For information about how to scale fonts, refer to *PSF for OS/390: Customization*. Converting fonts is a task usually done by your system administrator.

## Parameters for Distribution Information

You can specify the following distribution parameters on an OUTPUT JCL statement:

- ADDRESS
- BUILDING
- DEPT
- NAME
- ROOM
- TITLE

These values can be printed on a separator sheet if your installation writes an IP PrintWay exit that creates a separator sheet.

## AFP Parameters for Printing Remotely 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 for OS/390 use when you print on an IBM AFP printer. Also, data transforms provided with Infoprint Manager and Infoprint Server Transforms can use some of these parameters when transforming AFP and line data to another format, such as PCL or PostScript.

IP PrintWay sends the following JCL parameters to the target system:

- ADDRESS
- BUILDING
- CHARS
- CLASS
- COPIES
- DATACK
- DEPT
- DEST
- DUPLEX
- FCB
- FORMDEF
- FORMS
- INTRAY
- NAME
- OFFSETXB

OFFSETXF
OFFSETYB
OFFSETYF
OUTBIN
PAGEDEF
PRMODE – Values other than SOSI1, SOSI2, and SOSI3 are ignored.
ROOM
TITLE
TRC
UCS

For information about how IP PrintWay sends these and other JCL values to Infoprint Manager, refer to *z/OS Infoprint Server Operation and Administration*.

## Examples

In the following examples, assume that:

- `myprinter` a printer definition name.
- Class `E` is a JES work-selection criterion for the IP PrintWay output writer (FSA).
- Class `E` and destination `DEPT001` are printer-selection values specified in a printer definition.
- `pcl1` is a printer definition that does not specify a form name.
- `PS1` is a destination name.
- Class `E`, destination `DEPT002`, and form name `WIDE` are printer-selection values specified in another printer definition.
- `myoptions` is the name of an options component defined by the system administrator. Note that the component name is in lower case.
- `afpprinter` is the printer definition for a printer attached to a remote system running Infoprint Manager or Infoprint Server. Note that the printer definition name is in lower case.

The following examples are all JES2 examples. For differences between JES2 and JES3, refer to *z/OS MVS JCL Reference*.

### Direct Output to a Printer By Specifying the Printer Definition Name

These examples show how to direct an output data set 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 system administrator in this printer definition. If these values are not defined in the printer definition, IP PrintWay uses the standard defaults described in “Parameters” on page 109.

1. In this example, the OUTPUT statement specifies the printer definition name (`myprinter`).

```
//PWAYJOB3 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=E,FSSDATA='printer=myprinter'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

2. In this example, the OUTPUT statement specifies the printer definition name (`myprinter`)and the IP address (`99.123.453`). 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.

```
//PWAYJOB3 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=E,FSSDATA='printer=myprinter',DEST='IP:99.153.123.232'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

## Direct Output to a Printer By Specifying a Host Name or an IP Address

These examples show how to direct an output data set to a printer by specifying the host name or IP address of the target system 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 by your installation in a default printer definition. If no default printer definition exists, IP PrintWay uses the standard defaults described in “Parameters” on page 109.

1. In this example, the OUTPUT statement specifies the host name (`BOULDER.IBM.COM`) and the name of the print queue (`lpd1`).

   ```
   //PWAYJOB3 JOB ...
   //STEP1    EXEC PGM=USERA
   //OUTDS    OUTPUT CLASS=E,DEST='IP:BOULDER.IBM.COM',PRTQUEUE='lpd1'
   //DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
   ```

2. In this example, the OUTPUT statement specifies the IP address (`99.123.453`) and the name of the print queue (`lpd1`).

   ```
   //PWAYJOB3 JOB ...
   //STEP1    EXEC PGM=USERA
   //OUTDS    OUTPUT CLASS=E,DEST='IP:99.153.123.232',PRTQUEUE='lpd1'
   //DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
   ```

## Direct Output to a Printer by Specifying CLASS, FORMS, or DEST

These examples show how to specify the class, form name, or destination name to direct an output data set to a printer. IP PrintWay uses a printer whose definition matches the values you specify.

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 class, form, and destination name. The class and destination name match 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.

   ```
   //PWAYJOB1 JOB ...
   //STEP1    EXEC PGM=USERA
   //DD1      DD SYSOUT=(E,,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 the class and the destination name. It does not specify a form name. A JES default is used for the form name.

   ```
   //PWAYJOB2 JOB ...
   //STEP1    EXEC PGM=USERA
   //OUTDS    OUTPUT CLASS=E,DEST=DEPT001
   //DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
   ```

3. In this example, the OUTPUT statement specifies the class, form, and destination name. The print queue name, `lpd2`, overrides the name of the print queue specified in the printer definition.

```
//PWAYJOB2 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=E,FORMS=WIDE,DEST=DEPT002,PRTQUEUE='lpd2'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

## Direct Output to More Than One Printer

These examples show how to transmit an output data set to more than one printer at the same time by specifying multiple OUTPUT statements. The OUTPUT parameter on the DD statement refers to two OUTPUT JCL statements; therefore, JES creates two output data sets.

1. In this example, the OUTPUT statements specify two different destination names:

```
//PWAYJOB4 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS1   OUTPUT CLASS=E,DEST=DEPT001
//OUTDS2   OUTPUT CLASS=E,DEST=DEPT002
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS1,*.OUTDS2)
```

2. In this example, the OUTPUT statements specify the IP addresses of two printers:

```
//PWAYJOB5 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS1   OUTPUT DEST='IP:99.153.123.232',PRTQUEUE='lpd1'
//OUTDS2   OUTPUT DEST='IP:99.153.123.232',PRTQUEUE='lpd2'
//DD1      DD SYSOUT=(E,),OUTPUT=(*.OUTDS1,*.OUTDS2)
```

## Print AFP Data on a PostScript or PCL Printer

These examples show how to print line data or AFP data to a PostScript or PCL printer. These examples assume that your administrator has configured the printer definition in the Infoprint Server 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, AFP to PDF, and AFP to PostScript transforms use the same JCL parameters as PSF for OS/390 uses, you can specify the same JCL parameters as you do when you printing on an AFP printer.

1. In this example, an AFP job is sent to a PostScript printer. It does not specify a form name. A JES default is used for the form name:

```
//TRJOB1 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=E,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=E,FORMDEF=MYDEF,USERLIB=MYLIB,FSSDATA='printer=pcl1'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS1)
```

## Specify an Options Component

These examples show how to specify the name of Printer Inventory components defined by your system administrator.

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.

```
//PWAYJOB6 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT FSSDATA='printer=myprinter',PRTOPTNS='myoptions'
//DD1      DD SYSOUT=(E,),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.

```
//PWAYJOB7 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=E,DEST='IP:99.153.123.232',PRTQUEUE='lpd1',
//         PRTOPTNS='myoptions'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

## Specify Retry Values

These examples show how to specify the following retry values:

- Retry time of 1 minute. IP PrintWay retries a failed transmission several times immediately, then waits 1 minute between retries.
- Retry limit of 10 times. If the immediate retries fail, IP PrintWay retries a maximum of 10 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.

```
//PWAYJOB8 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT FSSDATA='printer=myprinter',
//         RETRYL=10,RETRYT='0000:01:00'
//DD1      DD SYSOUT=(E,),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.

```
//PWAYJOB9 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=E,DEST='IP:99.153.123.232',PRTQUEUE='lpd1',
//         RETRYL=10,RETRYT='0000:01:00'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

## Specify Retention Periods

These examples show how to specify the following 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.

```
//PWAYJOBA JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT FSSDATA='printer=myprinter',
//         RETAINF='96:00:00',RETAINS='24:00:00'
//DD1      DD SYSOUT=(E,),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.

```
//PWAYJOBA JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=E,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.

```
//PWAYJOBB JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=E,DEST='IP:99.153.123.232',PRTQUEUE='lpd1',
//         RETAINF='96:00:00',RETAINS='24:00:00'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

## Specify AFP Resources for Printing on a Remote 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 for OS/390. IP PrintWay prefixes P1 to the specified page definition name before transmitting the value.

```
//PWAYJOBC JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=E,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.

# Chapter 6. Transforming Batch Jobs from z/OS Using the AOPBATCH Program

The AOPBATCH program, provided by Infoprint Server in SYS1.LINKLIB, lets you submit a batch job to transform data to and from the Advanced Function Presentation (AFP) data format, using transforms provided by the Infoprint Server Transforms product (5697-F51).

## AOPBATCH Parameters

The AOPBATCH parameters are the name of the transform command, followed by transform options and arguments, in the following 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. The name of the transform program is case sensitive. You can specify one of the following transform command names provided by Infoprint Server Transforms: **afp2pcl, afp2pdf, afp2ps, pcl2afp, pdf2afp, ps2afp**, and **sap2afp**.

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. See “DD Statements” on page 136 for information about the defaults set for environment variables.

*transform_options*
Options and arguments accepted by transform. For a description of the transform command options and arguments, see the transform description in “Chapter 2. Printing from z/OS UNIX System Services Using Infoprint Server Commands” on page 25.

You must also 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. (When you use AOPBATCH, the transform cannot write its output to standard output and cannot read input from standard input.) To identify the transform input and transform output data set or file, you can specify either a DD statement name or a data set name. You must specify a DD statement name if you want the transform to write output to an MVS data set that does not already exist; the DD statement must allocate the output data set.

Specify the names of DD statements to the transform in the following format

```
//DD:DDname
```

where *DDname* is the name of the DD statement.

When you specify an MVS data set name, code two slashes before the data set name and enclose the data set name in two sets of single quotes if you specify

a fully qualified data set name. If you do *not* enclose the data set name in quotes, then OS/390 C/C++ assumes that the data set name is not fully qualified and adds a high-level qualifier to the name you specify, as follows:

- If you are running under TSO (batch or interactive), OS/390 C/C++ appends the TSO user prefix.
- If you are running under MVS batch or IMS (batch or online), OS/390 C/C++ appends the RACF user ID.
- If your system does not use RACF, OS/390 C/C++ does not add a high-level qualifier.

See “Examples” on page 137 for examples of different ways to specify transform input and output data sets and files.

## DD Statements

The AOPBATCH JCL procedure accepts the following 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 an HFS 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 following environment variables, AOPBATCH sets the following 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/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.

**STDERR**
: Specifies the system output data set where error messages are to be written. The data set can be an MVS data set or an HFS file.

**STDOUT**
: Specifies the system output data set where informational messages are to be written. The data set can be an MVS data set or an HFS file.

You can also include DD statements to specify the MVS data sets or HFS files that contain input data to be transformed, the transformed output, or job attributes that are input to the transform. To specify an MVS data set that already exists or to specify an HFS file, you can simply name the MVS data set or HFS file as a transform option in the PARM parameter, without including a DD statement. See “Examples” on page 137 for examples of different ways to specify transform input and output data sets and files.

**Note:** 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.

## Examples

The following 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. Transform **ps2afp** reads PostScript input from data set HLQ.INPUT.PS and writes AFP output to data set HLQ.OUTPUT.AFP. HLQ is 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  ...
//PRINT    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/%L/%N:/usr/lib/nls/msg/%L/%N
AOPCONF=/etc/Printsrv/aopd.conf
/*
```

## Specify Transform Input in an HFS File and Output in an MVS Data Set

This example shows how to transform data when the transform input is in an HFS file and transform output is written to an MVS data set. The **pdf2afp** transform reads the PDF input from HFS file **/tmp/input.pdf** and writes AFP output to HLQ.OUTPUT.AFP.

```
//AOPBATCH JOB  ...
//PRINT    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 an HFS File

This example shows how to transform data when the transform input is in an MVS data set and transform output is written to an HFS file. Transform **afp2pdf** reads the AFP input from MVS data set HLQ.INPUT.AFP and writes PDF output to HFS file **/tmp/output.pdf**.

```
//AOPBATCH JOB  ...
//PRINT    EXEC PGM=AOPBATCH,
// PARM='/afp2pdf -o /tmp/output.pdf "//''HLQ.INPUT.AFP''"'
//STDOUT   DD   SYSOUT=*
//STDERR   DD   SYSOUT=*
```

## Specify Transform Input and Output in HFS Files, and Specify an Attributes Data Set

This example shows how to transform data when the transform input is in an HFS file and transform output is also written to an HFS file. Transform **afp2ps** reads AFP input from HFS file **/tmp/input.afp** and writes PostScript output to HFS file **/tmp/output.ps**.

This example also shows how to specify Infoprint Server job attributes to the AFP to PostScript transform in a data set defined by a DD statement.

```
//AOPBATCH JOB  ...
//PRINT    EXEC PGM=AOPBATCH,
// PARM='/afp2ps -j attributes=//DD:ATTR -o /tmp/output.ps
//              /tmp/input.afp'
//STDOUT   DD   SYSOUT=*
//STDERR   DD   SYSOUT=*
//ATTR     DD   *
form-definition=F1A10010
page-definition=P1P08682
/*
```

# Exit Values

AOPBATCH returns the exit code of the spawned process. If AOPBATCH cannot execute the program, it returns 4.

# Part 4. Printing from VTAM Applications

# Chapter 7. Printing from VTAM Applications

The NetSpool component of Infoprint Server lets you print jobs from Virtual Telecommunications Access Method (VTAM) applications, such as Customer Information Control System (CICS) or Information Management System (IMS), without changing the applications. In order 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

## Data-Stream Support

NetSpool accepts the following 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 data, if your system administrator has configured NetSpool to treat VTAM data as binary data. In this case, NetSpool creates variable length records from the data that is received as input without converting or translating any controls or data.

For information about SCS and 3270 data streams, refer to *SNA—Sessions Between Logical Units* and *3270 Information Display System Data Stream Programmer's Reference*. For information about double-byte character set (DBCS) SCS and 3270 data streams, refer to *IBM 3270 Kanji Data Streams*.

NetSpool converts the SCS or 3270 data stream that it receives as input into a series of variable-length print records. Each record starts with an American Standards Association (ASA) carriage-control character.

NetSpool uses default page-formatting values defined by the system administrator if the SCS data stream does not contain Set Horizontal Format or Set Vertical Format commands.

"Appendix C. SCS Code Points" on page 177 describes the code points that NetSpool supports for the SCS data stream.

"Appendix D. 3270 Data Streams Code Points" on page 179 describes the code points that NetSpool supports for the 3270 data stream.

## 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 the S/370™ 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 allow the system administrator to 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. In an SCS data stream, NetSpool supports the following 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 the following 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 the S/370 line-data output.

**Note:** 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 system 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 system 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 the following 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 of function error (X'10030000'), indicating an unsupported function.
- Some SCS commands.

  See “Appendix C. SCS Code Points” on page 177 for details.

For 3270 data streams, NetSpool supports only the following 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 Table 10 on page 180.

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 remain unencrypted and uncompressed during processing and after placement on the job entry subsystem (JES) spool.

## Differences from SNA Network Printing

You may notice differences in the following 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, according to installation parameters that are specified by the system administrator.
- Deferred printing

  When you print output on an SNA network printer, each print request is printed immediately. However, JES or the system operator may defer the printing of data sets that are created by NetSpool 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 may 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 assist in determining when end-of-file occurs, NetSpool provides the following 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 system administrator specifies which end-of-file rule to use. If NetSpool does not correctly determine the end of your data sets, ask the system administrator to specify another end-of-file rule.

## Page Formatting for SCS Data Streams

In some cases, the SCS data streams used in LU type 1 sessions depend on a page format that has been preset for the SNA network printer. Instead, NetSpool uses a default page format that IBM supplies or a page format that the system administrator has defined in the printer definition for the printer in the Printer Inventory.

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. They remain in effect for all following print data sets on the same session. If no SHF or SVF command occurs in the print data stream, NetSpool uses the default page format or the page format that the system administrator defines.

These are the page-formatting values:

**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 Print Interface 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, ...***) | 0**
Identifies the position of vertical tabs (also channels 2–12). The first tab is always the same as the top margin value (TM) and does not need to be specified. The first 11 vertical tabs are also used as the line numbers for Select Vertical Channel 2 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 system administrator must define appropriate values in one or more printer definitions in the Printer Inventory.

**Notes:**

1. In the ISPF panels that the system administrator uses to define the Printer Inventory, the fields for setting page-formatting values are under the heading **Conversion between SCS and Line**.
2. The 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).

# Part 5. Printing from Remote Systems

# Chapter 8. Printing from Windows

Using Infoprint Server, you can print from your Windows 95, Windows 98, Windows NT, or Windows 2000 system to any printer defined to Infoprint Server. This includes IBM's Advanced Function Presentation (AFP) printers, also known as Intelligent Printer Data Stream (IPDS) printers.

Infoprint Server provides the following programs that run on a Windows system:

**AFP Printer Driver for Windows**
A printer driver converts your documents to a format that the printer understands. The AFP Printer Driver converts your documents to AFP format, which allows you to print to AFP printers. These files can contain documents, overlays, or page segments. Refer to *PSF for OS/390: User's Guide* for information about overlays and page segments.

**Note:** If the Infoprint Server Transforms are installed on z/OS, you can submit PostScript and PCL jobs to AFP printers. The Infoprint Server Transforms automatically convert jobs to the AFP data stream.

**AFP Viewer plug-in for Windows**
The AFP Viewer plug-in allows you to view files in AFP format from a Web browser. For example, you can download AFP files from your z/OS host system and view them. You can also view files that are in AFP format on the Web. Using the AFP Viewer plug-in, you can print AFP files to non-AFP printers as well as to AFP printers.

**Infoprint Port Monitor for Windows**
The Infoprint Port Monitor for Windows lets you print from Windows applications to any printer that your system administrator has defined to Infoprint Server and that you have defined to your Windows system. The printer can be attached directly to the z/OS system or can be a printer in your Transmission Control Protocol/Internet Protocol (TCP/IP) local area network (LAN) or a VTAM-controlled printer. The Infoprint Port Monitor for Windows lets you specify Infoprint Server job attributes when you print.

Instead of using the Infoprint Port Monitor for Windows to print from Windows applications, you can use either the standard Server Message Block (SMB) printing protocol used by Windows 95/98, Windows NT and Windows 2000 or the Internet Printing Protocol (IPP) used by Windows 2000. Infoprint Server provides transparent support for both the SMB and IPP protocols.

You can also use the Windows LPR command on a Windows NT or Windows 2000 system to print files directly, without using a Windows application that supports printing. For information about how to use the Windows LPR command, see "Printing From a Windows NT or Windows 2000 Workstation" on page 162.

## Getting Started

You can install any or all of these programs, depending on your needs:

- To print to AFP printers, install the AFP Printer Driver. Your Windows administrator may also tell you to install the Infoprint Port Monitor for Windows to improve performance or to allow you to specify job attributes.

- To print to non-AFP printers, you may not have to install any of these programs. However, your Windows administrator may tell you to install the Infoprint Port Monitor for Windows to improve performance or to allow you to specify job attributes.
- To view files that are in AFP format, install the AFP Viewer plug-in.

**Note:** The installation instructions in this chapter are current as of publication. If the product files are subsequently updated, the installation instructions may change. The Web site at **http://www.ibm.com/printers** will have the latest instructions.

## Requirements

These programs require Windows 95, Windows 98, Windows NT (Version 3.51 or higher), or Windows 2000. The Microsoft TCP/IP must be configured and operational.

The AFP Viewer plug-in also requires Netscape Navigator (Version 3.01 or later) or Microsoft Internet Explorer (Version 3.01, Level 4.70.1215 or later).

## Downloading Files

Use one of the following methods to download files to your workstation. Alternatively, your Windows administrator can download the files to a shared Windows folder.

- Download each program separately from the Web at **http://www.ibm.com/printers**.
- Use a file transfer program, such as **ftp**, to download the files in **binary**. To download the files, you need an account on the z/OS system where Infoprint Server is installed.

  Download the AFP Printer Driver and the Infoprint Port Monitor for Windows from one of the following z/OS directories, depending on the language version you want:

  **English** **/usr/lpp/Printsrv/win/En_US**

  **Japanese** **/usr/lpp/Printsrv/win/Ja_JP**

  **Spanish** **/usr/lpp/Printsrv/win/Es_ES**

  Download the AFP Viewer plug-in from the English directory:

  **English** **/usr/lpp/Printsrv/win/En_US**

  Download one or more of the following files:

  **afpdrv95.exe** AFP Printer Driver for Windows 95 and 98

  **afpdrvnt.exe** AFP Printer Driver for Windows NT

  **afpviewr.exe** AFP Viewer plug-in for Windows 95, 98, NT, and 2000

  **aopwin.exe** Infoprint Port Monitor for Windows 95, 98, NT, and 2000

  **Note:** The AFP Printer Driver and AFP Viewer on the Web might be later versions than the ones shipped with Infoprint Server on the z/OS system. You can download the AFP Printer Driver for Windows 2000 only from the Web.

The following examples assume that you downloaded files to folder **c:\temp**.

## Installing Files

This section describes how to install the files in a Windows folder on your workstation.

You do not need to install the Infoprint Port Monitor for Windows or the AFP Printer Driver on your workstation if your Windows administrator has installed these programs on the Windows server and used the Infoprint Port Monitor for Windows to configure the z/OS printers as shared printers. However, to use the AFP Viewer plug-in, you need to install the AFP Viewer plug-in on your own workstation.

### Installing the AFP Printer Driver for Windows 95 and 98

To install the AFP Printer Driver on a Windows 95 or Windows 98 system, run the **afpdrv95** command to extract files. Specify a Windows folder for the extracted files. For example, if you downloaded the driver to folder **c:\temp** and want to place the extracted files in folder **d:\afpdriver**, in the Run dialog, type:

```
c:\temp\afpdrv95 d:\afpdriver
```

### Installing the AFP Printer Driver for Windows NT and 2000

To install the AFP Printer Driver on a Windows NT or Windows 2000 system, run the **afpdrvnt** command to extract files. Specify a Windows folder for the extracted files. For example, if you downloaded the driver to folder **c:\temp** and want to place the extracted files in folder **d:\afpdriver**, in the Run dialog, type:

```
c:\temp\afpdrvnt d:\afpdriver
```

### Installing the AFP Viewer Plug-in

To install the AFP Viewer plug-in:

1. Install the Web browser on your workstation.
2. Run the **afpviewr** command to extract files. For example, if you downloaded the viewer to folder **c:\temp**, type the following command in the Run dialog:

   ```
   c:\temp\afpviewr
   ```
3. If your Web browser is running, stop and restart it.

### Installing the Infoprint Port Monitor for Windows

**Attention:** If you are currently have the Infoprint Port Monitor for Windows installed, you must uninstall it before trying to install a later port monitor. See “Uninstalling the Infoprint Port Monitor for Windows” on page 156 for instructions.

To install the Infoprint Port Monitor for Windows:

1. Run the **aopwin** command to extract files and specify a Windows folder to contain the extracted files. For example, if you downloaded the port monitor to folder **c:\temp** and want to place the extracted files in folder **c:\zostemp**, type the following command in the Run dialog:

   ```
   c:\temp\aopwin c:\zostemp
   ```
2. Run the **setup** command for the Infoprint Port Monitor for Windows. For example, in the Run dialog, type:

   ```
   c:\zostemp\setup
   ```

   The **setup** command asks you where you want to install files. Specify a directory on a drive that has enough space to temporarily hold files you want to print.
3. Restart your Windows system.

## Deleting Temporary Files

After installing the files, you can delete the files that you downloaded to your workstation. If you downloaded files to the folders that are shown in the examples, delete these files:

- File **c:\temp\afpdrv95.exe**
- File **c:\temp\afpdrvnt.exe**
- File **c:\temp\afpviewr.exe**
- File **c:\temp\aopwin.exe**
- Files in folder **c:\zostemp**

## Specifying the Directory for Infoprint Port Monitor Temporary Files

The Infoprint Port Monitor creates temporary files when it transmits print files to Infoprint Server. By default, the Infoprint Port Monitor creates these files in the root directory of your workstation's **c** drive. IBM recommends that you specify a different directory to contain port monitor temporary files, especially if you plan to print large files.

Later versions of the Infoprint Port Monitor might let you specify a directory for its temporary files when you install the Infoprint Port Monitor. However, if the Infoprint Port Monitor install process does *not* ask you to specify a directory for temporary files, then you must edit the Windows registry manually to specify the directory. (The Infoprint Port Monitor install process also asks you to specify a directory where Infoprint Port Monitor files can install its files; this *install* directory is different from the directory that Infoprint Port Monitor uses for its *temporary* files.)

To specify a directory for temporary files on a Windows 95 or Windows 98 system, follow these steps:

1. Start the registry editor using one of the following methods:
   - Enter `regedit` in an MS-DOS Command Prompt window. To open an MS-DOS Command Prompt window, select **Start** on the task bar; then select **Programs** --> **MS-DOS Command Prompt**.
   - Enter `regedit` in a Run dialog box. To open a Run dialog box, select **Start** on the task bar; then select **Run**.
2. Select the **+** icon to expand **HKEY_LOCAL_MACHINE**. Then expand **SOFTWARE** and **IBM**.
3. Select **Infoprint Port Monitor**.
4. Select **Edit** on the menu bar. Then select **New** in the pull-down menu and **String Value** in the cascaded menu.
5. Backspace to delete the **New Value** text in the Name column. Specify `SpoolDir` instead.
6. Double-click **SpoolDir** in the Name column.
7. The string editor is then displayed. Specify the drive and directory in which the port monitor should create its temporary files, for example, `d:\porttemp`. Specify a drive that has enough free space to hold the largest file you plan to print using the port monitor.
8. Shutdown and restart your workstation.

To specify a directory for temporary files on a Windows NT or Windows 2000 system, follow these steps:

1. Start the registry editor using one of the following methods:

- Enter `regedt32` in an MS-DOS Command Prompt window. To open an MS-DOS Command Prompt window, select **Start** on the task bar; then select **Programs** --> **MS-DOS Command Prompt**.
- Enter `regedt32` in a Run dialog box. To open a Run dialog box, select **Start** on the task bar; then select **Run**.

2. Double-click the **+** icon to expand **HKEY_LOCAL_MACHINE**. Then expand **SOFTWARE** and **IBM**.
3. Select **Infoprint Port Monitor**.
4. Select **Edit** on the menu bar. Then select **Add Value**.
5. Type `SpoolDir` for **Value Name**, and select `REG_SZ` for **Data Type**.
6. The string editor is then displayed. Type the drive and directory in which the port monitor should create its temporary files, for example, `d:\porttemp`. The drive you specify must have enough free space to hold the largest file you plan to print using the port monitor.
7. Shutdown and restart your workstation.

## Adding a z/OS Printer

Before you can print to a z/OS printer, you must define the printer to your Windows system. Ask your Windows administrator which of the following procedures to use:

- If you are using SMB protocol for printing, refer to *z/OS Distributed File Service SMB Administration* for information about adding a z/OS printer.
- On Windows 2000, your administrator may tell you to define the printer as an Internet printer.
- If your Windows administrator has defined the printer as a shared printer in your Windows network, define it to your system as a network printer.
- If your Windows administrator has not defined the printer as a shared printer in your Windows network, define it to your system as a local printer.

### Adding an Internet Printer

To define a z/OS printer to your Windows 2000 system as an Internet printer, follow these steps:

1. Ask your Infoprint Server administrator for the following information:
   - The Uniform Resource Identifier (URI) of the printer.

     The URI of a printer defined in the Printer Inventory has the following format:

     **http://*host*:*port*/servlet/IPPServlet/*printername***

     where:

     | | |
     |---|---|
     | *host* | The host name or IP address of the z/OS system. |
     | *port* | The port number where the IPP server is listening. By default, the IPP server listens at port 631. Ask your administrator the the port number to use. |
     | *printername* | The name of the printer definition in the Printer Inventory. |

     For example:

     ```
     http://myzoshost:631/servlet/IPPServlet/myprinter
     ```

     Be careful to note the exact spelling of the URI. Upper and lower case letters are *not* equivalent.
   - The manufacturer and model number of the printer.
   - The name of the printer driver to use.

This driver may be available online; or the system administrator may give it to you on a diskette or CD-ROM.

2. Use the standard Windows procedure to add a printer, and follow these special steps:
   a. When the **Add Printer Wizard** asks you whether to install the printer as a local printer or a network printer, select **Network printer**.
   b. When the **Add Printer Wizard** asks you how to connect, select **Connect to a printer on the Internet or your company's intranet**. Enter the URI of the printer in the **URL** field.
   c. When the **Add Printer Wizard** asks you whether to install the printer driver, select **Yes**.

      While Windows is installing the printer driver, the **Add Printer Wizard** returns to the screen where you entered the URI. For some time, it may seem that nothing is happening. Do *not* cancel the job. Wait for the **Add Printer Wizard** to go on to the next screen.

## Adding a Network Printer

If your Windows administrator has defined the z/OS printer as a shared printer in your Windows network, follow these steps:

1. Ask your Windows administrator for the name that he or she has assigned to the printer.
2. Follow standard Windows procedures to add the z/OS printer as a network printer.

**Note:** If the system administrator defines a printer as shared, individual users cannot be prompted for attributes when printing.

## Adding a Local Printer and Configuring the Infoprint Port Monitor for Windows

If your Windows administrator has not defined the z/OS printer as a shared printer in your Windows network, follow these steps to install it as a local printer:

1. Ask your Infoprint Server administrator for the following information:
   - The host name or the Internet Protocol (IP) address of the z/OS system.
   - The port number on the z/OS system at which Infoprint Server is listening. The default is 515.
   - The name of the printer to use. This is the name your system administrator used when defining the printer to Infoprint Server.
   - The name of the printer driver to use.
   - If you installed the AFP Printer Driver, the model number of the AFP printer.
   - If you installed the AFP Printer Driver, the resolution of the printer.
2. Use the standard Windows procedure to add a printer, and follow these special steps, which may occur in a different order on your Windows system:
   a. When the **Add Printer Wizard** asks you to select a port, follow these steps if you installed the Infoprint Port Monitor for Windows:
      1) Select **Infoprint Server**, and click **Configure** to configure it.
      2) On the Infoprint Port Configuration panel, follow the online instructions to connect to the z/OS system and select the printer.

         The **Options** button on this panel displays a screen where you can specify job attributes. By default, these attributes will apply to every job you send to this printer.

- In the Separator Sheet box, fill in the information that you want to appear on the cover sheet printed before each job. Whether a field is printed depends on how your system administrator has configured the separator sheet.
- In the **Job Attributes** field, enter any of the job attributes described in "Chapter 3. Using Job Attributes" on page 79. For example, if you want the printer to print jobs on both sides of the paper, enter:

  ```
  duplex=yes
  ```
- If you think that you may want to specify different attributes for some jobs, select the **Prompt for attributes when printing** check box.

b. When the **Add Printer Wizard** asks you to select a printer, follow these steps if you want to select the AFP Printer Driver:
   1) Select **Have Disk**.
   2) On the next panel, type the location of the Windows folder in which you installed the driver files, for example, **d:\afpdriver**, and click **OK**.
   3) Select the model number of the z/OS printer.

      If the model number is not on this list, select **IBM AFP** *nnn*, where *nnn* is the resolution of the printer. Then, change the printer characteristics as described in step 3, under "Configuring the AFP Printer Driver".

3. To add a second z/OS printer, you must add and configure another port if you installed the Infoprint Port Monitor for Windows. The **ReadMe** file installed with the Infoprint Port Monitor for Windows contains step-by-step instructions for adding another port.

**ReadMe File**

To find the **ReadMe** file:

1. Open the **Programs** folder from the Windows Start menu.
2. Open the Infoprint Port Monitor folder.
3. Select the **ReadMe** file. You can keep the **ReadMe** file open while you perform the steps that are required to add a z/OS printer.

## Configuring the AFP Printer Driver

After adding a printer, you can optionally configure the AFP Printer Driver to change default printing options and specify printer characteristics, if necessary. Follow these steps to configure the driver:

1. In the Windows **Printer** folder, highlight the icon for the printer.
2. Do one of the following, depending on your Windows system:
   - In Windows 95 or Windows 98, from the File menu, select **Properties**. Then select the **Paper** and **Options** tabs of the notebook.
   - In Windows NT or Windows 2000, from the File menu, select **Document Defaults** and **Properties**.
3. Specify the default printing options and printer characteristics. To specify the following printing options, select **Inline Form Definition** from either the **Options** tab (Windows 95 or 98) or from the **Document Defaults** dialog (Windows NT or 2000):
   - 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 on the **Use substitution table** option (Windows 95 or 98) or turning off the **Print text as graphics** option (Windows NT or 2000). This causes the driver to create a smaller output file. First, ensure that your printer can perform font substitution. Also, note that if you use True-Type fonts, the document may 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 or not the printer can perform 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 may need to change the printer characteristics to match those of the printer. Ask your system administrator for the needed information, or consult the printer documentation.

## Uninstalling the Infoprint Port Monitor for Windows

If you are currently using the Infoprint Port Monitor for Windows, you must uninstall it before trying to install a new port monitor.

To uninstall the Infoprint Port Monitor on Windows 95 or Windows 98, run the `unInstallShield` program provided with the Infoprint Port Monitor. To run the `unInstallShield` program, select **Start** on the task bar, and then select **Programs** --> **Infoprint Port Monitor** --> **unInstallShield**. If the `unInstallShield` program fails, follow these steps to uninstall the port monitor manually:

1. Remove port monitor data from the registry.
   a. Start the registry editor using one of the following methods:
      - Enter `regedit` in an MS-DOS Command Prompt window. To open an MS-DOS Command Prompt window, select **Start** on the task bar; then select **Programs** --> **MS-DOS Command Prompt**.
      - Enter `regedit` in a Run dialog box. To open a Run dialog box, select **Start** on the task bar; then select **Run**.

   b. Select the **+** icon to expand **HKEY_LOCAL_MACHINE** and then expand **SOFTWARE**.
   c. Delete the location of registry data for the version of the port monitor you installed:
      - If you installed a recent version of the port monitor, expand **IBM** and then delete **Infoprint Port Monitor**.
      - If you installed an early version of the port monitor, expand **IBM Printing Systems** and then delete **OS/390 Port**.

   d. Select the **-** icon to collapse SOFTWARE.
   e. Expand **System**, **CurrentControlSet**, **Control**, **Print**, and then **Monitors**.
   f. Delete the name of registry data for the version of the port monitor you installed:
      - If you installed a recent version of the port monitor, delete **Infoprint Printer Port**.
      - If you installed an early version of the port monitor, delete **OS/390 Printer Port**.

   g. Close the registry editor.
2. Restart your workstation.
3. Erase **ipmon95.dll** and **ip39095.dll** from the Windows system directory (typically c:\windows\system).

**Note:** You cannot erase these files until you have updated your registry and restarted your workstation.

4. Remove the port monitor's install directory and the files in it.
   a. Start Windows Explorer: select **Start** on the task bar; then select **Programs** and choose **Windows Explorer**.
   b. Delete the port monitor's install directory for the version of the port monitor you installed:
      - If you installed a recent version of the port monitor, delete the default directory, c:\Infoprint, or the directory you specified during installation.
      - If you installed an earlier version of the port monitor, delete the default directory, c:\os390, or the directory you specified during installation.
   c. Close Windows Explorer.
5. Remove the port monitor from Programs:
   a. Select **Start** on the task bar; then select **Settings** and choose **Taskbar**.
   b. Select the **Start Menu Programs** tab.
   c. Click **Remove**.
   d. Expand **Programs**, if necessary.
   e. Remove the name of the port monitor for the version you installed:
      - If you installed a recent version of the port monitor, select **Infoprint Port Monitor** and then click **Remove**.
      - If you installed an earlier version of the port monitor, select **OS/390 Printer Port** and then click **Remove**.
   f. Click **OK**.

To uninstall the Infoprint Port Monitor on Windows NT or Windows 2000, run the `unInstallShield` program provided with the Infoprint Port Monitor. To run the `unInstallShield` program, select **Start** on the task bar, and then select **Programs** --> **Infoprint Port Monitor** --> **unInstallShield**. If the `unInstallShield` program fails, follow these steps to uninstall the port monitor manually:

1. Remove port monitor data from the registry:
   a. Start the registry editor using one of these methods:
      - Enter `regedt32` in an MS-DOS Command Prompt window. To open an MS-DOS Command Prompt window, select **Start** on the task bar; then select **Programs** -> **MS-DOS Command Prompt**.
      - Enter `regedt32` in a Run dialog box. To open a Run dialog box, select **Start** on the task bar; then select **Run**.
   b. Double-click the **+** icon to expand **HKEY_LOCAL_MACHINE** and then expand **SOFTWARE**.
   c. Delete the location of registry data for the version of the port monitor you installed:
      - If you installed a recent version of the port monitor, expand **IBM**, select **Infoprint Port Monitor**, select **Edit** on the Menu bar, and then click **Delete**.
      - If you installed an early version of the port monitor, expand **IBM Printing Systems**, select **OS/390 Port**, select **Edit** on the Menu bar, and then click **Delete**.
   d. Double-click the **-** icon to collapse SOFTWARE.
   e. Expand **SYSTEM**, **CurrentControlSet**, **Control**, **Print**, and then **Monitors**.

f. Delete the name of registry data for the version of the port monitor you installed:
   - If you installed a recent version of the port monitor, select **Infoprint Printer Port**, select **Edit** on the Menu bar, and then click **Delete**.
   - If you installed an early version of the port monitor, select **OS/390 Printer Port**, select **Edit** on the Menu bar, and then click **Delete**.

g. Close the registry editor.

2. Stop the Spooler service:
   a. Select **Start** on the task bar; then select **Settings** -> **Control Panel**.
   b. Double-click **Services**.
   c. Select **Spooler** and then select **Stop**.
3. Erase **ipmonnt.dll** and **ip390nt.dll** from the Windows system directory (typically c:\winnt\system32). Note: You cannot erase these files until you have stopped the spooler service or shut down and restarted your workstation.
4. Start the Spooler service:
   a. Select **Start** on the task bar; then select **Settings** -> **Control Pane**l.
   b. Double-click **Services**.
   c. Select **Spooler** and then select **Start**.
5. Remove the port monitor's install directory and the files in it:
   a. Start Windows NT Explorer: select **Start** on the task bar; then select **Programs** -> **Windows NT Explorer**.
   b. Delete the port monitor's install directory for the version of the port monitor you installed:
      - If you installed a recent version of the port monitor, delete the default directory, c:\Infoprint, or the directory you specified during installation.
      - If you installed an earlier version of the port monitor, delete the default directory, c:\os390, or the directory you specified during installation.

   c. Close Windows NT Explorer.
6. Remove the port monitor from Programs:
   a. Select **Start** on the task bar; then select **Settings** -> **Taskbar**.
   b. Select the **Start Menu Programs** tab.
   c. Click **Remove**.
   d. Expand **Programs**, if necessary.
   e. Remove the name of the port monitor for the version you installed:
      - If you installed a recent version of the port monitor, select **Infoprint Port Monitor** and then click **Remove**.
      - If you installed an earlier version of the port monitor, select **OS/390 Printer Port** and then click **Remove**.

   f. Click **OK**.

## Printing and Viewing Files

After installing the print programs, adding a z/OS printer, and configuring the AFP printer driver, you can print to z/OS printers, including AFP printers. You can also view files in AFP format.

To print, use the standard print mechanism on any Windows application that supports printing.

If you installed the Infoprint Port Monitor for Windows and selected **Prompt for attributes when printing** when you added the printer, the Infoprint Server Options dialog will appear whenever you print a job. In the **Job Attributes** field, you can add the attributes described in “Chapter 3. Using Job Attributes” on page 79, or change any of the default attributes that you entered when you added the printer. For example, the **Job Attributes** may display the following default:

```
duplex=yes
```

You want to print this job on only one side of the paper, and you want three copies. Change the **Job Attributes** field to read:

```
duplex=no copies=3
```

To view an AFP file with the AFP Viewer plug-in, open the file from the File menu of your Web browser. The AFP file must have a file extension of **.afp** or be an AFP file from a Hypertext Transfer Protocol (HTTP) server with a MIME type of **application/vnd.ibm.modcap**. Using the AFP Viewer plug-in, you can also print an AFP file to an AFP printer or to a non-AFP printer. The printer must be defined to your Windows system. To print, click the print icon on the Viewer toolbar to print the entire document or selected pages.

Before you can view AFP files that reside on the z/OS system, you must use a transfer program such as **ftp** to download the AFP file in **binary** to your Windows workstation. Give the file on your Windows workstation a file extension of **.afp**.

# Chapter 9. Printing from Remote Systems in a TCP/IP Network

From workstations where Transmission Control Protocol/Internet Protocol (TCP/IP) is installed, you can use standard printing commands. Refer to the documentation for each remote system for the syntax of the commands.

**Notes:**

1. Infoprint Server may ignore some command options. For example, it ignores the command codes that contain information for printing on separator pages if your system 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 the Infoprint Server Transforms 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.

## Submitting a Print Request

You can use the **lpr** command to submit a print request. From an Advanced Interactive Executive (AIX) system, you can also use the **enq** and **qprt** commands.

Ask your system administrator for the following information:

- The host name or Internet Protocol (IP) address of the z/OS system on which Infoprint Server is running.
- The name of the printer definition that the system administrator has created for the printer. Specify this name as the name of the printer or print queue.
- The name of the printer driver for the z/OS printer, for printing from a workstation.

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.

## 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 following states:

**pending** The file is waiting to print.

**Note:** Because JES3 cannot distinguish job states, in a JES3 environment Infoprint Server may 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 may be:

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

**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.

  **Note:** JES3 does not recognize a job that is held for this reason and returns **pending**.

- The operator held the job.

**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 system 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 or to a print server has failed. Your system 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.

**purged** The file was deleted before printing.

## Printing From a Windows 3.1 Workstation

To print from a Windows 3.1 system, either within a Windows application or from the DOS command line, you must configure TCP/IP on the Windows operating system. During TCP/IP configuration, specify the name or IP address of the z/OS system and the name of the printer definition. Then, you must add the z/OS printer to the Windows operating system.

## Printing From a Windows NT or Windows 2000 Workstation

Windows NT and Windows 2000 systems provide an LPR command, which you can use to print files to a z/OS printer defined to Infoprint Server. The LPR command lets you print a file directly without using a Windows application that supports printing.

To use the LPR command, the system administrator must configure the Infoprint Server LPD to listen at port 515. If the administrator has configured the Infoprint Server LPD to listen at a different port, you can instead print with the Infoprint Port Monitor for Windows. This is because the Port Monitor lets you specify the port number at which the LPD listens. See “Chapter 8. Printing from Windows” on page 149 for information about the Infoprint Port Monitor for Windows.

You can specify the following LPR command and options when you print to Infoprint Server:

```
LPR  -S server -P printer -J job filename
```

where:

**-S** *server*
Specifies the IP address or host name of the z/OS system on which Infoprint Server is running.

**-P** *printer*
Specifies the name of the printer definition in the Printer Inventory. This name is case sensitive.

**-J** *job*
Specifies a title that can be printed on a separator page. Whether or not this title is printed depends on how the system administrator configures the printer's separator page.

*filename*
Specifies the name of the file you want to print.

The Windows LPR command also support the following options, which Infoprint Server either does not support or does not require:

**-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.

## Printing From an AIX Workstation

To print from an AIX system, you must configure a remote queue. During configuration of the remote queue, do the following:

- Specify the host name or IP address of the z/OS system as the host name.
- Specify the name of the printer definition as the queue name.
- Specify **BSD** as the type of print spooler.
- 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.

  The following **backend** option specifies a time-out value of 5 minutes in the -T option:

  ```
  backend=/usr/lib/lpd/rembak -X -T 5 -C
  ```

- After you change the **/etc/qconfig** file, delete the **/etc/qconfig.bin** file. Then, use the following 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** command, for example:

```
enq -P remotequeue -o "XAOP attribute=value..." filename
```

where:

**-P** *remotequeue*
Specifies the name of the remote queue.

**-o "XAOP** *attribute=value...*"

**-o 'X** *attribute=value...*'
Specifies any job attributes you want to use to print the job. If there are any spaces or special characters in the list of job attributes, surround the string with single or double quotation marks.

For a list of job attributes that you can specify, see "Chapter 3. Using Job Attributes" on page 79.

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:** The **lpr** command does not support the **-o** option.

*filename*
Specifies the name of the file you want to print.

## Printing from an OS/2 Workstation

You can print from an IBM Operating System/2 (OS/2) system that uses TCP/IP version 3.0, either from within an OS/2 application or by using the drag-and-drop method of printing. Before printing, you must configure TCP/IP and define the z/OS printer to the OS/2 system. To define a printer, do the following

- Select an LPD port as the output port.
- Change the properties of the output port, as follows:
  - Specify the host name or IP address of the z/OS system as the LPD server.
  - Specify the name of the printer definition in the Printer Inventory as the LPD printer. This name is case sensitive.
  - Optionally specify your system name and user name in the print source fields.
- Select a printer driver that is suitable for the type of printer; for example, select a PostScript driver for a printer that can print PostScript data streams. The printer driver creates output in a format that the printer understands.

  If the printer is an IBM AFP printer, you can select a generic text driver. However, if your installation has installed either the PCL to AFP transform or the PostScript to AFP transform on the z/OS system, you can get higher-quality output if you select a PCL or PostScript driver.

To print to the z/OS printer from the command line, use the **lpr** command. For example:

```
lpr -p printername -s hostaddress filename [-b]
```

where:

**-p** *printername*
Specifies the name of the printer definition in the Printer Inventory. This name is case sensitive.

**-s** *hostaddress*
Specifies the IP address or host name of the z/OS host on which Infoprint Server is running.

*filename*
Specifies the name of the file you want to print.

**-b** Specifies that the document contains data that must be interpreted as binary. Specify this option to print a document in PCL, PDF, PostScript, SAP, or AFP format.

## Printing From A Remote OS/390 or 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
```

where:

*filename*
Specifies the name of the file you want to print.

**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.

## Printing from a VM or z/VM System

To print from a Virtual Machine (VM) or z/VM system, use the LPR command. For example:

```
LPR filename (PRINTER printername HOST host_address
```

where:

*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.

## Printing from an AS/400 System

The most convenient way to print from an Application System/400 (AS/400) system is to perform these steps:

1. Define a remote print queue for a printer that your system administrator has defined to Infoprint Server, if the system administrator has not already done so. To do this:

a. Enter the CRTOUTQ command on the AS/400 command line.
b. Fill in the panels as follows:

**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 system administrator has created.

**Writers to autostart**
1

**Connection type**
*IP

**Destination type**
*OTHER

**Host print transform**
Specify *NO to print the Advanced Function Presentation (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:

```
'XAOP attribute=value...'
'X attribute=value...'
```

Surround the entire value, including the X or XAOP prefix and the list of attributes, in single quotation marks, as shown. If any of the attribute values contains special characters, surround the value in double quotation marks.

For a list of job attributes that you can specify, see “Chapter 3. Using Job Attributes” on page 79.

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 to the remote print queue exactly as you would submit it to a local print queue.
3. Enter the following command to start a remote printer writer:

   ```
   STRRMTWTR outputqueuename
   ```

   where *outputqueuename* is the name of the remote output queue. The remote printer writer takes files from the output queue and sends them to the printer.
4. To end the remote printer writer, enter the following command:

   ```
   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('XAOP attribute=value...')
```

where:

**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 lower-case 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 American National Standard Code for Information Interchange (ASCII) format. Specify *YES for SCS data; *NO for AFP data.

**DESTOPT('XAOP** *attribute=value...***')**

**DESTOPT('X** *attribute=value...***')**
Specifies any job attributes you want to use to print the job. Surround the entire value, including the X or XAOP prefix and the list of attributes, in single quotation marks, as shown. If any of the attribute values contains special characters, surround the value in double quotation marks.

For a list of job attributes that you can specify, see “Chapter 3. Using Job Attributes” on page 79.

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.

When you print a text document from an AS/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 AS/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 following source statements to create a workstation customization object that does not insert an initial null byte. These statements are the same as for the QSYS/QWPDEFAULT object, but with :INITPRT DATA='00'X. removed. For information about how to create a customization object, refer to *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.
```

# Chapter 10. Printing from Remote Systems in a Novell Netware Network

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. The Novell NetWare server must be connected by z/OS LANRES to the z/OS system where Infoprint Server is installed.

Before you can submit jobs to Infoprint Server, your system administrator must perform these tasks:

1. Create a NetWare print queue. You must know the name of this print queue in order to submit jobs to Infoprint Server.
2. Configure the LANRES Local Area Network (LAN)-to-Host print procedures data set according to the instructions in the prologue of the AOPLRXIT EXEC. Your system administrator installed this EXEC in the AOP.SAOPEXEC library on z/OS as part of the Infoprint Server installation.

# Part 6. Appendixes

# Appendix A. Job Attributes Valid for Different Printer Types

Table 5 shows which job attributes are validated for the printer you specified. Infoprint Server checks the value in some attributes against the supported values the administrator specifies in the printer definition. Even if a job attribute is valid for a printer type, a given printer of that type may not support all possible values of that attribute. For some job attributes, the system administrator can define the values that each printer supports. Before accepting a job, Infoprint Server verifies that the printer supports the values of these attributes.

*Table 5. Job Attributes Valididated for Printer*

| Job Attribute | Value Validated for Printer |
|---|---|
| **address-text**[1] | No |
| **building-text**[1] | No |
| **carriage-control-type** | No |
| **chars** | No |
| **copies** | Yes |
| **department-text**[1] | No |
| **document-codepage** | No |
| **document-format** | Yes |
| **document-type** | No |
| **duplex**[2] | Yes |
| **filter-options** | No |
| **form-definition** | No |
| **forms** | Yes |
| **hold** | No |
| **input-tray** | Yes |
| **input-tray-number**[2] | No |
| **jes-priority** | No |
| **name-text**[1] | No |
| **output-bin** | Yes |
| **output-bin-number**[2] | No |
| **overlay-back**[3]<br>**overlay-front**[3] | No |
| **page-definition** | No |
| **print-error-reporting** | Yes |
| **print-queue-name** | No |
| **printer-ip-address** | No |
| **resource-library**[3] | No |
| **room-text**[1] | No |
| **shift-out-shift-in**[2] | No |
| **table-reference-characters** | No |
| **title-text**[1] | No |

*Table 5. Job Attributes Valididated for Printer (continued)*

| Job Attribute | Value Validated for Printer |
|---|---|
| **x-image-shift-back**[2]<br>**x-image-shift-front**[2] | No |
| **y-image-shift-back**[2]<br>**y-image-shift-front**[2] | No |

[1] The **-text** attributes are valid for all printers, but they are used only if the system administrator sets up the printer's separator sheet to print the appropriate field.

[2] This attribute is used only when you use PSF for OS/390, the AFP to PCL, AFP to PDF, or AFP to PostScript transform, or Infoprint Manager to print AFP or line data; otherwise, this attribute is ignored.

[3] This attribute is used only when you use PSF for OS/390 or the AFP to PCL, AFP to PDF, or AFP to PostScript transform to print AFP or line data; otherwise, this attribute is ignored.

# Appendix B. JCL Parameters and Corresponding Job Attributes

Table 6 lists parameters of the OUTPUT and DD statements of the Job Control Language (JCL) and the Infoprint Server job attributes that correspond to them. For more information about the OUTPUT and DD JCL statements, refer to the *z/OS MVS JCL Reference*.

*Table 6. JCL Parameters and Corresponding Job Attributes*

| JCL Parameter | Job Attribute | See Page |
|---|---|---|
| ADDRESS | **address-text** | 81 |
| BUILDING | **building-text** | 81 |
| CHARS | **chars** | 82 |
| COPIES | **copies** | 84 |
| DATACK | **print-error-reporting** | 94 |
| DEPT | **department-text** | 84 |
| DEST=IP | **printer-ip-address** | 95 |
| DUPLEX | **duplex** | 86 |
| FORMDEF | **form-definition** | 88 |
| FORMS | **forms** | 89 |
| INTRAY | **input-tray**<br>**input-tray-number** | 89 |
| NAME | **name-text** | 91 |
| OFFSETXB | **x-image-shift-back** | 98 |
| OFFSETXF | **x-image-shift-front** | 99 |
| OFFSETYB | **y-image-shift-back** | 99 |
| OFFSETYF | **y-image-shift-front** | 100 |
| OUTBIN | **output-bin**<br>**output-bin-number** | 92 |
| OVERLAYB | **overlay-back** | 93 |
| OVERLAYF | **overlay-front** | 93 |
| PAGEDEF | **page-definition** | 94 |
| PRMODE | **shift-out-shift-in** | 97 |
| PRTQUEUE | **print-queue-name** | 95 |
| PRTY | **jes-priority** | 91 |
| ROOM | **room-text** | 96 |
| TITLE | **title-text** | 98 |
| TRC | **table-reference-characters** | 97 |
| USERLIB | **resource-library** | 96 |

# Appendix C. SCS Code Points

The NetSpool component of Infoprint Server transforms the Systems Network Architecture (SNA) character stream (SCS) for a logical unit (LU) type 1 printer into a variable blocked with ASA carriage control (VBA) data set. Table 7 describes the code points that are undefined, unsupported, supported with defaults, or fully supported.

NetSpool returns the following 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 unspecified code points to JES as EBCDIC data.

Refer to *SNA - Sessions Between Logical Units* for more information about SCS data streams. Refer to *IBM 3270 Kanji Data Streams* for more information about DBCS SCS data streams.

*Table 7. SCS Code Points*

| | **x0** | **x1** | **x2** | **x3** | **x4** | **x5** | **x6** | **x7** | **x8** | **x9** | **xA** | **xB** | xC | xD | xE | xF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0x | Null | (1) | (1) | (1) | SEL (9) | HT | RNL (4) | (1) | GE (3) | SPS (3) | RPT (3) | VT | FF | CR | SO (11) | SI (11) |
| 1x | (1) | DC1 (3) | DC2 (3) | DC3 (3) | ENP (3) | NL | BS | POC (3) | (1) | (1) | UBS (3) | CU1 (3) | IFS (4) | IGS (4) | IRS (4) | IUS (7) |
| 2x | (1) | (1) | (1) | WUS | INP (3) | LF | | | SA (12) | (1) | SW (3) | CSP (10) | (1) | (1) | (1) | BEL (3) |
| 3x | (1) | (1) | SYN (3) | IR (4) | PP | TRN | EBS (6) | (1) | SBS (3) | IT (3) | RFF (5) | CU3 (3) | DC4 (3) | (1) | (1) | SUB |
| 4x | | RSP (7) | | | | | | | | | | | | | | |
| 5x | | | | | | | | | | | | | | | | |
| 6x | | | | | | | | | | | | | | | | |
| 7x | | | | | | | | | | | | | | | | |
| 8x | | | | | | | | | | | | | | | | |
| 9x | | | | | | | | | | | | | | | | |
| Ax | | | | | | | | | | | | | | | | |
| Bx | | | | | | | | | | | | | | | | |
| Cx | | | | | | | | | | | SHY (8) | | | | | |
| Dx | | | | | | | | | | | | | | | | |
| Ex | | ESP (7) | | | | | | | | | | | | | | |
| Fx | | | | | | | | | | | | | | | | |

Notes on the table:

1. Undefined code point - function error.
2. Unsupported code point - function error.
3. Defaults to no operation - function ignored.
4. Defaults to new line (NL).
5. Defaults to form feed (FF).
6. Defaults to backspace (BS).
7. Defaults to space (X'40').
8. Defaults to dash (X'60').
9. Vertical channel select is supported. Select left/right platten is ignored. Select magnetic stripe reader/writer is unsupported.
10. Set Horizontal Format and Set Vertical Format are supported. Start of Format is ignored if at left margin and defaults to new line (NL) if not at left margin. Set Line Density, Set Graphic Escape Action, Set Chain Image and Set Print Density are ignored.
11. 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').
12. Set Attribute (SA) 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.

    NetSpool ignores Set Attribute code points with attributes of Color, Highlighting, or Field Outlining.

# Appendix D. 3270 Data Streams Code Points

The NetSpool component of Infoprint Server transforms the 3270 data streams for an logical unit (LU) type 0 or LU type 3 printer into a variable blocked with ASA carriage control (VBA) data set. Table 8, Table 9, and Table 10 on page 180 describe the code points that are supported for 3270 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 8. 3270 Data Stream Command Codes*

| Command Code | EBCDIC | Comments |
|---|---|---|
| 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 hexadecimal 00 (X'00') through hexadecimal 3F (X'3F').

*Table 9. 3270 Data Stream Control Codes*

| Control Code | EBCDIC | Comments |
|---|---|---|
| NL | X'15' | New Line |
| EM | X'19' | End of Message |
| FF | X'0C' | Forms Feed |
| CR | X'0D' | Carriage Return |
| SF | X'1D' | Start Field |
| SBA | X'11' | Set Buffer Address |
| IC | X'13' | Insert Cursor |
| PT | X'05' | Program Tab |
| RA | X'3C' | Repeat to Address |
| SFE | X'29' | Start Field Extended (See Table 10 on page 180.) |
| SA | X'28' | Set Attribute (See Table 10 on page 180.) |
| MF | X'2C' | Modify Field (See Table 10 on page 180.) |
| EUA | X'12' | Erase Unprotected to Address |
| GE | X'08' | Graphic Escape (Defaults to no operation-function, ignored and removed from data stream.) |
| SO | X'0E' | Shift Out |
| SI | X'0F' | Shift In |

*Table 9. 3270 Data Stream Control Codes (continued)*

| Control Code | EBCDIC | Comments |
|---|---|---|
| SYN | X'32' | SYN Character (Defaults to no operation-function, ignored and removed from data stream.) |
| Other control codes | | Function not supported. Returns SNA sense code X'1003000' |

## Attribute Types

*Table 10. 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) |
| Character Set | X'43' | X | X | When attribute value is X'00'-X'7F', character set attribute is set to single byte.<br><br>When attribute value is X'00'-X'7F', character set attribute is set to double byte. |
| 3270 Field Attribute | X'C0' | X | N/A | Field attribute bit definitions supported:<br>• Bit 2 = B'0'<br>Field is unprotected.<br>• Bit 2 = B'1'<br>Field is protected.<br>• Bits 4,5 = B'11'<br>Field is nonprintable.<br>• Bits 4,5<br>Other settings are ignored.<br><br>All other bit definitions are ignored. |
| Other Valid Attributes | X'41', X'42', X'45', X'46', X'C2' | X | X | Tolerated; defaults to 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.

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# Glossary

## Sources

This glossary defines technical terms and abbreviations used in Infoprint Server documentation. If you do not find the term you are looking for, see the index of this publication or view *IBM Glossary of Computing Terms*, located at: **http://www.ibm.com/ibm/terminology**

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Definitions that are specific to IBM products are so labeled; for example, “In TCP/IP,” or “In Infoprint Server.”

## References

The following cross-references are used in this glossary:

**Contrast with.** This refers to a term that has an opposite or substantively different meaning.

**See.** This refers to multiple-word terms in which this term appears.

**See also.** This refers to related terms that have similar, but not synonymous, meanings.

**Synonym for.** This appears in the commentary of a less desirable or less specific term and identifies the preferred term that has the same meaning.

**Synonymous with.** This appears in the commentary of a preferred term and identifies less desirable or less specific terms that have the same meaning.

# Numerics

**3270 data stream.** Data transferred from or to an allocated primary or tertiary device, or to the host system, as a continuous stream of data and 3270 Information Display System control elements in character form.

# A

**abend.** Termination of a task before its completion because of an error condition that cannot be resolved by recovery facilities while the task is executing.

**ACB.** Access method control block.

**access method control block (ACB).** A control block that links an application program to VTAM.

**ACIF.** (1) AFP conversion and indexing facility. (2) A PSF utility program that converts a print file into AFP, MO:DCA-P, creates an index file for input data, and collects resources used by an AFP document into a separate file.

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

**AFP.** Advanced Function Presentation.

**AFP Printer Driver for Windows.** A component of Infoprint Server that runs on a Windows workstation and creates output in AFP format, for printing on AFP printers.

**AFP Viewer plug-in for Windows.** A component of Infoprint Server that runs on a Windows workstation and allows you to view files in AFP format.

**AIX operating system.** IBM's implementation of the UNIX operating system. The RS/6000® system, among others, runs the AIX operating system.

**alphanumeric character.** A letter or a number.

**APPLID.** Identifier of a VTAM application program defined by a VTAM APPL resource statement.

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

**Note:** IBM has defined an extension to ASCII code (characters 128–255).

# B

**banner page.** A page printed before the data set is printed.

**binary data.** (1) Any data not intended for direct human reading. Binary data may contain unprintable characters, outside the range of text characters. (2) A type of data consisting of numeric values stored in bit patterns of 0s and 1s. Binary data can cause a large number to be placed in a smaller space of storage.

**BIND.** In SNA, a request to activate a session between two logical units (LUs).

**broadcast.** (1) Transmission of the same data to all destinations. (T) (2) Simultaneous transmission of data to more than one destination.

**buffer.** A portion of storage used to hold input or output data temporarily.

**burst.** To separate continuous-forms paper into single sheets.

# C

**carriage control character.** An optional character in an input data record that specifies a write, space, or skip operation.

**carriage return (CR).** (1) A keystroke generally indicating the end of a command line. (2) In text data, the action that indicates to continue printing at the left margin of the next line. (3) A character that will cause printing to start at the beginning of the same physical line in which the carriage return occurred.

**case-sensitive.** Pertaining to the ability to distinguish between uppercase and lowercase letters.

**catalog.** (1) A directory of files and libraries, with reference to their locations. (2) To enter information about a file or a library into a catalog. (3) The collection of all data set indexes that are used by the control program to locate a volume containing a specific data set.

**CICS.** Customer Information Control System.

**client.** A functional unit that receives shared services from a server. See also *client-server*.

**client-server.** In TCP/IP, the model of interaction in distributed data processing in which a program at one site sends a request to a program at another site and awaits a response. The requesting program is called a client; the answering program is called a server.

**code page.** (1) A table showing codes assigned to character sets. (2) An assignment of graphic characters and control function meanings to all code points. (3) Arrays of code points representing characters that establish ordinal sequence (numeric order) of characters. (4) A particular assignment of hexadecimal identifiers to graphic elements.

**code point.** A 1-byte code representing one of 256 potential characters.

**coexistence.** Two or more systems at different levels (for example, software, service or operational levels) that share resources. Coexistence includes the ability of a system to respond in the following ways to a new function that was introduced on another system with

which it shares resources: ignore a new function, terminate gracefully, support a new function.

**connection.** In TCP/IP, the path between two protocol applications that provides reliable data stream delivery service. In Internet communications, a connection extends from a TCP application on one system to a TCP application on another system.

**copy group.** (1) One or more copies of a page of paper. Each copy can have modifications, such as text suppression, page position, forms flash, and overlays. (2) An internal object in a form definition or a print data set that controls such items as modifications to a form, page placement, and overlays.

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

# D

**daemon.** A program that runs unattended to perform a standard service. Some daemons are triggered automatically to perform their task; others operate periodically.

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

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

**DBCS.** Double-byte character set.

**default.** A value, attribute, or option that is assumed when no alternative is specified by the user.

**directory.** (1) A type of file containing the names and controlling information for other files or other directories. Directories can also contain subdirectories, which can contain subdirectories of their own. (2) A file that contains directory entries. No two directory entries in the same directory can have the same name. (POSIX.1). (3) A file that points to files and to other directories. (4) An index used by a control program to locate blocks of data that are stored in separate areas of a data set in direct access storage.

**DLL filter.** A filter that provides one or more of these functions in a dynamic load library - init(), prolog(), process(), epilog(), and term(). See **cfilter.h** and **cfilter.c** in the **/usr/lpp/Printsrv/samples/** directory for more information. See also filter. Contrast with DLL filter.

**dotted decimal notation.** The syntactical representation for a 32-bit integer that consists of four 8-bit numbers written in base 10 with periods (dots) separating them. It is used to represent IP addresses.

**double-byte character set (DBCS).** A set of characters in which each character is represented by a two-bytes code. Languages such as Japanese, Chinese, and Korean, which contain more symbols than can be represented by 256 code points, require double-byte character sets. Because each character requires two bytes, the typing, display, and printing of DBCS characters requires hardware and programs that support DBCS. Contrast with *single-byte character set*.

**download.** To transfer data from one computer for use on another one. Typically, users download from a larger computer to a diskette or fixed disk on a smaller computer or from a system unit to an adapter.

**Download for OS/390.** A feature of PSF for OS/390 that allows the PSF program to automatically send data sets from the JES spool, without formatting them, directly to either Infoprint Manager for AIX or EDMSuite OnDemand, using the TCP/IP protocol. Infoprint Manager for AIX and EDMSuite OnDemand servers receive the data sets into files, which can be automatically formatted and printed by Infoprint Manager for AIX or loaded into EDMSuite OnDemand.

**drain.** An operator action to halt the flow of jobs to a printer, usually to stop the printer or to change print options.

# E

**EBCDIC.** Extended binary-coded decimal interchange code. A coded character set consisting of 8-bit coded characters. (A)

**encryption.** In computer security, the process of transforming data into an unintelligible form in such a way that the original data either cannot be obtained or can be obtained only by using a decryption process.

**environment variable.** (1) A name associated with a string of characters, made available to the programs that you run. (2) A variable that describes the operating environment of the process and typically includes information about the home directory, command search path, the terminal in use, and the current time zone. (3) A variable included in the current software environment that is available to any called program that requests it.

# F

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

**file system.** (1) A collection of files and directories. (2) The collection of files and file management structures on a physical or logical mass storage device, such as a disk or disk partition. A single device can contain several file systems. (3) A mountable subtree of the directory hierarchy. (4) A collection of files and certain of their attributes. A file system provides a name space for file serial numbers referring to those files. (POSIX.1).

**filter.** In Print Interface, a program that can add, delete, or modify input data before Print Interface writes the data to the JES spool. Print Interface provides support for two types of filter programs: DLL filters and UNIX filters. See also *DLL filter* and *UNIX filter*.

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

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

**FSA.** Functional subsystem application.

**FSS.** Functional subsystem.

**functional subsystem (FSS).** An address space uniquely identified as performing a specific function related to the JES.

**functional subsystem application (FSA).** The functional application program managed by the functional subsystem.

# H

**hexadecimal.** (1) Pertaining to a selection, choice, or condition that has 16 possible different values or states. (I) (2) Pertaining to a fixed-radix numeration system, with radix of 16. (I) (3) Pertaining to a system of numbers to the base 16; hexadecimal digits range from 0 through 9 and A through F, where A represents 10 and F represents 15.

**hiperspace.** A range of up to two gigabytes of contiguous virtual storage addresses that a program can use as a buffer. Like a data space, a hiperspace can hold user data; it does not contain common areas or system data. Instructions do not execute in a hiperspace. Unlike an address space or a data space, data is not directly addressable. To manipulate data in a hiperspace, you bring the data into the address space in 4K byte blocks.

**HFS data set.** A hierarchical file system data set, which is used to store, and is essentially identified with, a file system.

**home directory.** (1) The current directory associated with the user at the time of login. (POSIX.2) (2) A directory associated with an individual user. (3) The user's current directory on login or after issuing the **cd** command with no argument.

**host.** In the Internet suite of protocols, an end system. The end system can be any system; it does not have to be a mainframe.

**host address.** See *IP address*.

**host name.** In the Internet suite of protocols, the name given to a machine. Sometimes, ″host name″ is used to mean *fully qualified domain name*; other times, it is used to mean the most specific subname of a fully qualified domain name. For example, if *boulder.vnet.ibm.com* is the fully qualified domain name, either of the following may be considered the host name:

- boulder.vnet.ibm.com
- boulder

# I

**IMS.** Information Management System

**Infoprint Port Monitor for Windows.** A component of Infoprint Server that runs on a Windows 95/98 or

Windows NT workstation and sends a file for printing to Print Interface running on the z/OS system.

**Infoprint Server.** An element of z/OS V1R1 and higher that supports printing on z/OS printers, including local printers and remote printers in a TCP/IP network. Infoprint Server lets users submit print requests from remote workstations in a TCP/IP network, from z/OS UNIX System Services applications, from batch applications, and from VTAM applications, such as CICS or IMS applications. Infoprint Server consists of the following components:

- IP PrintWay
- NetSpool
- Print Interface
- Printer Inventory Manager
- Transform Manager and Infoprint Server Transforms
- SNMP subagent
- Windows client
  - IBM AFP Printer Driver for Windows
  - IBM AFP Viewer plug-in for Windows
  - Infoprint Port Monitor for Windows

**Information Management System (IMS).** A database/data communication system that can manage complex databases and networks.

**inline resource.** A resource contained in the print data set.

**internal copy group.** A copy group within a print data set instead of within a form definition. See also *copy group*.

**Internet.** A wide area network connecting thousands of disparate networks in industry, education, government, and research. The Internet network uses TCP/IP as the protocol for transmitting information.

**Internet Printing Protocol (IPP).** An application-level protocol that enables distributed printing on the Internet. IPP uses a client/server architecture and defines the interactions between IPP clients (typically work-stations) and IPP servers.

**Internet Protocol (IP).** A protocol used to route data from its source to its destination in an Internet environment.

**IP.** Internet Protocol.

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

**IPP.** Internet Printing Protocol.

**IP PrintWay.** A component of Infoprint Server that transmits output data sets from the JES spool to printers in a TCP/IP and SNA network. Also called PrintWay.

# J

**JCL.** Job control language.

**JES.** Job entry subsystem.

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

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

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

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

# K

**Kanji.** A Japanese ideographic alphabet. In Kanji, each character is represented by 2 bytes.

**kilobyte (KB).** (1) For processor storage, real and virtual storage, and channel volume, 1024 bits. (2) For disk storage capacity and communications volume, 1000 bytes.

# L

**LAN.** local area network.

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

**line printer daemon (LPD).** The printer server that allows other hosts to access its printer.

**line printer requester (LPR).** A client that allows the local host to submit a data set for printing on a remote printer server.

**local area network (LAN).** A computer network located on a user's premises within a limited geographical area. Communication within a local area

network is not subject to external regulations; however, communication across the LAN boundary may be subject to some form of regulation.

**locale.** (1) A description of a cultural environment. (POSIX.0). (2) The definition of the subset of a user's environment that depends on language and cultural conventions. (POSIX.2).

**logical printer.** In NetSpool, the target of the VTAM print data, which acts as the secondary LU (SLU) on the session.

**logical unit (LU).** A type of VTAM network accessible unit that enables end users to gain access to network resources and communicate with each other.

**logon mode.** In VTAM, a subset of session parameters specified in a logon-mode table for communication with a logical unit. See also *session parameters*.

**logon-mode table.** In VTAM, a set of entries for one or more logon modes. Each logon mode is identified by a logon mode name.

**LPD.** line printer daemon

**LPR.** line printer requester

**LU.** Logical unit.

**LU type.** The classification of an LU in terms of the specific subset of SNA protocols and options it supports for a given session, namely:

- The mandatory and optional values allowed in the session activation request
- The usage of data stream controls, function management headers, request unit parameters, and sense data values
- Presentation services protocols such as those associated with FMH usage

LU types 0, 1, 2, 3, 4, 6.1, 6.2, and 7 are defined.

# M

**Management Information Base (MIB).** A logical database made up of the configuration, status, and statistical information stored at a device.

**megabyte (MB).** (1) For processor storage, real and virtual storage, and channel volume, 1 048 576 bytes. (2) For disk storage capacity and communications volume, 1 000 000 bytes.

**MIB.** See *Management Information Base*.

**migration.** Activities that relate to the installation of a new version or release of a program to replace an earlier level. Completion of these activities ensures that the applications and resources on your system will function correctly at the new level.

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

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

# N

**NCP.** Network Control Program.

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

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

**Network Control Program (NCP).** An IBM licensed program that provides communication controller support for single-domain, multiple-domain, and interconnected network capability.

**Network Print Facility (NPF).** In eNetwork™ Communications Server, a feature that routes VTAM, JES2, or JES3 printer output to printers in a TCP/IP network.

**NPF.** Network Print Facility.

**NPM.** Network Printer Manager.

**Network Printer Manager (NPM) for the Web.** IBM Network Printer Manager (NPM) for the Web lets network administrators monitor, control, and configure IBM network printers. NPM also lets network administrators monitor some aspects of printers controlled by PSF for OS/390 and other manufacturers' network printers that comply with RFC 1759.

# O

**OnDemand.** A client/server application that you can use to replace hard copy reports and microfiche, and provide fast, online access to information. An OnDemand server manages electronic archives of reports and documents. You can use an OnDemand client program to search for information and view, print, and FAX copies of reports and documents.

**OpenEdition®.** See z/OS UNIX System Services.

**options data set.** In IP PrintWay prior to OS/390 V2R8, a VSAM data set containing one or more options

entries. Each options entry contains transmission options used by IP PrintWay. to transmit data sets to a print queue in a TCP/IP network. Each options entry can also contain NetSpool parameters that specify data-set characteristics for use by NetSpool.

**output writer.** A part of the job entry subsystem that receives job output from the system spool.

**output data set.** (1) A data set that a program opens so that it can write to that file. (2) A file that contains the results of processing.

**output writer.** A part of the job entry subsystem that receives job output from the system spool.

# P

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

**page-format table.** In NetSpool prior to OS/390 V2R8, a table that defines page-formatting values NetSpool uses for SCS data streams that do not contain SHF (Set Horizontal Format) or SVF (Set Vertical Format) commands. The table can contain several entries, each entry containing a different set of page-formatting values.

**parameter.** Information that the user supplies to a panel, command, or function.

**partitioned data set (PDS).** A data set in direct access storage that is divided into partitions, called members, each of which can contain a program, part of a program, or data. Synonymous with program library.

**pathname.** (1) A filename specifying all directories leading to the file. (2) A filename specifying all directories leading to a file plus the filename itself. (3) A string that is used to identify a file. A pathname consists of, at most, (PATH_MAX) bytes, including the terminating null character. It has an optional beginning slash, followed by zero or more filenames separated by slashes. If the pathname refers to a directory, it may also have one or more trailing slashes. Multiple successive slashes are considered to be the same as one slash. A pathname that begins with two successive slashes may be interpreted in an implementation-defined manner, although more than two leading slashes shall be treated as a single slash. (POSIX.1). In the z/OS UNIX System Services implementation, the C/370™ functions **fopen()**, **freopen()**, **remove()**, and **rename()** interpret names with exactly two leading slashes, no leading blanks or other characters, and the third character not a slash to mean that the rest of the name refers to a traditional MVS data set.

**pel.** Picture element.

**Picture element (pel, pixel).** (1) In computer graphics, the smallest element of a display surface that can be independently assigned color and intensity. (T). (2) The area of the finest detail that can be reproduced effectively on the recording medium. (3) An element of a raster pattern about which a toned area on a photoconductor can appear. (4) The addressable unit on a 3800 Printing System Model 3 or 8.

**PIDU.** Printer Inventory Definition Utility.

**PLU.** Primary logical unit.

**port.** (1) A part of the system unit or remote controller to which cables for external devices (display stations, terminals, or printers) are attached. The port is an access point for data entry or exit. (2) A specific communications end point within a host. A port is identified by a port number.

**POSIX.** Portable Operating System Interface for Computer Environments, an interface standard governed by the IEEE and based on UNIX. POSIX is not a product; rather, it is an evolving family of standards describing a wide spectrum of operating system components ranging from C language and shell interfaces to system administration.

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

**primary logical unit (PLU).** In SNA, the logical unit (LU) that sends the BIND to activate a session with its partner LU. Contrast with *secondary logical unit*.

**print queue.** A list of items waiting to be printed.

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

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

**printer definition.** In Infoprint Server, an entry in the Printer Inventory that contains information about a printer or set of printers that share the same characteristics. A printer definition contains information that Infoprint Server uses to print files.

**Printer Inventory.** In Infoprint Server, a set of files that contain printer definitions for printers. Each printer definition is identified with a unique printer name; the job submitter selects the printer name when printing a file. The printer definitions contain information that Infoprint Server uses to print files.

**Printer Inventory Definition Utility.** In Infoprint Server, a utility program that creates objects in the Printer Inventory.

**Printer Port Monitor.** See *Infoprint Port Monitor for Windows*.

**PrintWay.** See *IP PrintWay*.

**protocol.** A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication.

**PSF.** Print Services Facility.

**PSF/6000.** An intelligent printer driver that provides AFP capabilities for the AIX operating system on the RS/6000 system. AFP capabilities include electronic forms, images, graphics, and typographical fonts. Also called PSF for AIX.

# R

**RACF®.** Resource Access Control Facility

**Request for Comments (RFC).** In Internet communications, the document series that describes a part of the Internet suite of protocols and related experiments. All Internet standards are documented as RFCs.

**request unit (RU).** A message unit that contains control information, end-user data, or both.

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

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

**response unit (RU).** A message unit that acknowledges a request unit. It may contain prefix information received in a request unit. If positive, the response unit can contain additional information (such as session parameters in response to BIND SESSION). If negative, the response unit contains sense data defining the exception condition.

**Restructured Extended Executor (REXX).** A general-purpose, procedural language for end-user personal programming, designed for ease by both casual general users and computer professionals. It is also useful for application macros. REXX includes the capability of issuing commands to the underlying operating system from these macros and procedures. Features include powerful character-string manipulation, automatic data typing, manipulation of objects familiar to people, such as words, numbers, and names, and built-in interactive debugging.

**retain time.** In IP PrintWay, the length of time to keep a data set on the JES spool after either a successful transmission to the destination or a failed transmission, after retrying the transmission the number of times specified in the retry limit. You can specify a retain time for 2 different situations:

- Retain time for data sets that have been successfully transmitted
- Retain time for data sets whose transmission has failed

**retry limit.** In IP PrintWay, the maximum number of retries that IP PrintWay is to attempt.

**retry time.** In IP PrintWay, the time between two attempts to send the data set to its destination.

**REXX.** Restructured Extended Executor

**RFC.** Request for Comments.

**routing data set.** In IP PrintWay prior to OS/390 V2R8, a VSAM data set containing a routing entry for each print queue to which IP PrintWay can transmit output data sets. Each entry contains the name of the remote print queue, the IP address or name of the print queue's host system, the name of an options entry, and other routing information. Each routing entry can also define a NetSpool logical printer.

**RU.** Request/response unit.

# S

**SBCS.** Single-byte character set.

**SCS.** SNA Character String.

**SDSF.** System Display and Search Facility.

**secondary logical unit (SLU).** In SNA, the logical unit (LU) that receives the BIND request to establish a session with its partner LU. Contrast with *primary logical unit*.

**sense code.** In SNA, the data sent with a negative response, indicating the reason for the response.

**sequential data set.** (1) A data set whose records are organized on the basis of their successive physical positions, such as on magnetic tape. (2) A data set in which the contents are arranged in successive physical order and are stored as an entity. The data set can contain data, text, a program, or part of a program. Contrast with *partitioned data set (PDS)*.

**server.** (1) On a network, the computer that contains the data or provides the facilities to be accessed by

other computers on the network. (2) A program that handles protocol, queuing, routing, and other tasks necessary for data transfer between devices in a computer system.

**Server Message Block (SMB).** (1) A protocol for remote file and print access used by Windows clients. This protocol is also known as Common Internet File System (CIFS). (2) A program that handles protocol, queuing, routing, and other tasks necessary for data transfer between devices in a computer system.

**session.** A logical connection between two network accessible units that can be activated, tailored to provide various protocols, and deactivated, as requested.

**session parameters.** In SNA, the parameters that specify or constrain the protocols, for a session between two network addressable units (NAUs).

**shell script.** A file of shell commnds. If the file is executable; a user can run it by specifying the file's name as a shell command or as an operand on **sh** or on the TSO/E OMVS command. A shell script is like a TSO/E REXX program.

**shift-out, shift-in (SOSI).** Special EBCDIC or ASCII characters in the data stream that indicate switches between double-byte and single-byte fonts.

**Simple Network Management Protocol (SNMP).** A protocol that enables a management station to configure, monitor, and receive trap messages from network devices.

**single-byte character set (SBCS).** A set of characters in which each character is represented by a one-byte code. Contrast with *double-byte character set*.

**SLU.** Secondary logical unit.

**SMB.** Server Message Block.

**SMF.** System Management Facilities.

**SNA.** Systems Network Architecture.

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

**SNMP.** See *Simple Network Management Protocol*.

**SNMP agent.** Software that enables a device to respond to manager requests to view or update Management Information Base (MIB) data, and send traps reporting problems or significant events.

**SNMP Manager.** In SNMP, software in a network management station that enables the station to send requests to view or update MIB variables, to send and receive inform-requests, and to receive traps from an agent.

**SOSI.** See *shift-out, shift-in*.

**spool.** Simultaneous peripheral operation online.

**startup procedure.** JCL for a procedure to start an application (or, NetSpool and IP PrintWay).

**superuser.** A system user who operates without restrictions. A superuser has the special rights and privileges needed to perform administrative tasks.

**syntax.** The grammatical rules for constructing a command,

**System Display and Search Facility (SDSF).** An IBM-licensed program that provides a menu-driven full screen interface to obtain detailed information about the jobs and resources in an MVS/JES2 system.

**System Management Facilities (SMF).** An optional control program feature of z/OS that provides the means for gathering and recording information that can be used to evaluate system usage.

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

# T

**table reference character (TRC).** A numeric character corresponding to the order in which font character sets have been specified with the **chars** job attribute or in the page definition used to print a job. It is used to select a font character set during printing.

**TCP.** Transmission Control Protocol.

**TCP/IP.** Transmission Control Protocol/Internet Protocol.

**Telnet.** In the Internet suite of protocols, a protocol that provides remote terminal connection service. It allows users of one host to log on to a remote host and interact as directly attached terminal users of that host.

**Time Sharing Option (TSO).** An operating system option that provides interactive time sharing from remote terminals.

**trace.** A record of the execution of a computer program. It exhibits the sequences in which the instructions were executed. (A)

**transform.** A program that converts a data stream from one format to another, for example, from PCL to

AFP, PDF to AFP, and so on. The IBM-provided transforms are implemented as DLL filters.

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

**transmission-queue data set.** In IP PrintWay, a data set containing an entry for each data set that IP PrintWay is to transmit to the remote system or that IP PrintWay is retaining on the JES spool.

**transparent data.** (1) Data that is of no significance to the receiver. (2) Data that can contain any hexadecimal value.

**trap.** A message that reports a problem or a significant event.

**TRC.** Table reference character.

# U

**UCS.** Universal character set.

**universal character set (UCS).** A printer feature that permits the use of a variety of character arrays. Synonymous with *font*.

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

**UNIX filter.** A filter that accepts input via **stdin**, and returns the output via **stdout**. Options and positional arguments can be specified. UNIX filters may be any shell executable, for example, a shell script, a REXX exec, a C program, and so on. See also *filter*. Contrast with *DLL filter*.

**UNIX System Services.** See *z/OS UNIX System Services*.

**user port.** In IP PrintWay, a port address that is outside the range of addresses defined in RFC 1179 for the LPR source port.

# V

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

**VTAM.** Virtual Telecommunications Access Method.

# W

**Workbench for OS/2 and Windows.** An application that runs under Windows or WIN-OS/2® that enables you to browse and print AFP documents and resources on your workstation.

# Z

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

# Bibliography

This section lists publications that may be helpful to you as you configure and use Infoprint Server.

## Infoprint Server

| Title | Order Number |
|---|---|
| *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 Migration* | G544-5743 |
| *z/OS Infoprint Server Operation and Administration* | S544-5745 |
| *z/OS Infoprint Server User's Guide* | S544-5746 |

## Print Services Facility for OS/390

| Title | Order Number |
|---|---|
| *AFP Conversion and Indexing Facility: User's Guide* | S544-5285 |
| *PSF for OS/390: Customization* | S544-5622 |
| *PSF for OS/390: Diagnosis* | G544-5623 |
| *PSF for OS/390: Download for OS/390* | S544-5624 |
| *PSF for OS/390: Introduction* | G544-5625 |
| *PSF for OS/390: Messages and Codes* | G544-5627 |
| *PSF for OS/390: User's Guide* | S544-5630 |

## Advanced Function Presentation (AFP)

| Title | Order Number |
|---|---|
| *AFP: Printer Information* | G544-3290 |
| *AFP: Printer Summary* | G544-3135 |
| *AFP: Programming Guide and Line Data Reference* | S544-3884 |
| *IBM AFP Fonts: Font Summary* | G544-3810 |
| *IBM AFP Fonts: Font Summary for AFP Font Collection* | S544-5633 |
| *IBM Data Stream and Object Arcitectures: Bar Code Object Content Architecture Reference* | S544–3766 |

## z/OS Version 1 Release 1

| Title | Order Number |
|---|---|
| *z/OS C/C++ Programming Guide* | SC09-4765 |
| *z/OS Distributed File Service SMB Administration* | SC24-5918 |

| Title | Order Number |
|---|---|
| *z/OS Information Roadmap* | SA22-7500 |
| *z/OS ISPF Dialog Developer's Guide and Reference* | SC34-4821 |
| *z/OS JES2 Commands* | SA22-7526 |
| *z/OS JES2 Initialization and Tuning Guide* | SA22-7532 |
| *z/OS JES2 Initialization and Tuning Reference* | SA22-7533 |
| *z/OS JES3 Commands* | SA22-7540 |
| *z/OS JES3 Initialization and Tuning Guide* | SA22-7549 |
| *z/OS JES3 Initialization and Tuning Reference* | SA22-7550 |
| *z/OS Language Environment Programming Guide* | SA22-7561 |
| *z/OS MVS Diagnosis: Tools and Service Aids* | GA22-7589 |
| *z/OS MVS JCL Reference* | SA22-7597 |
| *z/OS MVS Product Management* | SA22-7603 |
| *z/OS MVS Programming: Authorized Assembler Services Reference ALE-DYN* | SA22-7609 |
| *z/OS MVS Programming: Authorized Assembler Services Reference ENF-IXG* | SA22-7610 |
| *z/OS MVS Programming: Authorized Assembler Services Reference LLA-SDU* | SA22-7611 |
| *z/OS MVS Programming: Authorized Assembler Services Reference SET-WTO* | SA22-7612 |
| *z/OS Planning for Installation* | GA22-7504 |
| *z/OS Program Directory* | GI10-0669 |
| *z/OS SDSF Operation and Customization* | SA22-7670 |
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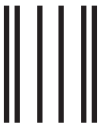

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