



IBM i

Printing

Advanced Function Presentation (AFP)

7.1





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Note

Before using this information and the product it supports, read the information in “Notices,” on page 75.

This edition applies to IBM i 7.1 (product number 5770-SS1) and to all subsequent releases and modifications until otherwise indicated in new editions. This version does not run on all reduced instruction set computer (RISC) models nor does it run on CISC models.

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Contents

Advanced Function Presentation (AFP)	1	
What's new for IBM i 7.1	1	
PDF files for AFP	2	
AFP concepts	2	
Overview of AFP printing	2	
Data streams	3	
AFP resources	4	
TrueType and OpenType fonts	10	
Resource libraries	12	
PSF configuration options	13	
Planning for AFP	17	
Determining whether PSF is required	17	
Installing PSF	18	
Ensuring that you have the necessary AFP resources	19	
Getting started with AFP	19	
Obtaining AFP resources	19	
Specifying AFP resources	25	
Creating AFP data	33	
Printing AFP data with PSF	34	
Transforming IPDS data to PDF	36	
Configuring PSF	42	
Configuring PSF by using a device description	43	
Configuring PSF by using a PSF configuration object	43	
Managing PSF	43	
Enabling IPDS pass-through support	44	
Sharing print sessions	44	
Automatic session recovery	45	
Disabling offset stacking and edge marking	46	
Specifying public data authority for directories created by PSF	47	
Line and mixed data stream support	48	
Special characters used with line data	48	
Printer file parameters used with line and mixed data	49	
Considerations and restrictions when using line data or mixed data	50	
Sending data from zSeries to IBM i	52	
Sending print data from VM to the output queue of a user ID	52	
Sending print data from z/OS to an IBM i output queue	53	
Sending data from zSeries to IBM i network files	54	
AFP reference information	54	
Form definitions included with the operating system	55	
Page definitions included with the operating system	55	
CL commands for PSF configuration objects	57	
CL commands for device descriptions	58	
TrueType fonts on OS/400 V5R2	58	
zSeries parameters and corresponding IBM i printer file parameters	59	
American National Standard carriage control characters	61	
Machine code carriage control characters	62	
Troubleshooting AFP	63	
Troubleshooting mapping problems	63	
Related information for AFP	69	
Appendix. Notices	75	
Programming Interface Information	76	
Trademarks	76	
Terms and conditions	77	

Advanced Function Presentation (AFP)

IBM® i has powerful printing and display functions. With Advanced Function Presentation (AFP) you can present information using overlays, bar codes, graphics, images, and more. IBM i supports a variety of powerful printing and presentation solutions.

This information illustrates some of the core IBM i printing functions, and helps you plan for and configure these functions.

Note: Read the “Code license and disclaimer information” on page 73 for important legal information.

What's new for IBM i 7.1

| Read about new information for the Advanced Function Presentation (AFP) topic collection.

| **Encrypting PDF output**

| When you transform an Intelligent Printer Data Stream (IPDS) file to PDF, you can encrypt the PDF stream or spooled file. See “Encrypting the PDF file” on page 41 for more information.

| **Disabling offset stacking and edge marking**

| Print Services Facility™ (PSF) lets you disable offset stacking on cut-sheet printers and edge mark printing on continuous forms printers. See “Disabling offset stacking and edge marking” on page 46 for more information.

| **Specifying public data authority for directories created by PSF**



| PSF lets you specify the public data authority for any directories that PSF creates when a mapping program specifies that PDF files are to be written to the integrated file system. See “Specifying public data authority for directories created by PSF” on page 47 for more information.

| **Troubleshooting mapping problems**

| PSF provides a diagnostic trace file and new error message reason codes to help you find errors in mapping programs. See “Troubleshooting mapping problems” on page 63 for more information.

| **How to see what's new or changed**

| To help you see where technical changes have been made, the information center uses:

- | • The  image to mark where new or changed information begins.
- | • The  image to mark where new or changed information ends.

| In PDF files, you might see revision bars (|) in the left margin of new and changed information.

| To find other information about what's new or changed this release, see the Memo to Users.

Related reference:



Infoprint Server for iSeries: User's Guide (G544-5775) PDF

PDF files for AFP

You can view and print a PDF file of this information.

To view or download the PDF version of this document, select Advanced Function Presentation (AFP) (about 844 KB).


| You can view or download the related topic PDF Basic printing (about 2613 KB).

Saving PDF files

To save a PDF file on your workstation for viewing or printing:

1. Right-click the PDF file in your browser (right-click the link above).
2. Click the option that saves the PDF locally.
3. Navigate to the directory in which you want to save the PDF file.
4. Click **Save**.

Downloading Adobe Reader

You need Adobe Reader installed on your system to view or print these PDFs. You can download a free copy from the Adobe Web site (www.adobe.com/products/acrobat/readstep.html) .

Related concepts:

“Related information for AFP” on page 69

Product manuals, IBM Redbooks® publications, Web sites, and other information center topic collections contain information that relates to the Advanced Function Presentation topic collection. You can view or print any of the PDF files.

AFP concepts

Use this information to understand how AFP works on IBM i.

Read these topics for an overview of the Advanced Function Presentation (AFP) and related concepts.

Related reference:

“AFP reference information” on page 54

Look up information about PSE, such as the form definitions and page definitions included with your system, here.

Overview of AFP printing

AFP is an architecture-based system of hardware and software for creating, formatting, viewing, retrieving, printing, and distributing information using a wide variety of printer and display devices.

Advanced Function Presentation (AFP) is the original, integrated data stream on IBM i for generating fully composed pages of data. Traditional line-mode print applications compose a line at a time down the page (typically continuous form pages), whereas AFP composes the entire page before printing. In AFP, page elements such as text, images, bar codes, page segments, and overlays, can be specified in any order at any position in the page. This is called all points addressability.

Advanced Function Presentation data stream (AFPDS) is a printer-independent data stream that composes full pages within a document. Many of the page elements you can use with AFP are special objects called resources.

AFPDS

AFPDS files can be generated on IBM i as well as many other platforms. These operating systems can send AFPDS files to each other for printing on AFP-configured printers.

PSF

Print Services Facility (PSF) combines print data with resources to manage and control data transmitted to AFP printers. PSF accepts various data streams, transforms these data streams into the data stream required by each printer, and then transmits the data to the printer. PSF uses processing and printing options specified by the user and the installation during these processes. In addition, PSF does the following:

- Manages resources.
- Verifies part of the input data stream's syntax (the printer verifies the remainder of the syntax).
- Provides diagnostic aids, which provide information that can be used for problem analysis.
- Reports the status of a printer to the system operator.
- Provides accounting information.
- Provides error-recovery procedures for AFP printers. If a spooled file does not print due to a printer problem such as a paper jam, PSF retransmits the affected pages when the problem at the printer is corrected.

To use AFP support on IBM i, typically PSF must be installed. However, if the ASCII data stream is converted through Host Print Transform, you can use the AFP support without installing PSF.

Related concepts:

“AFP resources” on page 4

Advanced Function Presentation (AFP) resource objects contain data and control information.

“Determining whether PSF is required” on page 17

You must install PSF if you use certain printers, use IBM i to print line or mixed-mode data, or use certain printer file parameters or DDS keywords.

“Creating AFP data” on page 33

There are several different ways to generate Advanced Function Presentation (AFP) data. You can use a printer file, DDS keywords, Infoprint Server, the AFP printer driver, or Advanced Function Printing Utilities.

Data streams

Advanced Function Presentation (AFP) applications can generate Advanced Function Printing data stream (AFPDS), line, or mixed (AFPDS and line) spooled files.

These applications can run on IBM i or on other platforms. IBM i can receive spooled files from other operating systems.

Line data

Line data is record-oriented readable text.

The generating application can partially format line data by doing one of these:

- Adding carriage control characters to the first column of each record
- Adding blank lines to adjust vertical positioning
- Using skipping and spacing controls (such as on an RPG output specification)

Line data is supported as a device type in the printer file commands through the DEVTYPE(*LINE) specification. The printer file commands follow:

- Create Printer File (CRTPRTF)

- Change Printer File (CHGPRTF)
- Override with Printer File (OVRPRTF)

Related concepts:

“Line and mixed data stream support” on page 48

Use this information to understand how PSF supports line and mixed data on IBM i.

Related information:

 [Advanced Function Printing: Programming Guide and Line Data Reference \(S544-3884\) PDF](#)

Mixed data

Mixed data is line data intermixed with AFPDS data.

Mixed data can also be called *AFPDSLIN data. Only certain AFPDS structured fields are allowed to be intermixed with line data. See *Advanced Function Printing: Programming Guide and Line Data Reference*, S544-3884, for information about mixing line data and AFPDS structured fields.

Related concepts:

“Line and mixed data stream support” on page 48

Use this information to understand how PSF supports line and mixed data on IBM i.

Related information:

 [Advanced Function Printing: Programming Guide and Line Data Reference \(S544-3884\) PDF](#)

zSeries and z/OS data

IBM i can receive data from zSeries systems.

From an Advanced Function Presentation (AFP) perspective, data sent to IBM i from a zSeries system can be any of these:

- Print data (letters, documents, and so on)
 - Advanced Function Presentation data stream (AFPDS).
 - AFPDSLIN (or mixed data). AFPDSLIN is data that has a mixture of line data and AFPDS data.
 - LINE (line data). Line data is data that has been prepared for printing on a line printer. Line data does not contain all placement or presentation information that is needed for printing on page printers.
- Resources

Note: In these topics, the term *zSeries* means zSeries and z/OS[®] unless otherwise stated.

AFP resources

Advanced Function Presentation (AFP) resource objects contain data and control information.

This information can be shared by different pages within a spooled file as well as different spooled files. Examples of resources are fonts, which define the characters used to print text, and page segments, which can include images and text.

Resources can be stored and accessed from within the operating system being used. By referring to the name of the stored resource, many data streams can share the same resources. For more information about resources, see the descriptions of the different resource types.

Related concepts:

“TrueType and OpenType fonts” on page 10

There is extensive operating system support for TrueType fonts, and they are popular with PC applications. Consequentially, TrueType is probably the most prevalent font technology in the industry today. OpenType is an extension of the TrueType font format.

“Resource libraries” on page 12

Advanced Function Presentation (AFP) resource libraries group resources of the same type.

“Ensuring that you have the necessary AFP resources” on page 19

You need to determine what resources you need for your Advanced Function Presentation (AFP) application and ensure that they are stored in appropriate locations.

Related tasks:

“Printing data sent to IBM i from zSeries” on page 35

PSF can print data that was generated on zSeries. This data might be AFP, AFPDLINE (AFP data mixed with line data), or line data. The data might be sent to network files or directly to an output queue.

AFP fonts

A font is a collection of characters of a certain size, typeface, and type style. Advanced Function Presentation (AFP) fonts, also called Font Object Content Architecture (FOCA) fonts, are the standard fonts used for Intelligent Printer Data Stream (IPDS) output. AFP fonts are made up of a code page and a character set. All AFP fonts are encoded as either single-byte or double-byte fonts, depending on the language for which they are being used.

Each character in a font is identified by a 1-byte (single-byte) or a 2-byte (double-byte) code. The internal structure of fonts depends on whether the font is for a phonetic or a non-phonetic writing system. An example of a phonetic writing system is English. An example of a non-phonetic writing system is Kanji.

At least two resources are needed to make up a font: a font character set and a code page. The relationship between code pages and font character sets is illustrated in Figure 1 on page 6. A third resource, a coded font, can define a font by naming a font character set and a code page.

Font character set

This resource contains the patterns for each character in the font and associates an 8-byte character identifier with each pattern. This resource also contains descriptive information for the entire character set.

Code page

This resource associates code points with character identifiers within a font character set, each representing a character pattern. A code point is an 8-bit binary number representing one of 256 potential characters.

Coded font

This resource associates one or more code pages with the appropriate font character sets.

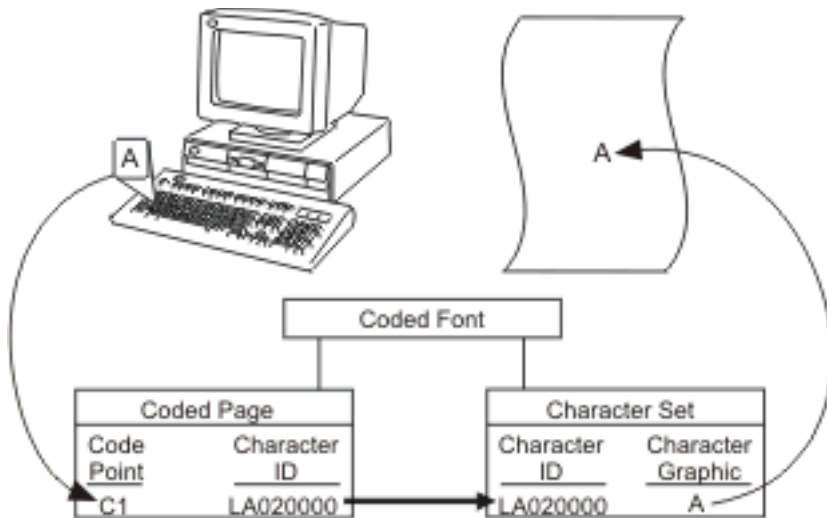


Figure 1. Translation of a keyboard character into a printed character. A code page and character set together make a coded font. Pressing the A key selects Code point C1. The code page associates Code point C1 with Character ID LA020000. The character set associates Character ID LA020000 with an A in the selected typeface. An A prints on the page.

Related concepts:

“Obtaining AFP resources” on page 19

There are many sources of Advanced Function Presentation (AFP) resources.

“AFP font libraries” on page 13

IBM supplies several AFP font libraries. In addition, you can create a library list that allows AFP to locate and use other fonts.

“TrueType and OpenType fonts” on page 10

There is extensive operating system support for TrueType fonts, and they are popular with PC applications. Consequentially, TrueType is probably the most prevalent font technology in the industry today. OpenType is an extension of the TrueType font format.

Related reference:

“Specifying an AFP font” on page 28

There are many different tools you can use to specify Advanced Function Presentation (AFP) fonts in your document. Each tool has different capabilities.

“How TrueType and OpenType fonts differ from AFP fonts” on page 11

When using TrueType fonts, you will see differences in how the fonts are specified, managed, and installed when compared to Advanced Function Presentation (AFP) fonts.

Form definitions

A form definition is an Advanced Function Presentation (AFP) resource object that defines the characteristics of the physical form to be printed on.

Form definitions define these characteristics:

- Overlays to be used
- Position of page data on the form
- Rotation
- Duplexing
- Input drawer
- Formfeed type
- Print quality
- Number of copies of each page and the modifications that apply to each set of copies

Whenever you are printing to a printer configured as AFP(*YES), a form definition is required. If you do not specify a form definition on the printer file, an inline form definition is built from the printer file parameters. If you specify a form definition, no inline form definition is built from the printer file parameters. In this case, if you send the data to an AFP printer, Print Services Facility (PSF) ignores some printer file parameters.

AFP-related form definitions can be:

- Provided with IBM i
- Created with the IBM Infoprint Designer for iSeries licensed program
- Downloaded from zSeries
- Included inline from zSeries
- Created automatically from printer file parameters

Related concepts:

“How page definitions, form definitions, and printer files interact” on page 16

You can use a printer file to specify some of the same options as you can specify with a page definition and a form definition. This topic describes how PSF chooses an option when a printer file is used with a page definition and form definition.

“Obtaining AFP resources” on page 19

There are many sources of Advanced Function Presentation (AFP) resources.

“Specifying a form definition” on page 25

To use or identify a fully qualified form definition, specify a value in the FORMDF parameter with a CL command.

Related reference:

“Form definitions included with the operating system” on page 55

This topic lists the form definitions that are provided with IBM i in library QSYS.

Object containers

Object containers are used to carry non-Object Content Architecture (OCA) objects in an Advanced Function Presentation (AFP) data stream.

Some such objects are Graphics Interchange Format (GIF) and Tagged Image File Format (TIFF) images. These non-OCA objects can be *wrapped* or *unwrapped*. Wrapped objects are carried in a Mixed Object Document Content Architecture (MO:DCA) envelope called an object container. Unwrapped objects are unaltered from their original form. If the object is to be carried in MO:DCA resource groups and interchanged, it must be wrapped.

Note: Print Services Facility (PSF) does not check an object container's contents. Therefore, it is up to the user to verify that the printer can handle the type of data in the object container. The Infoprint Server PDF subsystem works like a printer. For information about the types of images it can accept, see the *Infoprint Server for iSeries: User's Guide*.

Object containers, even though they contain non-OCA objects, are similar to other AFP resources in these ways:

- They can be mapped. A mapped resource is downloaded once per spooled file, no matter how many times the resource is referenced in the spooled file.
- They can be included on a page.
- They can be captured in the printer.

Using object containers has several benefits:

- You can reference several types of MO:DCA objects in a spooled file without having to include them in an overlay or page segment. These image types are image data, bar code data and graphics data.

- You can scale and rotate these objects. With page segments and overlays, you need to create one copy of the object in each orientation needed.
- You can include images larger than 16 MB in your output. If an image exceeds 16 MB, the image cannot be stored as a page segment object.
- Print applications can specify the use of non-OCA objects which refer to other non-OCA objects, such as color mapping tables (which are printer-resident). These are called *secondary resources*.
- Applications can use color objects with Intelligent Printer Data Stream (IPDS) printers.
- The IBM Infoprint Server for iSeries licensed program's PDF subsystem accepts object containers with certain types of images as input.

Related concepts:

“Obtaining AFP resources” on page 19

There are many sources of Advanced Function Presentation (AFP) resources.

“Specifying an object container” on page 32

There are different ways to include object containers in your data, depending on your installation and how you want to use them.

Related information:



Infoprint Server for iSeries: User's Guide (G544-5775) PDF

Overlays

Overlays, also known as electronic forms, are a collection of predefined data such as lines, shading, text, boxes, or logos. They can be merged with variable data on a sheet while a spooled file is being processed.

You can use the licensed program IBM Infoprint Designer for iSeries, the licensed program Advanced Function Printing Utilities, the licensed program IBM Infoprint Server for iSeries, or the Advanced Function Presentation (AFP) printer drivers provided for Microsoft Windows to create overlays on IBM i. Overlays can also be downloaded from other operating systems, such as zSeries.

When overlay data is received from the zSeries system, you place it in a data file. To convert the page overlay data to a format that can be used by IBM i, use the Create Overlay (CRTOVL) CL command.

Related concepts:

“Obtaining AFP resources” on page 19

There are many sources of Advanced Function Presentation (AFP) resources.

“Specifying an overlay” on page 27

To use overlays, specify them in the front and back overlay parameters of the printer file being used with your application.

Related reference:

Create Overlay (CRTOVL) CL command

Page definitions

Page definitions are resources that format and compose line data into logical pages.

A page definition contains printing controls that specify:

- Where data from each input record is to be printed
- Page size (height and width)
- Data fields that can be suppressed
- Print positions for line-data records containing carriage control characters
- Inline printing direction
- Number of lines per inch
- List of page segments that might be used
- List of overlays that might be used

- Record definitions
- Constant data to be printed
- List of fonts that might be used

Whenever you are printing to a printer configured as AFP(*YES) and you are printing line or mixed data, a page definition is required. If a page definition is not specified on the printer file, an inline page definition is built from the printer file parameters.

If you specify a page definition and also specify line data or mixed data, no inline page definition is built from the printer file parameters. In this case, if you send the data to an Advanced Function Presentation (AFP) printer, Print Services Facility (PSF) ignores some print parameters.

Related concepts:

“How page definitions, form definitions, and printer files interact” on page 16

You can use a printer file to specify some of the same options as you can specify with a page definition and a form definition. This topic describes how PSF chooses an option when a printer file is used with a page definition and form definition.

“Obtaining AFP resources” on page 19

There are many sources of Advanced Function Presentation (AFP) resources.

“Specifying a page definition” on page 26

To use or identify a fully qualified page definition, specify the PAGDFN parameter on a CL commands.

Related reference:

“Page definitions included with the operating system” on page 55

This topic lists the page definitions that are provided with IBM i in library QSYS.

Page segments

Page segments are objects containing composed text and images that are prepared before formatting and included during printing.

For example, you might want to repeat constant data at different positions on a page or overlay. You might also want to repeat that data on different pages or overlays. You can do this by using a page segment. A company logo is an example of this type of data.

You can use the IBM Infoprint Designer for iSeries licensed program, the Advanced Function Printing Utilities licensed program, the IBM Infoprint Server for iSeries licensed program, or the Advanced Function Presentation (AFP) printer drivers provided with Microsoft Windows 2000 or Windows XP, to create page segments on IBM i. Page segments can also be downloaded from zSeries systems. The page segments must be stored in an accessible library.

When page segment data is received from the zSeries system, you place it in a data file. To convert the page data to a format that can be used by IBM i, use the Create Page Segment (CRTPAGSEG) command.

Related concepts:

“How page definitions, form definitions, and printer files interact” on page 16

You can use a printer file to specify some of the same options as you can specify with a page definition and a form definition. This topic describes how PSF chooses an option when a printer file is used with a page definition and form definition.

“Obtaining AFP resources” on page 19

There are many sources of Advanced Function Presentation (AFP) resources.

“Specifying a form definition” on page 25

To use or identify a fully qualified form definition, specify a value in the FORMDF parameter with a CL command.

“Specifying a page segment” on page 31

A page segment object can be built into your application output in a number of ways.

Related reference:

Create Page Segment (CRTPAGSEG) CL command

“Form definitions included with the operating system” on page 55

This topic lists the form definitions that are provided with IBM i in library QSYS.

Resources in the integrated file system

Print Services Facility (PSF) can process several types of Advanced Function Presentation (AFP) and non-AFP resources that are stored in the integrated file system. These are objects that are not stored within a page segment or overlay.

Following are the AFP resource types that can be stored in the integrated file system:

- Image Object Content Architecture (IOCA)
- Graphics Object Content Architecture (GOCA)
- Bar Code Object Content Architecture (BCOCA)

All non-AFP resources are placed in the integrated file system. PSF processes any non-AFP resource that is specified. However, the actual support of non-AFP resources depends on the printer to which the data is being sent.

The Data description specifications (DDS) keyword AFPRSC is used to identify any resources stored in the integrated file system. For information about DDS keywords used with printer files, see the DDS for printer files topic in the Programming category. There are several benefits of using the AFPRSC keyword:

- You do not need to create objects as a page segment.
- You can use non-AFP resources.
- You can obtain objects from other operating systems and reference them without further modification. You do not need to create them into a page segment.
- Some applications generate AFP resources and write them to the integrated file system. PSF can access those resources without requiring you to create a page segment or overlay.

When referencing resources in the integrated file system, you must understand how the operating system searches for those resources. See the “Search order of library list” on page 32 topic for information.

Related concepts:

“Ensuring that you have the necessary AFP resources” on page 19

You need to determine what resources you need for your Advanced Function Presentation (AFP) application and ensure that they are stored in appropriate locations.

TrueType and OpenType fonts

There is extensive operating system support for TrueType fonts, and they are popular with PC applications. Consequentially, TrueType is probably the most prevalent font technology in the industry today. OpenType is an extension of the TrueType font format.

The OpenType font format allows better support for international character sets and provides broader multiplatform support. The OpenType format allows both TrueType or Adobe Type 1 outline fonts to be packaged as a TrueType font. OpenType fully supports Unicode. Advanced Function Presentation data stream (AFPDS) accepts Unicode UTF-8 or UTF-16.

Related concepts:

“AFP fonts” on page 5

A font is a collection of characters of a certain size, typeface, and type style. Advanced Function Presentation (AFP) fonts, also called Font Object Content Architecture (FOCA) fonts, are the standard fonts used for Intelligent Printer Data Stream (IPDS) output. AFP fonts are made up of a code page and a character set. All AFP fonts are encoded as either single-byte or double-byte fonts, depending on the language for which they are being used.

“Obtaining AFP resources” on page 19

There are many sources of Advanced Function Presentation (AFP) resources.

“Specifying a TrueType or OpenType font” on page 29

You can specify a TrueType font anywhere that you can specify an Advanced Function Presentation (AFP) font. You can also mix references to TrueType and AFP fonts. However, TrueType fonts are referenced differently than AFP fonts.

“Purchasing fonts” on page 21

IBM offers several different font products that you can purchase, depending on your needs.

Resource access tables

- | When you install a TrueType font with the Font Installer for AFP Systems or the InfoPrint AFP Resource
- | Installer (program number 5639-EE2), the installer creates a resource access table (RAT). This table has a hard-coded name and is used to find fonts on your system.

The Font Installer for AFP Systems is a feature of the IBM Infoprint Fonts for Multiplatforms licensed program.

How TrueType and OpenType fonts differ from AFP fonts

When using TrueType fonts, you will see differences in how the fonts are specified, managed, and installed when compared to Advanced Function Presentation (AFP) fonts.

Note: In this topic, the term TrueType refers to both TrueType and OpenType fonts.

Table 1. Differences between AFP and TrueType or OpenType fonts

AFP fonts	TrueType fonts
AFP fonts are IBM i objects.	TrueType fonts are stream files in the integrated file system.
DDS keyword FNTCHRSET is used to select AFP fonts.	DDS keyword FONTNAME is used to select TrueType fonts.
Print Services Facility (PSF) uses a defined search algorithm to search for AFP fonts. It searches the library list associated with the job for a matching font.	TrueType fonts reside in one of two locations. <ul style="list-style-type: none">• /QIBM/ProdData/OS400/Fonts/TTFonts contains IBM-supplied fonts• /QIBM/UserData/OS400/Fonts/TTFonts contains user fonts.
AFP fonts are created and managed using the font resource commands: CHGCODEFNT, CHGFNTRSC, CRTFNTRSC, DLTFNTRSC, DSPCDEFNT, DSPFNTRSCA, and WRKFNTRSC.	TrueType fonts have no IBM i management commands. Instead, the fonts are installed using the Font Installer for AFP Systems feature of the Infoprint Fonts licensed program. The generated resource access table resides in the /QIBM file system.
An AFP font is specified by using the *FNTRSC object name such as C0D0GT10.	TrueType fonts are specified using a font name such as Times New Roman.
AFP fonts can be substituted when the requested font is not available.	There is no font substitution with TrueType fonts.
An AFP font is marked as eligible for capture with the Change Font Resource (CHGFNTRSC) command.	TrueType fonts are marked as eligible for capture by the Font Installer for AFP Systems feature of the Infoprint Fonts licensed program or by the InfoPrint AFP Resource Installer licensed program.
PSF tries to capture AFP fonts only if the PSF configuration object specifies FNTCAPTURE(*YES).	PSF always tries to capture TrueType fonts.

Related concepts:

“AFP fonts” on page 5

A font is a collection of characters of a certain size, typeface, and type style. Advanced Function Presentation (AFP) fonts, also called Font Object Content Architecture (FOCA) fonts, are the standard fonts used for Intelligent Printer Data Stream (IPDS) output. AFP fonts are made up of a code page and a character set. All AFP fonts are encoded as either single-byte or double-byte fonts, depending on the language for which they are being used.

“Specifying a TrueType or OpenType font” on page 29

You can specify a TrueType font anywhere that you can specify an Advanced Function Presentation (AFP) font. You can also mix references to TrueType and AFP fonts. However, TrueType fonts are referenced differently than AFP fonts.

Related reference:

“Specifying an AFP font” on page 28

There are many different tools you can use to specify Advanced Function Presentation (AFP) fonts in your document. Each tool has different capabilities.

Resource libraries

Advanced Function Presentation (AFP) resource libraries group resources of the same type.

For example, a page segment library might contain images of the company logo in several different sizes.

Resource library lists

A resource library list specifies the libraries that are searched for the Advanced Function Presentation (AFP) resources needed to process a spooled file.

There are two types of resource library lists: user and device.

User resource library list

Specifies what user libraries are searched when processing your spooled files. It might vary from user to user.

Device resource library list

Specifies what libraries are searched when using a specific device, regardless of who is using the device. This list does not change from user to user but can vary from device to device.

There are several reasons to use library lists:

- You can ensure that the necessary libraries are actually in the library list that Print Services Facility (PSF) uses.
- They can improve performance when you specify only the libraries that need to be searched. For example, you can specify one set of libraries for a 240-pel printer and another set for a 300-pel printer.

When searching for resources, the user library list is searched first and then the device library list. The libraries are searched in the order listed. You can specify a user resource library list and a device resource library list in the PSF configuration object.

Related concepts:

“Ensuring that you have the necessary AFP resources” on page 19

You need to determine what resources you need for your Advanced Function Presentation (AFP) application and ensure that they are stored in appropriate locations.

Related tasks:

“Search order of library list” on page 32

Print Services Facility (PSF) uses the user library list and device library list to search for the AFP resources that you specify.

“Receiving AFP resources from another system” on page 22

When you receive Advanced Function Presentation (AFP) resource data from an operating system other than IBM i, you typically cannot change the resource. If you want to change the resource, it must be

changed on the originating operating system and then resent to IBM i.

“Printing data sent to IBM i from zSeries” on page 35

PSF can print data that was generated on zSeries. This data might be AFP, AFPDSLIN (AFP data mixed with line data), or line data. The data might be sent to network files or directly to an output queue.

AFP font libraries

IBM supplies several AFP font libraries. In addition, you can create a library list that allows AFP to locate and use other fonts.

When a printer writer is started for an Advanced Function Presentation (AFP)-configured printer and a font is specified, the operating system searches in these locations:

1. User library list
2. IBM-supplied font libraries

The IBM-supplied font libraries are:

- QFNTCPL

This library contains the AFP Compatibility Fonts. These are the fonts included with IBM i.

- Single-byte character set font libraries numbered QFNT01 through QFNT19 and double-byte character set font libraries numbered QFNT61 through QFNT69.

These are the font libraries that support various IBM licensed programs on IBM i.

Any of the libraries in the previous list that are found are put in the library list of the job printing the spooled file. These libraries are then available to the device even if they were not in the library list of the user that created the spooled file. Also, if you have acquired additional font resources, you can store them in these IBM-supplied font libraries. Storing them in the IBM-supplied libraries provides widespread access to the font.

You can use a font that is not in one of the QFNTxx libraries. To do so, add the library containing the font to your library list when you create the spooled file.

For information about specifying a different font library list on a printer, see the Resource library lists topic.

To list the font libraries available on your system and the fonts in them, use the WRKFNTRSC command.

Related concepts:

“AFP fonts” on page 5

A font is a collection of characters of a certain size, typeface, and type style. Advanced Function Presentation (AFP) fonts, also called Font Object Content Architecture (FOCA) fonts, are the standard fonts used for Intelligent Printer Data Stream (IPDS) output. AFP fonts are made up of a code page and a character set. All AFP fonts are encoded as either single-byte or double-byte fonts, depending on the language for which they are being used.

“Ensuring that you have the necessary AFP resources” on page 19

You need to determine what resources you need for your Advanced Function Presentation (AFP) application and ensure that they are stored in appropriate locations.

Related reference:

Work with Font Resources (WRKFNTRSC) command

PSF configuration options

PSF allows you to specify printing options in several ways.

Print Services Facility (PSF) configuration objects allow you to enable print functions like Intelligent Printer Data Stream (IPDS) pass-through, IPDS-to-PDF transform support, printer sharing, and automatic system recovery. Printer files and resources such as form definitions and page definitions control the appearance of printed output.

Related tasks:

“Configuring PSF” on page 42

You can configure Print Services Facility (PSF) by using the printer device description or by using a PSF configuration object.

PSF configuration objects

A Print Services Facility (PSF) configuration object lets you specify Intelligent Printer Data Stream (IPDS) printer customization options that you cannot specify elsewhere.

- | These are some of the print functions that you can enable or disable with a PSF configuration object:
 - “IPDS pass-through”
 - IPDS-to-PDF transform
 - Session and IPDS dialog sharing
 - “Resource library lists” on page 12
 - “Automatic session recovery” on page 45
- | • Offset stacking and edge marking
- | • Public data authority for directories created by PSF

Related concepts:

“Specifying a PSF configuration object” on page 27

Specify a PSF configuration object in the device description for the printer.

“Enabling IPDS pass-through support” on page 44

When IPDS pass-through support is enabled for a printer, all eligible files spooled to that printer are processed without conversion to AFPDS and to printer-specific IPDS.

Related tasks:

“Configuring PSF” on page 42

You can configure Print Services Facility (PSF) by using the printer device description or by using a PSF configuration object.

“Search order of library list” on page 32

Print Services Facility (PSF) uses the user library list and device library list to search for the AFP resources that you specify.

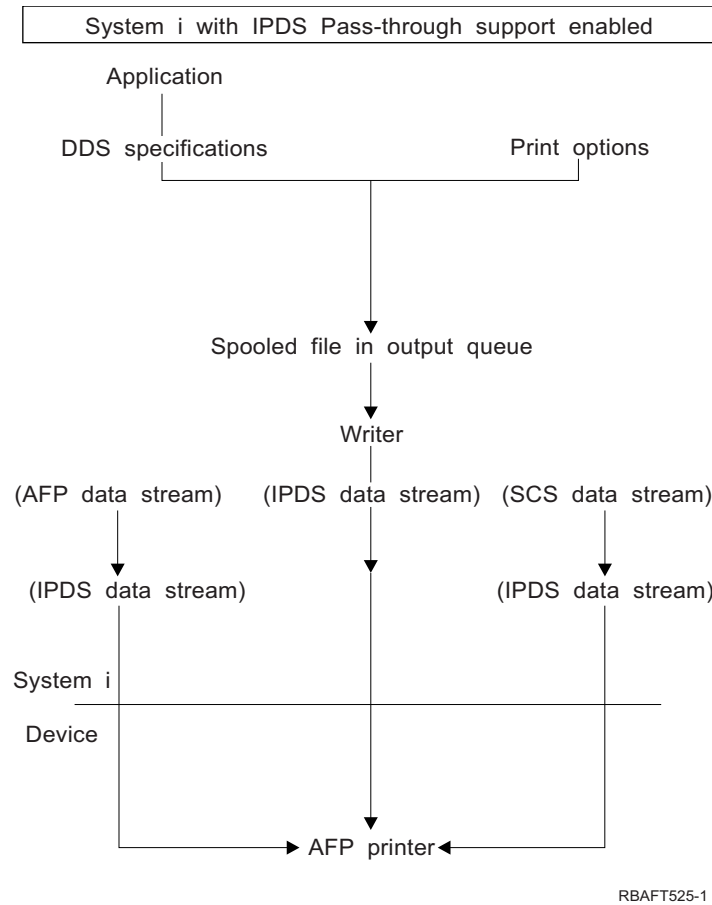
IPDS pass-through:

IPDS pass-through allows you to process some SCS and IPDS spooled files more efficiently.

Before printing, SNA character string (SCS) files are converted to Intelligent Printer Data Stream (IPDS) files. These are then converted to Advanced Function Presentation data stream (AFPDS), and then to printer-specific IPDS. Also, IPDS files are converted to AFPDS, then are converted to printer-specific IPDS. The final IPDS files have specific commands for your printer. You can choose to skip the conversion to AFPDS and to printer-specific IPDS. This is called IPDS pass-through. IPDS pass-through is specified on a PSF configuration object.

Specifying IPDS pass-through in the PSF configuration object allows only those spooled files eligible for IPDS pass-through to bypass the extra transforms. Those spooled files not eligible for IPDS pass-through are still transformed to AFPDS and then to printer-specific IPDS.

Figure 2 shows the data stream origination, flow, and conversion for a spooled file when IPDS pass-through support is enabled.



RBAFT525-1

Figure 2. Spooled file conversion with IPDS pass-through support

Consider using IPDS pass-through if one of these apply:

- You have applications that generate SCS or IPDS data streams when printing to an Advanced Function Presentation (AFP) printer.
- You are using applications such as the IBM Business Graphics Utility for IBM i licensed program, GDDM, or Virtual Print that do not support AFPDS.
- Your SCS or IPDS application does not contain any reference to overlays or to host font character sets.

Limitations of IPDS pass-through

These IPDS pass-through limitations determine whether a spooled file or printer is eligible for IPDS pass-through:

- Some SCS or IPDS spooled files are not eligible for IPDS pass-through. One such situation is when they contain special functions that require being transformed to AFPDS for the spooled file to print correctly.

Spooled files that contain the following data or printer file attributes are not eligible for IPDS pass-through:

- For SCS or IPDS data streams, the data stream contains Image Object Content Architecture (IOCA) or IM1.
- For SCS or IPDS data stream, a front or back overlay was specified in the printer file.
- For SCS data stream, IGCDTA(*YES) was specified in the printer file.

- For SCS or IPDS data streams, MULTIUP with REDUCE(*NONE) was specified in the printer file.
- For SCS or IPDS data stream, a form definition was specified in the printer file.
- The EDGESTITCH or CORNERSTPL finishing operation is specified in the printer file.

If IPDS pass-through is specified but the spooled file is ineligible, a diagnostic message is sent and the spooled file is processed as usual. It is transformed to AFPDS and then to printer-specific IPDS.

- IPDS pass-through support is available for any IPDS printer that provides resident fonts. This is because the resident fonts referenced in the data stream must be mapped to the host fonts, which are downloaded to the printer. Therefore, IPDS pass-through support is not available for these IPDS printers: 3820, 3825, 3827, 3828, 3829, 3831, 3835, and 3900-001.

When a printer writer is started to an AFP(*YES) printer that does not support IPDS pass-through and IPDSPASTHR(*YES) is specified, a diagnostic message is sent. The spooled file is transformed to AFPDS and then to printer-specific IPDS.

Related concepts:

“Enabling IPDS pass-through support” on page 44

When IPDS pass-through support is enabled for a printer, all eligible files spooled to that printer are processed without conversion to AFPDS and to printer-specific IPDS.

How page definitions, form definitions, and printer files interact

You can use a printer file to specify some of the same options as you can specify with a page definition and a form definition. This topic describes how PSF chooses an option when a printer file is used with a page definition and form definition.

Page definition and the printer file

When you specify a page definition on the printer file, some printer file parameters might be ignored when the spooled file is printed through Print Services Facility (PSF). For example, if you specify a page definition and also specify line data or mixed data, an inline page definition is not built. In this case, the following happens:

- If you send line data with a printer file to an Advanced Function Presentation (AFP) printer, PSF ignores these printer file parameters:
 - CDEFNT
 - CHRID
 - CPI
 - FNTCHRSET
 - FOLD
 - FONT
 - LPI
 - MULTIUP
 - PAGESIZE
 - PAGRTT
 - REDUCE
- If you send the line data with a page definition to a non-AFP printer with a device type of *LINE, the page definition parameter is ignored and the printer file parameters are used. The line data is converted to SNA character string (SCS) or Intelligent Printer Data Stream (IPDS).

Form definition and the printer file

When using a form definition, depending on the specifications given, some printer file parameters might be ignored when output is printed through PSF. For example, if you specify a form definition, an inline form definition is not built. In this case, if you send the line data with a form definition to an AFP device, PSF ignores these printer file parameters:

- BACKMGN
- CORNERSTPL
- EDGESTITCH
- FORMFEED
- FRONTMGN
- MULTIUP (N_UP)
- PAGRTT
- PRTQLTY
- REDUCE (N_UP)
- SADLSTITCH

However, if you send the line data with a form definition to a non-AFP printer with a device type of *IPDS or *SCS in this example, the form definition parameter is ignored and the printer file parameters are used.

When specifying a form definition, the values you specify on the printer file's DRAWER and DUPLEX parameters override those values specified in the form definition. To use the drawer and duplex values specified in the form definition, specify DRAWER(*FORMDF) and DUPLEX(*FORMDF) on the printer file.

Related concepts:

“Form definitions” on page 6

A form definition is an Advanced Function Presentation (AFP) resource object that defines the characteristics of the physical form to be printed on.

“Page definitions” on page 8

Page definitions are resources that format and compose line data into logical pages.

“Page segments” on page 9

Page segments are objects containing composed text and images that are prepared before formatting and included during printing.

“Specifying a form definition” on page 25

To use or identify a fully qualified form definition, specify a value in the FORMDF parameter with a CL command.

“Specifying a page definition” on page 26

To use or identify a fully qualified page definition, specify the PAGDFN parameter on a CL commands.

“Specifying a PSF configuration object” on page 27

Specify a PSF configuration object in the device description for the printer.

Planning for AFP

Use this information to help plan how to use Print Services Facility (PSF) in your environment.

Before using Advanced Function Presentation (AFP), use these topics to help you get ready.

Determining whether PSF is required

You must install PSF if you use certain printers, use IBM i to print line or mixed-mode data, or use certain printer file parameters or DDS keywords.

The Print Services Facility (PSF) feature is required if your printer falls into one of these categories:

- Any TCP/IP attached IPDS printer.
- Any Twinax attached IPDS printer that uses PSF functions. See the lists of printer file parameters and data description specifications (DDS) keywords that require PSF.

PSF is also required in these situations:

- IBM i is used to print any line or mixed-mode data.
- You use any of the parameters listed below.

Printer file parameters that require PSF

- AFP characters (AFPCHARS)
- Back overlay (BACKOVL) (requires PSF when printing to a device with type *SCS)
- Corner staple (CORNERSTPL)
- Device type (DEVTYPE= *LINE, or *AFPDSLIN)
- Edge stitch (EDGESTITCH)
- Font resolution for formatting (FNTRSL)
- Front overlay (FRONTOVL) (requires PSF when printing to a device with type *SCS)
- IPDS pass-through (IPDSPASTHR)
- Multi-up (MULTIUP REDUCE(*NONE))
- Page definition (PAGEDEF)
- Saddle stitch (SADLSTITCH)
- Table reference characters (TBLREFCHR)
- | • User-defined data (USRDFNDDTA ('AFPRESPOOL(*PRINT|*NOPRINT)'))
- | • User-defined data (USRDFNDDTA ('IPDSPASTHR(*YES|*NO)'))
- | • User-defined data (USRDFNDDTA ('MAILSENDER(*mail-sender-name*)'))
- | • User-defined data (USRDFNDDTA ('MAILTAG(*mail-tag* | *e-mail address*)'))
- | • User-defined data (USRDFNDDTA ('PDFENCRYPT(*STMF | *SPLF | *NOMAIL)'))
- | • User-defined object (USRDFNOBJ (*PSFCFG))
- User resource library list (USRRSCLIBL(*DEVDD))

DDS keywords that require PSF

- AFP resource (AFPRSC)
- Document Index Tag (DOCIDXTAG)
- End page group (ENDPAGGRP)
- Graphic data file (GDF)
- Invoke data map (INVDTAMAP)
- Start page group (STRPAGGRP)
- Staple (STAPLE)
- Z-fold (ZFOLD)

Installing PSF

This topic points to instructions for installing PSF and lists installation options.

To install Print Services Facility (PSF), follow the instructions in the Installing, upgrading, or deleting IBM i and related software topic.

PSF options

There are three options associated with PSF. Depending on what you purchase, you will be issued a key for one of these options:

- 36: PSF 1–55 pages per minute license
- 37: PSF 1–100 pages per minute license

- 38: PSF Any speed license

Related tasks:

Installing, upgrading, or deleting IBM i and related software

Ensuring that you have the necessary AFP resources

You need to determine what resources you need for your Advanced Function Presentation (AFP) application and ensure that they are stored in appropriate locations.

Resource objects contain data and control information that can be used by a printing job. Resources can be shared by different pages and different print data sets. Examples of resources are fonts, which define the characters used to print text, and page segments, which can include images and text. Resources can be stored and accessed from within the operating system being used. By referring to the name of the stored resource, many data streams can share the same resources.

Most resources should be placed in a library that is defined to your library list when you initially sign on the system. However, some resources, such as TrueType fonts and object containers, are stored in the integrated file system. True Type Fonts must be stored in specific directories but you can store object containers in any directory.

Related concepts:

“AFP font libraries” on page 13

IBM supplies several AFP font libraries. In addition, you can create a library list that allows AFP to locate and use other fonts.

“AFP resources” on page 4

Advanced Function Presentation (AFP) resource objects contain data and control information.

“Resources in the integrated file system” on page 10

Print Services Facility (PSF) can process several types of Advanced Function Presentation (AFP) and non-AFP resources that are stored in the integrated file system. These are objects that are not stored within a page segment or overlay.

“Resource library lists” on page 12

A resource library list specifies the libraries that are searched for the Advanced Function Presentation (AFP) resources needed to process a spooled file.

“Obtaining AFP resources”

There are many sources of Advanced Function Presentation (AFP) resources.

Getting started with AFP

Use this information to help you get started using PSF by using AFP resources and creating AFP data.

Use the information in these topics to get started using Advanced Function Presentation (AFP).

Obtaining AFP resources

There are many sources of Advanced Function Presentation (AFP) resources.

Some of the resources are included with the system. You can download resources from another system, or they can come inline with the data that is to be printed. Form definitions, fonts, page segments, overlays, and page definitions are examples of resources that can come from another system. Additionally, you can create overlays and page segments yourself using the IBM Infoprint Designer for iSeries licensed program (5733-ID1). You can generate page segments and overlays from existing images using the IBM Infoprint Server for iSeries licensed program (5722-IP1).

Related concepts:

“AFP fonts” on page 5

A font is a collection of characters of a certain size, typeface, and type style. Advanced Function Presentation (AFP) fonts, also called Font Object Content Architecture (FOCA) fonts, are the standard fonts used for Intelligent Printer Data Stream (IPDS) output. AFP fonts are made up of a code page and a character set. All AFP fonts are encoded as either single-byte or double-byte fonts, depending on the language for which they are being used.

“Form definitions” on page 6

A form definition is an Advanced Function Presentation (AFP) resource object that defines the characteristics of the physical form to be printed on.

“Object containers” on page 7

Object containers are used to carry non-Object Content Architecture (OCA) objects in an Advanced Function Presentation (AFP) data stream.

“Overlays” on page 8

Overlays, also known as electronic forms, are a collection of predefined data such as lines, shading, text, boxes, or logos. They can be merged with variable data on a sheet while a spooled file is being processed.

“Page definitions” on page 8

Page definitions are resources that format and compose line data into logical pages.

“Page segments” on page 9

Page segments are objects containing composed text and images that are prepared before formatting and included during printing.

“TrueType and OpenType fonts” on page 10

There is extensive operating system support for TrueType fonts, and they are popular with PC applications. Consequentially, TrueType is probably the most prevalent font technology in the industry today. OpenType is an extension of the TrueType font format.

“Ensuring that you have the necessary AFP resources” on page 19

You need to determine what resources you need for your Advanced Function Presentation (AFP) application and ensure that they are stored in appropriate locations.

Fonts provided by IBM i

IBM i AFP Compatibility Fonts is included free of charge in the IBM i base operating system.

AFP Compatibility Fonts can be installed as an option on any IBM i system. The fonts are downloadable 240-pel raster fonts and are installed in font library QFNTPCL.

The 240- and 300-pel versions of the AFP Compatibility Fonts are provided in the IBM AFP Font Collection for Workstations and OS/400® licensed product.

When your operating system was loaded, you chose to install or not install IBM-supplied fonts. If you did not install the fonts and now want to install them, see *Installing, upgrading, or deleting IBM i and related software* for instructions.

The compatibility set is provided to allow IBM i applications that use resident fonts to print on the 3820, 3825, 3827, 3828, 3829, 3831, 3835, and 3900 model 1 printers. The numeric font identifiers specified in the application are translated into one of the fonts in the compatibility set.

The AFP Compatibility Fonts feature includes both uniformly spaced and mixed-pitch type families at 240-pel resolution. These font families are included:

- APL
- Boldface
- Courier
- Document
- Essay

- Format
- Gothic
- Orator
- Prestige
- Proprinter Emulation
- Roman
- Script
- Serif
- Symbol Set
- Text

In addition to these 240-pel raster fonts, the compatibility set includes a number of code pages that are downloadable to printers. For use on printers that support outline fonts, the compatibility set also includes a Letter Gothic outline font that contains the euro symbol.

To determine the fonts that are available on your system, use the WRKFNTRSC command.

Related concepts:

“Purchasing fonts”

IBM offers several different font products that you can purchase, depending on your needs.

Related tasks:

Installing, upgrading, or deleting IBM i and related software PDF

Related information:



Font Summary for AFP Font Collection (S544-5633) PDF

This publication describes the AFP Compatibility Fonts.

Purchasing fonts

IBM offers several different font products that you can purchase, depending on your needs.

IBM Infoprint Fonts for Multiplatforms (Program 5648-E77)

IBM Infoprint Fonts for Multiplatforms licensed program is the current and recommended font product. It is best for customers who are in one of these categories:

- Those who do not already have AFP Font Collection.
- Those who want to use the Font Installer for AFP Systems to install and manage TrueType fonts.

IBM Advanced Function Printing Fonts for AS/400 (Program 5769-FNT)

This licensed program is only required for compatibility with older font technology.

IBM AFP Font Collection for Workstations and OS/400 (Program 5648-B45)

This licensed program is only required for compatibility with older font technology.

IBM Advanced Function Printing DBCS Fonts for AS/400 (Program 5769-FN1)

This licensed program is only required for compatibility with older font technology.

There are many sources of TrueType fonts. However, not all TrueType fonts are suitable for use in Advanced Function Presentation (AFP). In general, a TrueType font that is to be installed and referenced in an AFP system must be Unicode-enabled. A Unicode-enabled font has these characteristics:

- It must contain a Microsoft Unicode subtable identified by platform ID = 3 (Microsoft) and platform-specific encoding ID = 1 (Unicode, UTF-16).
- It must specify a full font name (Name ID 4) using the same encoding in the naming table.

The TrueType fonts included with IBM i and the TrueType fonts available with the IBM Infoprint Fonts for Multiplatforms licensed program are suitable for use in AFP. The TrueType fonts included with IBM i are installed with option 43 Additional fonts.

Related concepts:

“TrueType and OpenType fonts” on page 10

There is extensive operating system support for TrueType fonts, and they are popular with PC applications. Consequentially, TrueType is probably the most prevalent font technology in the industry today. OpenType is an extension of the TrueType font format.

“Fonts provided by IBM i” on page 20

IBM i AFP Compatibility Fonts is included free of charge in the IBM i base operating system.

Related information:



InfoPrint Font Summary (G550-1140) PDF

Creating AFP resources

There are several different ways to create the Advanced Function Presentation (AFP) resources that you need.

Creating page segments and overlays

There are several tools available for you to use to create page segments and overlays:

- The IBM Infoprint Designer for iSeries licensed program lets you design and create page segments and overlays and upload them to the iSeries.
- The IBM Infoprint Server for iSeries licensed program lets you create page segments and overlays from Joint Photographic Experts Group (JPEG), Graphics Interchange Format (GIF), and Tagged Image File Format (TIFF) images.
- The AFP Manager component of System i[®] Navigator lets you build a file on your system as a page segment or overlay. This file must already be in AFP resource format. This tool is useful for migrating AFP resources from other systems to the IBM i.
- The AFP printer driver creates AFP documents, overlays, and page segments from your Windows applications.

Creating page definitions and form definitions

Page definitions and form definitions are created automatically with Infoprint Designer when you create an overlay.

Receiving AFP resources from another system

When you receive Advanced Function Presentation (AFP) resource data from an operating system other than IBM i, you typically cannot change the resource. If you want to change the resource, it must be changed on the originating operating system and then resent to IBM i.

Follow these steps to receive an AFP resource from another system:

1. Place the received resource in a data file.
2. Start an System i Navigator session.
3. Expand **My Connections** (or your active environment).
4. If you do not have an AFP Manager icon, install AFP Manager as follows: Right-click **My Connections** (or your active environment) and select **Install Options > Selective Setup**.
5. Expand **Resources**.
6. Right-click the appropriate resource type and select **Import**.
7. Specify the name of the source file and the name and location for the new resource to be created.

Related concepts:

“Resource library lists” on page 12

A resource library list specifies the libraries that are searched for the Advanced Function Presentation (AFP) resources needed to process a spooled file.

“Sending data from zSeries to IBM i” on page 52

Use these instructions to receive and print data and resources from zSeries systems to your IBM i.

“Receiving resources and AFPDS data sent to network files” on page 24

To make receiving resources and Advanced Function Presentation data stream (AFPDS) data as easy as possible, you should be aware of these points.

“Sending data from zSeries to IBM i network files” on page 54

The examples in this topic show how to send print data and resources from a zSeries system to an IBM i network file.

Receiving fonts from zSeries:

Fonts can be downloaded to IBM i from zSeries systems.

Check your licensing agreements to see if they preclude the transfer of printer resources between operating systems.

Downloaded font resources cannot be altered by the IBM i operator. If changes need to be made to any font resources, the zSeries site must be notified.

When these font resources are received from the zSeries system, you place them in a data file. To convert these font resources to a format that can be used by IBM i, use the Create Font Resource (CRTFNTRSC) command.

3800 Printer font restrictions on IBM i

- You can receive data from a zSeries system that was generated to print on a 3800 printer using 3800 printer font character sets. However, IBM i does not support the 3800 printer and its font character sets. Therefore, you should not receive 3800 printer font character sets on IBM i.
- If you have Advanced Function Presentation (AFP) data that calls for a 3800 font and you have the 3800 printer font character sets on the system, IBM i tries to use them. You get an error when the data prints.
- Instead, download the 3820 printer font character sets from the zSeries system. When the data generated for the 3800 printer starts to print, IBM i substitutes the 3820 printer font character sets.
- The naming convention for 3800 printer font character sets is C1xxxxxx. The naming convention for 3820 printer font character sets is C0xxxxxx.

Related concepts:

“Sending data from zSeries to IBM i network files” on page 54

The examples in this topic show how to send print data and resources from a zSeries system to an IBM i network file.

Related reference:

Create Font Resource (CRTFNTRSC) CL command

Receiving AFP resources inline in the data stream:

Advanced Function Presentation (AFP) resources can be part of the data received from another system, such as a zSeries system.

These resources can only be used in that data stream. They cannot be saved to your IBM i system in a data file and converted to an AFP resource.

Receiving resources and AFPDS data sent to network files:

To make receiving resources and Advanced Function Presentation data stream (AFPDS) data as easy as possible, you should be aware of these points.

- Make sure you do not send line data or mixed data (AFPDSLIN data) to network files.
- The AFPDS files, as they exist on z/OS, are in variable-length record format. Make sure the z/OS site converts the AFPDS files to a fixed-length record format. If this is not done before sending the AFPDS files, large amounts of System i disk space are required. You need to reach an agreement with the z/OS site as to what fixed-length record format you will use; for example, 4000 bytes. AFPDS records longer than the fixed-length record size must be converted into multiple fixed-length records. Pad the last record with blank characters if necessary.
- Before receiving AFPDS files from z/OS, you should consider creating a fixed-length physical data file to hold the files from z/OS. The CL command to do this is Create Physical File (CRTPF).

The length of the records in the physical data file should be the number that you and the z/OS site agreed to; for example, 4000 bytes.

When resource data is received from z/OS, convert the resources to a format that can be used by IBM i. These commands are in the “Creating AFP resources” on page 22 topic.

Creating a physical file

Many types of resources are sent to the IBM i system. Administratively, it is more convenient to store the different types of resources in separate physical files. That is, put all the font data in a physical file that contains only fonts, the overlay data in a physical file that contains only overlays, and so on.

This command creates a physical file that can receive resources and AFPDS data:

```
CRTPF FILE(MYLIB/MYFILE) RCDLEN(4000) MBR(*NONE) MAXMBRS(*NOMAX) LVLCHK(*NO)
```

Examples: Using the Work with Network Files (WRKNETF) and Receive Network File (RCVNETF) commands

Use the Work with Network Files (WRKNETF) and Receive Network File (RCVNETF) commands to receive, delete, browse, or submit (print) files.

This command lets you work with the network files for USR1 and prints the output with the job's spooled output. This command can only be issued by USR1, a member of the USR1 group, or a user with security officer authority.

```
WRKNETF USER(USR1) OUTPUT(*PRINT)
```

This command lets you work with the network files for all users and is written to the first member of the specified database file. If the file exists in a library on the library list, the existing file is used; otherwise, the file is created in library QGPL. If the file did not exist, or did not contain any members, a member with the same name as the file is added to the file. Otherwise, the first member of the file is cleared and used. Only a user with security officer authority can issue this command.

```
WRKNETF USER(*ALL) OUTPUT(*OUTFILE) OUTFILE(NETFILES)
```

This command receives the network file SCRIPT, member \$REPORT, into a physical file named MYFILE in library MYLIB. The new member in MYFILE is \$REPORT.

```
RCVNETF FROMFILE(SCRIPT) TOFILE(MYLIB/MYFILE) FROMMBR($REPORT)
```

Related concepts:

“Sending data from zSeries to IBM i” on page 52

Use these instructions to receive and print data and resources from zSeries systems to your IBM i.

Related tasks:

“Printing data sent to IBM i from zSeries” on page 35

PSF can print data that was generated on zSeries. This data might be AFP, AFPDSLINE (AFP data mixed with line data), or line data. The data might be sent to network files or directly to an output queue.

“Receiving AFP resources from another system” on page 22

When you receive Advanced Function Presentation (AFP) resource data from an operating system other than IBM i, you typically cannot change the resource. If you want to change the resource, it must be changed on the originating operating system and then resent to IBM i.

Related reference:

Create Physical File (CRTPF) CL command

Receive Network File (RCVNETF) CL command

Work with Network Files (WRKNETF) CL command

Specifying AFP resources

When specifying an overlay, page definition, or page segment, you need to include the library that contains the resource in your library list.

If you have more than one overlay, page definition, or page segment with the same name, make sure the one you want to use is in the first library searched. Otherwise, you might specify the correct name, but get the wrong resource in your output. When PSF searches for resources, it searches the user library list first and then the device library list.

If you have a resource that many users need to access (fonts, for example), you might put that resource in a library that everyone can access. Some such libraries are those identified in the system values QSYSLIBL or QUSRLIBL.

Alternatively, if you have a resource to which you want to restrict access (signatures, for example), you might put it in a library that only certain users can access. If you own the library that the resources are stored in, you can grant access to that library with the Grant Object Authority (GRTOBJAUT) command.

Specifying a form definition

To use or identify a fully qualified form definition, specify a value in the FORMDF parameter with a CL command.

The following CL commands allow you to specify the FORMDF parameter:

- Create Printer File (CRTPRTF)
- Change Printer File (CHGPRTF)
- Override with Printer File (OVRPRTF)

You can specify a form definition with these device types:

- *AFPDS
- *AFPDSLINE
- *IPDS
- *LINE
- *SCS
- *USERASCII (If the data is ASCII XML, a page definition and form definition are required.)

When you specify output to an Advanced Function Presentation (AFP) printer but do not specify a form definition, an inline form definition is built from the printer file parameters. The inline form definition is then passed to Print Services Facility (PSF).

Depending on the specifications given, some printer file parameters might be ignored when output is printed through PSF.

To indicate an output bin for a form definition, specify the OUTBIN parameter on the printer file.

Use Change Spooled File Attributes (CHGSPLFA) to change the spooled file attributes for the form definition.

Related concepts:

“Form definitions” on page 6

A form definition is an Advanced Function Presentation (AFP) resource object that defines the characteristics of the physical form to be printed on.

“Page segments” on page 9

Page segments are objects containing composed text and images that are prepared before formatting and included during printing.

“How page definitions, form definitions, and printer files interact” on page 16

You can use a printer file to specify some of the same options as you can specify with a page definition and a form definition. This topic describes how PSF chooses an option when a printer file is used with a page definition and form definition.

Related reference:

Change Printer File (CHGPRTF) CL command

Create Printer File (CRTPRTF) CL command

Change Spooled File Attributes (CHGSPLFA) CL command

Grant Object Authority (GRTOBJAUT) CL command

Override with Printer File (OVRPRTF) CL command

Specifying a page definition

To use or identify a fully qualified page definition, specify the PAGDFN parameter on a CL commands.

The following CL commands allow you to specify the PAGDFN parameter:

- Create Printer File (CRTPRTF)
- Change Printer File (CHGPRTF)
- Override with Printer File (OVRPRTF)

You can specify a page definition with *LINE, *AFPDSLIN, or *USERASCII data.

Note: If the data is ASCII XML (*USERASCII), a page definition and form definition are required. After Print Services Facility (PSF) completes formatting, it converts the line data and page definition to Intelligent Printer Data Stream (IPDS).

When you specify a page definition on the printer file, some printer file parameters might be ignored when the spooled file is printed through PSF.

To change the PAGDFN spooled file attribute, use the Change Spooled File Attributes (CHGSPLFA) command.

Related concepts:

“Page definitions” on page 8

Page definitions are resources that format and compose line data into logical pages.

“How page definitions, form definitions, and printer files interact” on page 16

You can use a printer file to specify some of the same options as you can specify with a page definition and a form definition. This topic describes how PSF chooses an option when a printer file is used with a page definition and form definition.

Related reference:

Change Printer File (CHGPRTF) CL command

Change Spooled File Attributes (CHGSPLFA) CL command

Create Printer File (CRTPRTF) CL command

Override with Printer File (OVRPRTF) CL command

Specifying a PSF configuration object

Specify a PSF configuration object in the device description for the printer.

To use a Print Services Facility (PSF) configuration object, do these on either the Create Device Description (Printer) (CRTDEVPRT) or Change Device Description (Printer) (CHGDEVPRT) commands:

- Name the PSF configuration object on the User Defined Object (USRDFNOBJ) parameter.
- Specify AFP(*YES).

Example: In this example, the device named MYPRINTER is configured to reference the PSF configuration object MYPSFCFG. MYPSFCFG is in the library MYLIB.

```
CHGDEVPRT DEVD(MYPRINTER) AFP(*YES) USRDFNOBJ(MYLIB/MYPSFCFG *PSFCFG)
```

Any device description for an Intelligent Printer Data Stream (IPDS) printer specified as AFP(*YES) can use any PSF configuration object. PSF checks for a PSF configuration object when a writer is started.

Related concepts:

“PSF configuration objects” on page 14

A Print Services Facility (PSF) configuration object lets you specify Intelligent Printer Data Stream (IPDS) printer customization options that you cannot specify elsewhere.

“How page definitions, form definitions, and printer files interact” on page 16

You can use a printer file to specify some of the same options as you can specify with a page definition and a form definition. This topic describes how PSF chooses an option when a printer file is used with a page definition and form definition.

“Enabling IPDS pass-through support” on page 44

When IPDS pass-through support is enabled for a printer, all eligible files spooled to that printer are processed without conversion to AFPDS and to printer-specific IPDS.

Related tasks:

“Configuring PSF” on page 42

You can configure Print Services Facility (PSF) by using the printer device description or by using a PSF configuration object.

Related reference:

Create Device Description (Printer) (CRTDEVPRT) CL command

Change Device Description (Printer) (CHGDEVPRT) CL command

“Sharing print sessions” on page 44

You can specify printer-sharing properties on the PSF configuration object. This lets you limit the amount of time that you have a connection to the printer, control when the session is released, control when a new session is started, and specify how many times PSF tries to connect to the printer.

“Automatic session recovery” on page 45

PSF can try to resume printing when a session has been unexpectedly ended by a device.

Specifying an overlay

To use overlays, specify them in the front and back overlay parameters of the printer file being used with your application.

Use one of these commands or keywords:

- **Override with Printer File (OVRPRTF)** command: Temporarily changes the printer file.
- **Change Printer File (CHGPRTF)** command: Permanently changes the printer file.
- **Change Spooled File Attributes (CHGSPLFA)** command: Changes the spooled file before printing.

- Data description specifications (DDS) **OVERLAY** keyword: For information about this keyword, see Printer files in the DDS topic of the Programming category.

Related concepts:

“Overlays” on page 8

Overlays, also known as electronic forms, are a collection of predefined data such as lines, shading, text, boxes, or logos. They can be merged with variable data on a sheet while a spooled file is being processed.

“Specifying a page segment” on page 31

A page segment object can be built into your application output in a number of ways.

Related reference:

Change Printer File (CHGPRTF) CL command

Change Spooled File Attributes (CHGSPLFA) CL command

Override with Printer File (OVRPRTF) CL command

Specifying an AFP font

There are many different tools you can use to specify Advanced Function Presentation (AFP) fonts in your document. Each tool has different capabilities.

Use the tool that best fits your needs. These tools are discussed in greater detail in other topics and related publications.

DDS You can use keywords in your Data description specifications (DDS) application to specify fonts, including how they look and how they are placed. The example in “Example: Specifying a font” on page 29 uses DDS.

IBM Infoprint Designer for iSeries

This graphical tool lets you use menus to specify fonts and font properties, such as size and weight. You can also specify placement properties, such as alignment and orientation.

AFP printer driver

This device driver can be used to produce AFP documents, overlays, and page segments from Windows applications that support printing to AFP printers.

IBM Advanced Function Printing Utilities

You can specify fonts in the components of AFP Utilities.

Third-party applications

Several third-party applications exist that you can use to work with fonts in a document. Some such products are Papyrus, Elixir, Opus, StreamServe, and DOC1.

To determine the names of the fonts that are available on your system, use the WRKFNTRSC command.

Related concepts:

“AFP fonts” on page 5

A font is a collection of characters of a certain size, typeface, and type style. Advanced Function Presentation (AFP) fonts, also called Font Object Content Architecture (FOCA) fonts, are the standard fonts used for Intelligent Printer Data Stream (IPDS) output. AFP fonts are made up of a code page and a character set. All AFP fonts are encoded as either single-byte or double-byte fonts, depending on the language for which they are being used.

Related tasks:

DDS keyword finder

Related reference:

Work with Font Resources (WRKFNTRSC) command

“How TrueType and OpenType fonts differ from AFP fonts” on page 11

When using TrueType fonts, you will see differences in how the fonts are specified, managed, and installed when compared to Advanced Function Presentation (AFP) fonts.

“Example: Specifying a font”

This example uses Data description specifications (DDS) keywords and RPG to specify TrueType and Advanced Function Presentation (AFP) fonts.

Related information:



Infoprint Server for iSeries: User's Guide (G544-5775) PDF



System i5 Guide to Output (S544-5319) PDF

Specifying a TrueType or OpenType font

You can specify a TrueType font anywhere that you can specify an Advanced Function Presentation (AFP) font. You can also mix references to TrueType and AFP fonts. However, TrueType fonts are referenced differently than AFP fonts.

Note: In this topic, the term TrueType refers to both TrueType and OpenType fonts.

To specify a TrueType font in your document, use the Data description specifications (DDS) FONTNAME keyword to specify the TrueType font name. You can also use this keyword to specify other options, such as a code page.

Usage notes:

1. If you do not specify a code page with the TrueType font, IBM i assumes that the print data that uses this font is UTF-16.
2. The font name must match exactly, including the case, trailing blanks, embedded blanks, and so on.
3. You must ensure that your printer supports the specified font. If the printer does not support a requested font, processing stops. No substitution is done.

Note: Any TrueType font that is to be used with AFP must be Unicode-enabled. This means that the font must have these characteristics:

- It must contain a Microsoft Unicode subtable identified by platform ID = 3 (Microsoft) and platform-specific encoding ID = 1 (Unicode, UTF-16).
- It must specify a full font name (Name ID 4) using the same encoding in the naming table.

Related concepts:

“TrueType and OpenType fonts” on page 10

There is extensive operating system support for TrueType fonts, and they are popular with PC applications. Consequentially, TrueType is probably the most prevalent font technology in the industry today. OpenType is an extension of the TrueType font format.

“TrueType fonts on OS/400 V5R2” on page 58

You can use TrueType fonts on V5R2 operating systems. However, there are some differences between using these fonts on a V5R2 operating system as compared to using the fonts on a later-level system.

Related tasks:

DDS keyword finder

Related reference:

“How TrueType and OpenType fonts differ from AFP fonts” on page 11

When using TrueType fonts, you will see differences in how the fonts are specified, managed, and installed when compared to Advanced Function Presentation (AFP) fonts.

Example: Specifying a font

This example uses Data description specifications (DDS) keywords and RPG to specify TrueType and Advanced Function Presentation (AFP) fonts.

The document is followed by the DDS keywords used.

Using Fonts with DDS

Using Fonts with DDS

1 → **Using Fonts With DDS**

2 →

The brown Fox jumped ABC123! ☐ #

Courier New, 20p
Code page 37
TrueType, Outline

3 →

The brown fox jumped ABC123! ☐ #

Boldface
Character set C0S0BRTR, Code page T1V10037
Proportional, Host-Resident, Raster

4 →

The brown fox jumped ABC123! ☐ #

Times New Roman, Italic, Bold, 18p
FGID 2311
Typographic, Printer-Resident, Outline

5 →

The brown fox jumped ABC123] ☐ #

Times New Roman, Italic, Bold, 18p
Character set CON500H0, Code page T1V10500
Typographic, Host-Resident, Raster

6 →

The brown fox jumped ABC123] ☐ Ñ

Times New Roman, Italic, Bold, 18p
Character set CZN500, Code page T1V10284
Typographic, Host-Resident, Outline

7 →

The brown fox jumped ABC123] € #

Times New Roman, Italic, Bold, 18p
Coded font XON51EHC
Character set CON500H0, Code page T1001148
Typographic, Host-Resident, Outline

8 →

The brown fox jumped ABC123! ☐ #

Helvetica, Roman, Medium, 24ph 10pw
FGID 2304 Code Page 37 (default)
Typographic, Host-Resident, Outline

9 →

The brown fox jumped ABC123] ☐ #

Helvetica, Roman, Medium, 48ph 10pw
Character set CZH200, Code page T1V10274
Typographic, Host-Resident, Outline

10 →

THE BROWN FOX JUMPED ABC123] # H J Y

OCR-A
FGID 19 Code Page 37 (default)
Fixed Pitch, Host-Resident, Raster

11 →

12 →

Figure 3. Document with several fonts

The fonts in the example have been specified using these DDS keywords. The line numbers below correspond to the numbering in the sample document.

```
Line 1:  FONT(2305 (*POINTSIZ 18)) COLOR(RED)
Line 2:  FONTNAME('Courier New' (*POINTSIZ 20)(*CODEPAGE T1V10037)) COLOR(GRN)
Line 3:  FNTCHRSET(C0S0BRTR T1V10037) COLOR(BLU)
Line 4:  FONT(2311 (*POINTSIZ 18)) COLOR(PNK)
Line 5:  FNTCHRSET(C0N500H0 T1V10500) COLOR(*RGB 50 50 75)
Line 6:  FNTCHRSET(CZN500 T1V10284 (*POINTSIZ 18)) COLOR(*RGB 75 20 40)
Line 7:  CDEFNT(X0N51EHC) COLOR(*CMYK 0 50 50 0)
Line 8:  FONT(2304 (*POINTSIZ 24 10)) COLOR(*CMYK 50 0 0 50)
Line 9:  FNTCHRSET(CZH200 T1V10274 (*POINTSIZ 48 10)) COLOR(TRQ)
Line 10: FONT(19) COLOR(BRN)
Line 11: FONT(420 (*POINTSIZ 18 50)) COLOR(RED) TXTRTT(270)
Line 12: FONT(420 (*POINTSIZ 18 50)) COLOR(RED) TXTRTT(90)
```

Figure 4. DDS keywords used to create the sample document

Notes:

1. To determine the names of the font character sets and coded fonts that are available on your system, use the WRKFNTRSC command.
2. The TXTRTT keyword only works with fields, not constants.
3. The print data for lines 1 through 10 is constant text and was specified in the DDS source.
4. The print data for lines 11 and 12 is a data field that contains the printed text.
5. By using the code examples, you agree to the terms of the “Code license and disclaimer information” on page 73.

Related tasks:

DDS keyword finder

Related reference:

Work with Font Resources (WRKFNTRSC) command

“Specifying an AFP font” on page 28

There are many different tools you can use to specify Advanced Function Presentation (AFP) fonts in your document. Each tool has different capabilities.

Specifying a page segment

A page segment object can be built into your application output in a number of ways.

- Calling it in the printer file data description specifications (DDS)
- Referencing it in any overlay
- Placing it in a print application with the print format utility of the AFP Utilities licensed program
- Specifying it within a page definition or form definition
- Using it directly in Advanced Function Presentation (AFP) data streams

Related concepts:

DDS for printer files

“Page segments” on page 9

Page segments are objects containing composed text and images that are prepared before formatting and included during printing.

“Specifying an overlay” on page 27

To use overlays, specify them in the front and back overlay parameters of the printer file being used with your application.

“Creating AFP data” on page 33

There are several different ways to generate Advanced Function Presentation (AFP) data. You can use a printer file, DDS keywords, Infoprint Server, the AFP printer driver, or Advanced Function Printing Utilities.

Specifying an object container

There are different ways to include object containers in your data, depending on your installation and how you want to use them.

With the AFPRSC keyword, you can reference a print resource stored in the integrated file system, including an object container.

You can specify at most 10 object containers per page of data. When using object containers, you must ensure that the device to which you send the data supports the type of object included. Also, the system searches for object containers differently than how it searches for other objects. The search method is described in the documentation of the Data description specifications (DDS) AFPRSC keyword.

Related concepts:

“Object containers” on page 7

Object containers are used to carry non-Object Content Architecture (OCA) objects in an Advanced Function Presentation (AFP) data stream.

Related tasks:

DDS keyword finder

Related information:



System i5 Guide to Output (S544-5319) PDF

Search order of library list

Print Services Facility (PSF) uses the user library list and device library list to search for the AFP resources that you specify.

It is essential that you understand how IBM i searches for Advanced Function Presentation (AFP) resources. When you create a spooled file, the operating system saves the libraries in your library list. Within that list are the libraries that contain the resources used to create the spooled file.

Related concepts:

“Resource library lists” on page 12

A resource library list specifies the libraries that are searched for the Advanced Function Presentation (AFP) resources needed to process a spooled file.

“PSF configuration objects” on page 14

A Print Services Facility (PSF) configuration object lets you specify Intelligent Printer Data Stream (IPDS) printer customization options that you cannot specify elsewhere.

DDS AFPRSC keyword

Related reference:

Add Environment Variable (ADDENVVAR) CL command

Change Environment Variable (CHGENVVAR) CL command

Remove Environment Variable (RMVENVVAR) CL command

Work with Environment Variables (WRKENVVAR) CL command

Why you should use a library list:

When specifying an overlay, page definition, or page segment, you need to include the library that contains the resource in your library list. If you have more than one overlay, page definition, or page segment with the same name, make sure the one you want to use is in the first library searched. Otherwise, you might specify the correct name, but get the wrong resource in your output.

If you have a resource that you want many users to access (fonts, for example), put that resource in a library that everyone can access. For example, you might put it in a library identified in the system value QSYSLIBL.

Search order for resources that are not specified by the AFPRSC keyword:

When the operating system searches libraries for the resources needed to print a spooled file, the user library list is searched first and then the device library list. By default, the operating system searches libraries in the following order:

1. System libraries

These libraries are identified in system value QSYSLIBL. System libraries are available to all users; they are identified in your library list with a Type of SYS.

2. Current library

The current library is identified in your user profile as the value for the current library (CURLIB) parameter. In your library list, the current library has a Type of CUR.

3. User libraries

User libraries are identified in system value QUSRLIBL or in a job description. In your library list, these libraries are identified with a Type of USR.

You can override the system library search list and specify a library search list for a particular device or user. To do this, use a PSF configuration object. If you create a PSF configuration object, the default for the user and device library lists will be the same as the library search described previously.

Search order for resources that are specified by the AFPRSC keyword:

When you specify a resource by using the AFPRSC Data description specifications (DDS) keyword, the operating system uses a different method to search for that resource. Instead, it uses a search order that involves the environment variable QIBM_AFP_RESOURCES_PATH. The system searches the integrated file system for those resources as described in the AFPRSC topic.

The QIBM_AFP_RESOURCES_PATH environment variable:

The QIBM_AFP_RESOURCES_PATH environment variable is used when The DDS keyword AFPRSC is used to specify objects in the integrated file system. This environment variable specifies the paths to search for the specified object.

To specify multiple paths in QIBM_AFP_RESOURCES_PATH, use a colon to separate them. For example, /home/officers/signatures:/home/checkimages/2003 identifies two directories to be searched:

- /home/officers/signatures (This directory is searched first.)
- /home/checkimages/2003 (This directory is searched second.)

The directories are searched in the order in which they are listed.

The /QIBM/UserData/OS400/AFPresources directory is created when IBM i is installed. It is always available for use.

You can use these CL commands to work with environment variables:

- Work with Environment Variables (WRKENVVAR)
- Add Environment Variable (ADDENVVAR)
- Change Environment Variable (CHGENVVAR)
- Remove Environment Variable (RMVENVVAR)

Creating AFP data

There are several different ways to generate Advanced Function Presentation (AFP) data. You can use a printer file, DDS keywords, Infoprint Server, the AFP printer driver, or Advanced Function Printing Utilities.

Creating AFP data by using a printer file

You can create AFP data on IBM i from applications using a printer file with the device type (DEVTYPE) parameter value set to *AFPDS.


Creating AFP data by using DDS keywords

You can create AFP data with Data description specifications (DDS) printing functions that are tailored for use with AFP.

Creating AFP data by using IBM Infoprint Server for iSeries

Infoprint Server has a Create AFP Data (CRTAFPDTA) command that lets you transform line (*LINE) or mixed (*AFPDSL) data into AFP (*AFPDS) data. It can also take an AFP file as input and generate an AFP stream file. It can index a document for viewing, archiving, or document retrieval. Optionally, it retrieves and packages the AFP resources that are needed for printing or viewing. Refer to the *Infoprint Server for iSeries: User's Guide* for instructions to use the CRTAFPDTA command.

| Creating AFP data by using the AFP printer driver for Windows

- | The AFP printer driver creates AFP documents, overlays, and page segments from your Windows
- | applications. For more information about the AFP printer driver or to download the printer driver, see
- | the InfoPrint Solutions Company web site  .

Creating AFP data by using IBM Advanced Function Printing Utilities

By using the IBM Advanced Function Printing Utilities (AFP Utilities) licensed program, you can create and print AFP data from an existing database file, merged with an overlay. For more information about this licensed program, see *AFP Utilities for iSeries: User's Guide (S544-5349)*. This publication is available

on the IBM Publications Center Web page  at <http://www.elink.ibm.com/public/applications/publications/cgibin/pbi.cgi>.


Related concepts:

“Specifying a page segment” on page 31

A page segment object can be built into your application output in a number of ways.

DDS for printer files

Related information:

 [Infoprint Server for iSeries: User's Guide \(G544-5775\) PDF](#)

Printing AFP data with PSF

You can use Print Services Facility (PSF) to print both AFP data that was generated on IBM i and data that was generated on a zSeries system and sent to IBM i.

Printing AFP data generated on IBM i

To print AFP data that was generated on IBM i, use an application program or the PRTAFPDTA command.

Follow these steps to generate and print Advanced Function Presentation data stream (AFPDS) data with Print Services Facility (PSF):

1. Create the AFPDS data.
2. Optional: Specify overlays.
3. Generate an AFPDS spooled file.

Method 1: Use an application program. The application program that creates the data to be used with the overlays might need to be tailored so the printed output fits with the overlays you designed.

Tailoring the program to fit the overlay is similar to tailoring the program to work with a preprinted form.

Method 2: Use the Print AFP Data (PRTAFPDTA) command. If you have a database file that contains AFP data, use the PRTAFPDTA command to spool the file.

If you want to use a prompt display with this command, type PRTAFPDTA and press F4 (Prompt).

Notes:

- a. The PRTAFPDTA command prints AFPDS data. Any padding between the AFPDS structured fields must be X'40' or X'00'.
- b. When using the PRTAFPDTA command, do not override the DEVTYPE parameter on the system printer file, QSYSPRT.
- c. When using the PRTAFPDTA command, the form definition typically identifies the drawer to print from. An exception is when an Override with Printer File (OVRPRTF) command has been issued with a different drawer value. In this case, the drawer value is taken from the override command.

Examples

This command prints the first member in file MYFILE starting with page 2 and ending on page 6.

```
PRTAFPDTA FILE(MYLIB/MYFILE) STRPAGE(2) ENDPAGE(6)
```

This command prints the member \$REPORT in file MYFILE using a form definition of F10101 and all available exception handling.

```
PRTAFPDTA FILE(MYLIB/MYFILE) MBR($REPORT) FORMDF(F10101) FIDELITY(*CONTENT)
```

Note: By using the code examples, you agree to the terms of the “Code license and disclaimer information” on page 73.

4. Release the spooled file to a device with device type *AFPDS.

Related reference:

Print AFP Data (PRTAFPDTA) CL command

Printing data sent to IBM i from zSeries

PSF can print data that was generated on zSeries. This data might be AFP, AFPDSLNE (AFP data mixed with line data), or line data. The data might be sent to network files or directly to an output queue.

There are different steps to print data sent to a System i host, depending on where it is sent to.

Related concepts:

“Receiving resources and AFPDS data sent to network files” on page 24

To make receiving resources and Advanced Function Presentation data stream (AFPDS) data as easy as possible, you should be aware of these points.

“AFP resources” on page 4

Advanced Function Presentation (AFP) resource objects contain data and control information.

“Resource library lists” on page 12

A resource library list specifies the libraries that are searched for the Advanced Function Presentation (AFP) resources needed to process a spooled file.

“Sending data from zSeries to IBM i network files” on page 54

The examples in this topic show how to send print data and resources from a zSeries system to an IBM i network file.

Related tasks:

Releasing a spooled file

Related reference:

Print AFP Data (PRTAFPDTA) CL command

Printing data sent from zSeries to an IBM i network file:

To print data that has been placed on an IBM i network file, follow these steps:

1. Receive the file to a library.

2. Use the Print AFP Data (PRTAFPDTA) command.

All resources must be processed this way.

Printing data sent from zSeries to an IBM i output queue:

You can print data that has been placed on an IBM i output queue the same way you print any other spooled file. However, there are some considerations when having data placed directly on an output queue. If a printer is active for that output queue, spooled files placed directly into the output queue can be printed without the owner of the queue realizing it. To avoid this, try one of these possible solutions:

- Create a special user ID and a special output queue for that user ID. You can then sign on using that user ID and assign a printer to your output queue to print the spooled files.
- Make sure the output queue of the receiving user ID is held before the zSeries system sends the files.
- Use the End Writer (ENDWTR) command to end the printer assigned to that output queue before the zSeries system sends the file.

When data is sent from a zSeries system to an IBM i output queue and then printed, it follows this path:

1. zSeries system
2. Target System i host, identified by a node ID
3. Target output queue for the target user ID

The target user ID must have access to the libraries containing the resources that the spooled file needs when it prints on IBM i.

4. Target printer

Make sure that the printer you want to print the files on is assigned to the correct output queue. If any special handling of the printer is necessary (form choice, drawer selection, envelopes, and so on), it should be done before the files are sent.

Note: If you cannot find the spooled file on the output queue of the specified user ID, look in the QNFTP job log for messages. The QNFTP job runs under the QSNADS user profile.

Transforming IPDS data to PDF

IPDS-to-PDF transform support, also called the PDF subsystem, is an IBM Infoprint Server for iSeries function that lets you generate Portable Document Format (PDF) files or Advanced Function Presentation (AFP) files (for spooling only) from AFP, SNA character string (SCS), or Intelligent Printer Data Stream (IPDS) spooled files.

Intelligent routing is then used to route the output file. Intelligent routing is the ability to take the entire spooled file or any segment of the input spooled file and do any combination of these:

- Generate a PDF file and send it as an e-mail attachment.
- Generate a PDF file and store it as a stream file in the integrated file system.
- Generate a PDF file and spool it.
- Generate an AFP file and spool it.

Intelligent routing is controlled by values in a PSF configuration object and a mapping program.

Note: The Print Services Facility (PSF) transform interface supports an IPDS-to-PDF transform program that emulates a TCP/IP-connected IPDS 4028, 3812, or Infoprint 40 printer device.

An IPDS-to-PDF transform that can be used with PSF is provided in the IBM Infoprint Server for iSeries product. The transform converts IPDS controls and data into PDF files. The output PDF files include text, graphics, and image data, as appropriate. The transform also stores the mail tag in a comment statement in the PDF output. The mail tag is specified in the printer file's USRDFNDDTA parameter or the STRPAGGRP Data description specifications (DDS) keyword. For

detailed information about the IPDS-to-PDF transform (including the user exit program), see the *Infoprint Server for iSeries User's Guide*. To use the transform provided in Infoprint Server, PSF is not required.

A mapping program is a user exit program specified on the PSF configuration object's PDFMAPPGM parameter. You can do these and more with a mapping program:

- Interpret routing tags
- Specify the subject of an e-mail
- Add text to the beginning of an e-mail
- Specify the path to store the PDF stream file

If you are using a Simple Mail Transfer Protocol (SMTP) server to send the e-mail, it has additional capabilities, such as specifying carbon-copy (cc), blind-carbon-copy (bcc), and return-to e-mail addresses; specifying a file to use as the body of an e-mail; and specifying attachments.

These topics describe the main ways to access the PDF subsystem and how to specify that a PDF file is sent as e-mail:

Related information:



Infoprint Server for iSeries: User's Guide (G544-5775) PDF

Transforming spooled files to PDF without manual setup

For operating systems later than V5R3, this method requires no setup. It is best for simple applications, such as a trial run of a billing application. The input spooled files can be transformed in only one way, not a combination.

Follow these steps to transform an Intelligent Printer Data Stream (IPDS), Advanced Function Presentation (AFP), or SNA character string (SCS) spooled file to Portable Document Format (PDF) automatically. This method is not available on operating systems earlier than V5R4. An Infoprint Server for iSeries license is required.

Related tasks:

Configuring e-mail

Related information:



Infoprint Server for iSeries: User's Guide (G544-5775) PDF

Prerequisites:

1. If the PDF file will be sent as e-mail, make sure that IBM i is set up to send e-mail. For instructions on setting up IBM i to send e-mail, see the *Configure e-mail* topic.
2. Optional: Write your mapping program. Refer to the *Infoprint Server for iSeries User's Guide* for the format.

Transforming a spooled file to PDF:

To transform a spooled file to PDF, do these steps:

1. Start a System i Navigator session.
2. Expand **My Connections** (or your active environment).
3. If you do not have an AFP Manager icon, install AFP Manager as follows: Right-click **My Connections** (or your active environment) and select **Install Options** then **Selective Setup**.
4. Expand **Basic Operations** and select **Printer Output**.
5. Right-click the output files you want to convert and select **Convert to PDF**. The Convert to PDF wizard opens.
6. Follow the instructions in the wizard.

Transforming spooled files to PDF with manual setup

This method requires varying levels of setup, depending on the complexity of the required output. This method gives you the most flexibility.

Prerequisites:

1. Set up your PSF configuration object. The Print Services Facility (PSF) configuration object you use specifies what is done with the PDF file and other transform options.
2. Optional: Change the input file to create multiple output files or an indexed file.
3. Configure a device for PDF conversion.

Transforming a spooled file to PDF:

To transform a spooled file, submit it to a printer that is set up correctly.

Setting up your PSF configuration object:

Before you set up your Print Services Facility (PSF) configuration object, you need to decide what you want done with the output file after it is created.

It can be stored in a directory as PDF, placed on an output queue as Advanced Function Presentation (AFP) or PDF, or e-mailed as a PDF attachment.

Note: You must have system configuration authority (*IOSYSCFG) to create a PSF configuration object.

To create or change a PSF configuration object, follow these steps:

1. In System i Navigator, expand **My Connections** (or your active environment).
2. Expand **AFP Manager**.
If you do not have an AFP Manager icon, install AFP Manager as follows: Right-click **My Connections** (or your active environment) and select **Install Options** then **Selective Setup**.
3. Create a new PSF configuration object or change one that already exists.
 - To create a PSF configuration object, right-click the **PSF configuration objects** folder and select **New**.
 - To change a PSF configuration object, expand the **PSF configuration objects** folder, right-click the PSF configuration object you want to change, and select **Configure**.
4. If you are creating a PSF configuration object, on the **General** page, specify a name.
5. On the **PDF Destinations** page, specify what you want done with the generated PDF files:
 - Select **Generate PDF**.
 - If you want the PDF files spooled to an output queue, select **Store as printer output**. You must also specify the library-qualified output queue. Click **Browse** to search for an output queue.
 - If you want the PDF files stored as a stream file in the integrated file system, select **Store as stream file**. You must also specify the stream file directory where you want the PDF file stored.
 - If you want the PDF files sent as e-mail, select **Send as electronic mail**.
 - For **Administrator address**, specify the e-mail address of the PDF administrator. Any PDF files that are not distributed correctly are attached (if possible) to an e-mail that is sent to this address. Your IBM i must be set up to send e-mail to use this option. If the specified address is on an IBM i, that IBM i must be set up to receive e-mail. For instructions about setting up your IBM i to send and receive e-mail, see the Configure e-mail topic.
6. If you selected **Send as electronic mail** or specified an **Administrator address**, specify the mail sender and, optionally, the mail server to use:
 - Specify the e-mail sender or click the arrow to select from a list. The e-mail sender must be enrolled in the system distribution directory.

Use the Display Directory Entries (DSPDIRE) command to view the entry in the system distribution directory. If you have security administrator authority, you can change the Simple Mail Transfer Protocol (SMTP) information with the Work with Directory Entries (WRKDIRE) command.

- If you want to specify the mail server to use, select **Advanced**. If you do not specify a mail server, the Send Distribution (SNDDST) command is used. Many of the options available through the mapping program require you to use an SMTP server.
7. On the **PDF Processing** page, specify any of these options to customize the PDF that is generated:
- If you want the fonts to be included in the output file, select **Include PDF fonts inline**. This ensures fidelity when you print or view the file, but increases file size. This function only works with IP40240 or IP40300 device emulation.
 - If you want PSF to use the named groups defined in the input file, select **Generate multiple PDF files**.
 - If you want the file split at named group boundaries, select **Create separate PDF files**.
 - If you want one output file created with index tags at named group boundaries, select **Create single PDF file with index tags**.
 - In the **Device emulation type** field, specify the device that AFP should emulate.
 - Specify the paper size in printer drawers one and two of the device specified for **Device emulation type**.
 - Specify the library-qualified data queue where the PDF transform status messages should be posted. Click **Browse** to search for a library.
 - If applicable, specify the library-qualified **Mapping program**. Click **Browse** to search for a library. If you want to use a mapping object, select *IBMPGM.
 - If applicable, specify the library-qualified **Mapping object**. Click **Browse** to search for the mapping object.
8. Click **OK**.

For help with any field, select the field and press F1.

Related tasks:

Configuring e-mail

Related reference:

Display Directory Entries (DSPDIRE) CL command

Send Distribution (SNDDST) CL command

Work with Directory Entries (WRKDIRE) CL command

Changing the input file to create multiple output files or an indexed file:

You can insert group tags into your data before it is transformed. This lets the transform generate one Portable Document Format (PDF) file for each group or insert an index tag at the beginning of each group.


The action taken depends on the value specified for the Multiple PDF Files (PDFMULT) parameter on the Print Services Facility (PSF) configuration object. You can also use group tags to send each group as e-mail to a different recipient. The group name is used as the index tag or mail tag when appropriate. For information about putting mail tags on the group tags, see the *Infoprint Server for iSeries User's Guide*.

You can use a utility such as Data description specifications (DDS) or the IBM Infoprint Server for iSeries Create AFP Data (CRTAFPDTA) command to insert group tags in your data. If you choose to specify groups, all of the data must be inside a group.

To use DDS to generate groups, use the STRPAGGRP and ENDPAGGRP DDS keywords.

To use CRTAFPDTA to generate groups, follow the instructions in the *Infoprint Server for iSeries User's Guide* to index your file. The value specified with **Select index for group names (IDXGRP)** is the group name.

Related information:

 [Infoprint Server for iSeries: User's Guide \(G544-5775\) PDF](#)

Configuring a device for PDF conversion:

Set up your device for Portable Document Format (PDF) conversion the same way you set up a TCP/IP Intelligent Printer Data Stream (IPDS) printer.

You can have multiple IPDS-to-PDF printers active, but each must be configured as a different printer with a different port. Use the Create Device Description (Printer) (CRTDEVPRT) command to specify the following parameters:

Device description

printer-name

Device class

*LAN

Device type

*IPDS

Device model

0

LAN attachment

*IP

Advanced function printing

*YES

Port number

xxxxx, the number must be unique for each printer.

Font *printer font*

Remote location

127.0.0.1

User defined object

Object

PSF-configuration-object-name

Library

PSF-configuration-object-library

Object type

*PSFCFG

Sending the PDF file as e-mail

A mapping program, a mapping object, or the Print Services Facility (PSF) configuration object specifies that an output Portable Document Format (PDF) file should be sent as e-mail. A mail tag provides the e-mail address.

To specify that an output PDF file is sent as e-mail, you can set up a mapping program for e-mail. For instructions to set up a mapping program for e-mail, see the *Infoprint Server for iSeries User's Guide*.

There are two ways to send the output file as e-mail without using a mapping program:

- Specify PDFGEN(*MAIL) in the PSF configuration object.
- Use a mapping object.

After the PDF file creation, PSF retrieves the mail tag. The mail tag is on the printer file's User defined data (USRDFNDDTA) parameter or the Start page group (STRPAGGRP) Data description specifications (DDS) keyword. If you do not specify an exit program, you must provide a valid e-mail address in the USRDFNDDTA parameter or in the STRPAGGRP DDS keyword. PSF then electronically mails the output. It uses a Simple Mail Transfer Protocol (SMTP) server if one is specified in the PSF configuration object. If none is specified, it uses the Send Distribution (SNDDST) command.

Format of the printer file's USRDFNDDTA mail information

The format of the mail information when it is specified in the printer file's USRDFNDDTA parameter is:
 USRDFNDDTA('MAILTAG(80 bytes of text) MAILSENDER(10 byte name)')

The 80 bytes of text can contain a mail address or a tag. The mail exit routine converts tags into a mail address and an optional message. The MAILSENDER parameter is 10 bytes long and specifies the name of the user profile that is sending the file. This parameter overrides the PSF configuration object's PDFSENDER value.

Format of the STRPAGGRP mail tag


When you specify PDFMULT(*YES *SPLIT), the Name parameter of the STRPAGGRP DDS keyword can contain a mail tag. The mail tag can contain either a mail address or a tag. The mail exit routine converts tags into a mail address and an optional message. The STRPAGGRP name overrides a mail tag in the printer file's USRDFNDDTA parameter.

Related tasks:

“Encrypting the PDF file”

The PDFENCRYPT parameter on the User defined data (USRDFNDDTA) parameter specifies whether to encrypt an output PDF stream file or spooled file and whether to send it as e-mail.

Related information:

 Infoprint Server for iSeries: User's Guide (G544-5775) PDF

Encrypting the PDF file

The PDFENCRYPT parameter on the User defined data (USRDFNDDTA) parameter specifies whether to encrypt an output PDF stream file or spooled file and whether to send it as e-mail.

To encrypt the output PDF file:

1. Specify the e-mail distribution option in a PDF map object entry or segment.
2. Specify encryption values for the e-mail distribution option.
3. Specify the name of the PDF map object with parameter PDFMAP in the Print Services Facility (PSF) configuration object.
4. Specify the default IBM-supplied user program with parameter PDFMAPPGM in the PSF configuration object.
5. Specify the PDFENCRYPT parameter on the printer file's or spooled file's USRDFNDDTA parameter. Values for the PDFENCRYPT parameter are:

*NONE

Encryption and e-mail distribution options are not specified at the spooled file level. The encryption values specified in a PDF map object are used. Specifying PDFENCRYPT(*NONE) is the same as not specifying PDFENCRYPT.

A value of *NONE cannot not be specified with any other values. If other values are specified with *NONE they are ignored.

***NOMAIL**

The e-mail is not sent. If this value is not specified, the e-mail is sent. Use *NOMAIL to encrypt a stream file or spooled file without sending an e-mail.

***STMF**

The generated PDF file placed in a stream file is encrypted. If this value is not specified and a stream file is generated, the stream file is not encrypted. If the stream file distribution option is not specified, this value is ignored.

***SPLF**

The PDF file placed in a spooled file is encrypted. If this value is not specified and a spooled file is generated, the spooled file is not encrypted. If the spooled file distribution option is not specified, this value is ignored.

Examples

- To convert a spooled file to an encrypted PDF, send it as e-mail, and write it as an encrypted PDF to the integrated file system:
 1. Specify the stream file distribution option in the PDF map object entry or segment.
 2. Specify this parameter on the printer file or spooled file's attributes:

```
USRDFNDA('PDFENCRYPT(*STMF)')
```
- To convert a spooled file to an encrypted PDF and spool it as an encrypted PDF without sending it as e-mail:
 1. Specify the spooled file distribution option in the PDF map object entry or segment.
 2. Specify this parameter on the printer file or spooled file's attributes:

```
USRDFNDA('PDFENCRYPT(*SPLF *NOMAIL)')
```
- To convert a spooled file to an encrypted PDF, spool it as an encrypted PDF, and write it as an encrypted PDF to the integrated file system without sending it as e-mail:
 1. Specify the stream file distribution option in the PDF map object entry or segment.
 2. Specify the spooled file distribution option in the PDF map object entry or segment.
 3. Specify this parameter on the printer file or spooled file's attributes:

```
USRDFNDA('PDFENCRYPT(*NOMAIL *STMF *SPLF)')
```
- To convert a spooled file to an encrypted PDF, spool it as a PDF without encryption, and write it as an encrypted PDF to the integrated file system without sending it as e-mail:
 1. Specify the stream file distribution option in the PDF map object entry or segment.
 2. Specify the spooled file distribution option in the PDF map object entry or segment.
 3. Specify this parameter on the printer file or spooled file's attributes:

```
USRDFNDA('PDFENCRYPT(*STMF *NOMAIL)')
```

Related concepts:

“Sending the PDF file as e-mail” on page 40

A mapping program, a mapping object, or the Print Services Facility (PSF) configuration object specifies that an output Portable Document Format (PDF) file should be sent as e-mail. A mail tag provides the e-mail address.

Related reference:

Change Spooled File Attributes (CHGSPLFA) CL command

Configuring PSF

You can configure Print Services Facility (PSF) by using the printer device description or by using a PSF configuration object.

Related concepts:

“PSF configuration objects” on page 14

A Print Services Facility (PSF) configuration object lets you specify Intelligent Printer Data Stream (IPDS) printer customization options that you cannot specify elsewhere.

“Specifying a PSF configuration object” on page 27

Specify a PSF configuration object in the device description for the printer.

Related reference:

Create Device Description (Printer) (CRTDEVPRT) CL command

Create PSF Configuration Object (CRTPSF CFG) CL command

Change Device Description (Printer) (CHGDEVPRT) CL command

Configuring PSF by using a device description

To use PSF, you must specify AFP(*YES) in the printer device description.

Other parameters in the device description affect how PSF works with Advanced Function Presentation (AFP). For example, you can specify these options:

- The maximum number of print requests that can be queued for printers.
- Whether a file using AFP must be completely converted to IPDS before printing begins.
- How long to wait after a print request has been received before forcing the last pages of the output into the paper stacker. This is for continuous forms printers only.
- A default form definition to use.
- A PSF configuration object to use.

Configuring PSF by using a PSF configuration object

A PSF configuration object is an extension of the printer device description. You can use a PSF configuration object to specify device configuration options that you cannot specify with the device description. For example, with a PSF configuration object you can specify these:

- A library list for PSF to use to search for resources
- When PSF should release a session with a printer
- Whether to automatically take advantage of outline fonts
- Whether to generate Portable Document Format (PDF) output from the spooled file

To use a PSF configuration object, follow these steps:

1. Create a PSF configuration object by using the Create PSF Configuration Object (CRTPSF CFG) command or by using AFP Manager:
 - a. Start an System i Navigator session.
 - b. Expand **My Connections** (or your active environment).
 - c. Expand **AFP Manager**.
If you do not have an AFP Manager icon, install AFP Manager as follows: Right-click **My Connections** (or your active environment) and select **Install Options** then **Selective Setup**.
 - d. Right-click **PSF configurations** and select **New**.
 - e. Specify the options you want. For help on any page, press F1. Select **OK**.
2. Specify the PSF configuration object by following the steps in the “Specifying a PSF configuration object” on page 27 topic.

Managing PSF

After you configure Print Services Facility (PSF), you can continue to work with your AFP environment.

You can change the PSF configuration object and the printer files as necessary to manage PSF sessions.

Enabling IPDS pass-through support

When IPDS pass-through support is enabled for a printer, all eligible files spooled to that printer are processed without conversion to AFPDS and to printer-specific IPDS.

There are several ways to enable Intelligent Printer Data Stream (IPDS) pass-through support:

- Specify IPDSPASTHR(*YES) in the printer file.
- Specify IPDSPASTHR in the PSF configuration object and specify IPDSPASTHR(*DEVD) in the printer file.

When IPDSPASTHR(*DEVD) is specified, PSF will first check whether IPDSPASTHR is specified in the printer file's USRDFNDDTA parameter. It then checks for a value for IPDSPASTHR in the PSF configuration object that is specified in the printer device description, if one is specified. If there is no object that is specified in the printer device description, IPDS pass-through is ignored.

Related concepts:

"IPDS pass-through" on page 14

IPDS pass-through allows you to process some SCS and IPDS spooled files more efficiently.

"PSF configuration objects" on page 14

A Print Services Facility (PSF) configuration object lets you specify Intelligent Printer Data Stream (IPDS) printer customization options that you cannot specify elsewhere.

"Specifying a PSF configuration object" on page 27

Specify a PSF configuration object in the device description for the printer.

Sharing print sessions

You can specify printer-sharing properties on the PSF configuration object. This lets you limit the amount of time that you have a connection to the printer, control when the session is released, control when a new session is started, and specify how many times PSF tries to connect to the printer.

Several parameters from the PSF configuration object and device description let you configure Print Services Facility (PSF) to share sessions with other PSF sessions or ASCII print drivers.

Notes:

1. PSF supports session sharing with TCP/IP-attached printers.
2. PSF supports session sharing with any printer attached to the PSF Direct licensed program.
3. PSF does not support session sharing with APPC-attached printers. If you want to use session sharing with these printers, either use their TCP/IP support, if available, or attach them to PSF Direct, if supported.
4. PSF does not support session sharing with twinaxial printers attached to local or remote workstation controllers. If you want to use session sharing with these printers, check if TCP/IP support is available.

Following are the parameters you need to consider for printer session and dialog sharing.

ACTMR

Printer device description parameter that specifies how long (in seconds) that PSF waits for a printer to respond to an activation request. This applies to TCP/IP-attached printers only. PSF uses this timer only after a session has been opened with the printer.

No timers can influence the length of time that TCP/IP takes to wait for a response to a session start request. You can specify that PSF tries to start a session again after a failure of the session start request is detected. To do this, use the PSF configuration object RETRY parameter to specify how many times PSF should repeat the session start request.

ACTRLSTMR

PSF configuration object parameter that specifies the point at which the Release Timer (RLSTMR) is activated.

If you are using a non-impact continuous forms printer, do not set the PRTRQSTMR parameter in the printer device description to *NOMAX. If you set the PRTRQSTMR to *NOMAX, an operator must perform a manual nonprocess runout (NPRO) at the printer. PSF will not release a session or Intelligent Printer Data Stream (IPDS) dialog until the last file sent to the printer is printed.

RESTRTMR

PSF configuration object parameter that specifies the amount of time to wait before the printer writer attempts to reestablish either a session or dialog. For example, if this value is set to 10, PSF activates the timer as soon as a session or dialog is released. After 10 minutes have elapsed, PSF checks for a spooled file with a status of RDY. If there is one, PSF tries to start a session or dialog with the printer in order to print the file. If a spooled file is not ready after the timer expires, PSF waits for a RDY spooled file to be placed on its output queue before attempting to start a session or dialog.

This timer is ignored if PSF has not been configured to release either a session or dialog. Use the ACTRLSTMR and RLSTMR parameters to configure PSF to release either a session or dialog.

RETRY

PSF configuration object parameter that specifies the number of additional attempts PSF makes to establish an APPC or TCP/IP session. When PSF is sharing a PSF directly-attached printer with other PSF sessions, you might want to set the value to *NOMAX. This specifies that PSF will continue trying to obtain a session. The default value for the RETRY parameter is 15.

The RETRY parameter is helpful for TCP/IP-attached printers in this situation: You want to share an AFCCU printer with more than three PSFs. A printer is temporarily unavailable when PSF tries to open a session with it. You might see this when PSF fails to start a printer session. One example of this is when PSF issues message PQT3603 with error code 22 or 15. The RETRY parameter specifies that instead of ending PSF should try again to open a session with the printer. PSF will try to open a session up to the number of times specified.

RETRYDLY

PSF configuration object parameter that specifies the number of seconds to wait between each additional attempt to establish a session. This parameter is used only when PSF is using an SNA attachment. The default value for the RETRYDLY parameter is 90.

RLSTMR

Timer set in the PSF configuration object. Its value is referenced by the ACTRLSTMR parameter. The default setting is *NOMAX, which means that PSF does not release the session or dialog with the printer until the writer is ended.

The value specified for parameter RESTRTMR determines when PSF reestablishes a session or a dialog.

Related concepts:

“PSF configuration objects” on page 14

A Print Services Facility (PSF) configuration object lets you specify Intelligent Printer Data Stream (IPDS) printer customization options that you cannot specify elsewhere.

“Specifying a PSF configuration object” on page 27

Specify a PSF configuration object in the device description for the printer.

Related reference:

“CL commands for PSF configuration objects” on page 57

There are several CL commands that you can use the commands to use to create, change, display, and delete a PSF configuration object.

“CL commands for device descriptions” on page 58

There are several CL commands that you can use to create or change a printer device description.

Automatic session recovery

PSF can try to resume printing when a session has been unexpectedly ended by a device.

A message is sent to the message queue when Print Services Facility (PSF) is performing automatic session recovery.

These PSF configuration object parameters support automatic session recovery.

AUTOSSNRCY

Automatic session recovery specifies whether PSF tries to resume printing when a session has been unexpectedly ended by a printer or other network device, such as a router. AUTOSSNRCY(*YES) also lets you power your printer off and on without ending PSF. If you plan to specify *YES, you should consider these values for other parameters in the PSF configuration object:

- For a TCP/IP connection, use RETRY or ACKFRQ.
- For an APPC connection, use RETRY, RETRYDLY, or ACKFRQ.

Note: When automatic session recovery takes place, pages might be printed when printing resumes.

ACKFRQ

Acknowledgment frequency specifies the frequency, in pages, with which PSF sends Intelligent Printer Data Stream (IPDS) acknowledgment requests to a printer. The acknowledgment request responses from the printer that contains information as to the status of pages that is sent to the printer. You might want to adjust this value if you are concerned about one of these issues:

- Losing a connection to a printer while spooled files are being printed
- Duplicate pages being printed

More frequent acknowledgment request responses provide more information about pages that have been printed. However, if you increase the frequency of acknowledgment requests (by specifying a lower value), you can slow the print process. You might need to experiment with different values in order to find one that is suitable for your environment.

Related concepts:

“PSF configuration objects” on page 14

A Print Services Facility (PSF) configuration object lets you specify Intelligent Printer Data Stream (IPDS) printer customization options that you cannot specify elsewhere.

“Specifying a PSF configuration object” on page 27

Specify a PSF configuration object in the device description for the printer.

Related reference:

“CL commands for PSF configuration objects” on page 57

There are several CL commands that you can use to create, change, display, and delete a PSF configuration object.

| **Disabling offset stacking and edge marking**

| PSF lets you disable offset stacking on cut-sheet printers and edge mark printing on continuous forms printers.

| This PSF configuration object parameter supports disabling offset stacking and edge marking:

| **PSFDFNOPT (OFFSTACK)**

| **PSFDFNOPT (OFFSTACK(*YES))**

| Specifies that there is no change to offset stacking and edge marking. That is, offset stacking and edge marking occurs between each spooled file. All offset stacking and edge mark changes specified in the form definition are honored. This is the default.

| **PSFDFNOPT (OFFSTACK(*NO))**

| Specifies that no offset stacking or edge marking is done. This includes the offset stacking and edge marking that is done between spooled files and through the form definition.

Specifying public data authority for directories created by PSF

PSF lets you specify the public data authority for any directories that PSF creates when a mapping program specifies that PDF files are to be written to the integrated file system. This ability applies to customer-written PDF mapping programs and to map objects.

This PSF configuration object parameter specifies public data authority:

PSFDFNOPT (PDFDTAAUT)

PSFDFNOPT (PDFDTAAUT(*INDIR))

The authority for the directory to be created is determined by the directory it is to be created in. The directory immediately preceding the new directory determines the authority.

A directory created in the root (/), QOpenSys, or user-defined file system is assigned the same public, private and primary group authority, authorization list, and primary group as the directory it is to be created in.

A directory created in QDLS for a folder defaults to *EXCLUDE for a first level folder. If created in the second level or greater, the authority of the previous level is used.

The QOpenSys and root (/) file systems use the parent directory Ifs Data Authority value. If the value *INDIR is specified, then PSF specifies the value *INDIR for the *PUBLIC object authority.

PSFDFNOPT (PDFDTAAUT(*RWX))

The user can change the object and perform basic functions on the object except those limited to the owner or controlled by object existence (*OBJEXIST), object management (*OBJMGT), object alter (*OBJALTER) and object reference (*OBJREF) authorities. Read, write, execute (*RWX) authority provides object operational (*OBJOPR) and all data authorities.

PSFDFNOPT (PDFDTAAUT(*RW))

The user can view and change the contents of an object. Read, write (*RW) authority provides *OBJOPR and data read (*READ), add (*ADD), update (*UPD) and delete (*DLT) authorities.

PSFDFNOPT (PDFDTAAUT(*RX))

The user can perform basic operations on the object, such as run a program or display the contents of a file. The user is prevented from changing the object. Read, execute (*RX) authority provides *OBJOPR and data *READ and execute (*EXECUTE) authorities.

PSFDFNOPT (PDFDTAAUT(*WX))

The user can change the contents of an object and run a program or search a library or directory. Write, execute (*WX) authority provides *OBJOPR and data *ADD, *UPD, *DLT, and *EXECUTE authorities.

PSFDFNOPT (PDFDTAAUT(*R))

The user can view the contents of an object. Read (*R) authority provides *OBJOPR and data *READ authorities.

PSFDFNOPT (PDFDTAAUT(*W))

The user can change the contents of an object. Write (*W) authority provides *OBJOPR and data *ADD, *UPD, and *DLT authorities.

PSFDFNOPT (PDFDTAAUT(*X))

The user can run a program or search a library or directory. Execute (*X) authority provides *OBJOPR and data *EXECUTE authorities.

PSFDFNOPT (PDFDTAAUT(*EXCLUDE))

The user cannot access the object. The OBJAUT value must be *NONE, if this special value is used. The value *NONE is not supported for PDDTAAUT.

If you specify a value for PDDTAAUT that is not supported, PSF issues PQT0038 with reason code 5 and terminates. Message PQT0038 is: "Printer writer writer ended because of an error." Reason code 5 is: "Value not recognized."

Line and mixed data stream support

Use this information to understand how PSF supports line and mixed data on IBM i.

Special characters control line positioning and fonts. Printer file parameters define the use of special characters and other printing options.

Related concepts:

“Line data” on page 3

Line data is record-oriented readable text.

“Mixed data” on page 4

Mixed data is line data intermixed with AFPDS data.

Special characters used with line data

There are two types of special characters that can be used with line data; carriage control characters (CC) and table reference characters (TRC).

Carriage control characters affect the data's line positioning. A carriage control character can be represented as either American National Standard (ANSI) or machine code. You cannot use both ANSI and machine codes within a single data set. ANSI carriage control is a standard representation that is used with printers from many different manufacturers. See the American National Standard carriage control characters topic for the ANSI codes and their functions. Machine code control characters were defined by IBM; they correspond to channel command words issued by the operating system. See the Machine code carriage control characters topic for the IBM machine code values and functions.

There are differences in the conventions used by the IBM i operating system for ANSI and machine code line spacing. The IBM i convention for ANSI handles line spacing and then causes the line to be printed. The IBM i convention for machine codes causes the line to be printed and then performs the spacing action.

Table reference characters allow an additional byte at the beginning of a line. The byte indicates which coded font (specified on the AFPCHARS parameter) is used to print the line. Up to four coded fonts are specified on the AFPCHARS parameter. The table reference character contains a value of X'F0', X'F1', X'F2', or X'F3'. The value corresponds to the relative position of the required coded font in the list on the AFPCHARS parameter. If table reference characters are used, every data record must contain a table reference character. The printer file parameter Table Reference Characters (TBLREFCHR) specifies whether table reference characters are in the data.

If carriage control and table reference characters are used with the data, the table reference character follows the carriage control character. Both special characters precede the data. If carriage control bytes are not used, the table reference character is the first byte of the data record.

These graphics illustrate the valid forms of line data.



Figure 5. Simple line data



Figure 6. Line data with table reference characters

CC	Data
----	------

Figure 7. Line data with carriage control characters

CC	TRC	Data
----	-----	------

Figure 8. Line data with carriage control characters and table reference characters

Related reference:

“American National Standard carriage control characters” on page 61

This topic lists the American National Standard carriage control characters for line or mixed data. It also describes what each is used for.

“Machine code carriage control characters” on page 62

This topic lists the carriage control characters for line or mixed data in IBM machine code. It also describes what each character is used for.

Printer file parameters used with line and mixed data

There are several printer file parameters that can be used when working with line and mixed data. These parameters can all be specified on the Create Printer File (CRTPRTF), Change Printer File (CHGPRTF), and Override with Printer File (OVRPRTF) CL commands.

AFP characters (AFPCHARS)

This parameter identifies up to four 4-byte coded font names. The 4-byte names are concatenated to X'0'. The names identify the coded fonts that are needed when table reference characters are used in line or mixed data.

Control character (CTLCHAR)

This parameter specifies the type of control characters (American National Standards Institute (ANSI) or machine code) that are in the line or mixed data.

Convert line data (CVTLINDTA)

This parameter specifies whether line data is converted to Advanced Function Presentation data stream (AFPDS) before the data is spooled. A page definition specifies how the data is formatted.

DBCS character rotation (IGCCHRRTT)

For non-Advanced Function Presentation (AFP) printers, this parameter is used to rotate the double-byte character set (DBCS) data when line data is transformed to SNA Character Stream (SCS). For AFP printers, this parameter is ignored. Character rotation can be specified in the page definition.

DBCS characters per inch (IGCCPI)

For non-AFP printers, this parameter specifies the pitch of the DBCS data during transformation from line data to SCS. DBCS shift-out, shift-in (SOSI) characters cannot be transformed when going to an Intelligent Printer Data Stream (IPDS) printer. Mixed data cannot be transformed when going to an SCS or IPDS printer. For AFP printers, this parameter is ignored, as the pitch of the DBCS data is determined by the selected font.

DBCS SO/SI spacing (IGCSOSI)

This parameter indicates what action should be taken when SOSI characters are found in the data. If the data is mixed, the SOSI should be taken out and appropriate spaces inserted based on the value of this keyword.

Printer device type (DEVTYPE)

Use this parameter to place line data or mixed data onto the printer spool.

Table reference characters (TBLREFCHR)

This parameter indicates whether table reference characters (TRC) exist in the line or mixed data.

If forms control characters are used with the data, the TRC follows the forms control character, but precedes the data bytes. If forms control characters are not used, the TRC is the first byte of the data record. If table reference characters are used, every data record must contain a TRC byte.

User-specified DBCS data (IGCDTA)

This parameter specifies whether the file processes DBCS data. If so, the user of a line or mixed data file must specify *YES to indicate that there are SOSI characters in the data.

Related reference:

Change Printer File (CHGPRTF) CL command

Create Printer File (CRTPRTF) CL command

Override with Printer File (OVRPRTF) CL command

Considerations and restrictions when using line data or mixed data

In order to print line data, you might need to change an application or the printer file to generate control characters. You must be aware of the ways in which the parameters that specify page definitions and form definitions interact. You must remember that only a subset of DDS keywords is supported for line data. You must also remember that the SPOOL(*NO) parameter in the printer file is not valid for either line data or mixed data.

Application considerations for line data

To use line data, first determine whether your application generates an American National Standard control character in column 1 of your spooled output. If your application does generate an American National Standard control character as described, specify CTLCHAR(*FCFC) and DEVTYPE(*LINE) on the printer file.

If your application does not generate an American National Standard control character in column 1 of your spooled output, change your application to do so. To change your application, use a language or application construct (such as a SKIP or SPACE option on a COBOL WRITE statement), or make an RPG output specification. If your application cannot generate American National Standard control characters, specify CTLCHAR(*NONE) and DEVTYPE(*LINE) on your printer file. The operating system will use control information to generate machine code control characters in your data.

Specifying a page definition and form definition for line data

When using line data, you can specify various combinations of DEVTYPE(*LINE), PAGDFN, and FORMDF parameters on the printer file:

If you specify DEVTYPE(*LINE), PAGDFN and FORMDF

When you print to an Advanced Function Presentation (AFP) printer, Print Services Facility (PSF) uses the PAGDFN and FORMDF parameters to transform the data to Intelligent Printer Data Stream (IPDS).

When you print to a non-AFP printer, the PAGDFN and FORMDF parameters are ignored. The other parameters on the printer file are used and the line data is transformed to IPDS or SNA Character Stream (SCS).

If you specify DEVTYPE(*LINE) and FORMDF (no page definition)

When you print to an AFP printer, an inline page definition is built from the printer file parameters. PSF uses the form definition and the inline page definition to transform the data to IPDS.

When you print to a non-AFP printer, the FORMDF parameter is ignored. The other printer file parameters are used and the line data is transformed to IPDS or SCS.

If you specify DEVTYPE(*LINE) and PAGDFN (no form definition)

When you print to an AFP printer, an inline form definition is built from the printer file parameters. PSF uses the page definition and the inline form definition to transform the data to IPDS.

When you print to a non-AFP printer, the PAGDFN parameter is ignored. The other printer file parameters are used and the line data is transformed to IPDS or SCS.

If you specify DEVTYPE(*LINE) only (no page definition or form definition)

When you print to an AFP printer, an inline page definition and an inline form definition are built from the printer file parameters. PSF uses the inline form definition and the inline page definition to transform the data to IPDS.

When you print to a non-AFP printer, the printer file parameters are used and the line data is transformed to IPDS or SCS.

If you specify DEVTYPE(*AFPDSLNE)

The support for combinations of DEVTYPE(*AFPDSLNE), PAGDFN, and FORMDF are similar to DEVTYPE(*LINE) line data. However, you should be aware of these exceptions:

- The spooled file must be printed on an AFP printer. When you send data to a non-AFP printer, the data cannot be transformed to IPDS or to SCS.
- You are not required to specify a page definition or form definition with *AFPDSLNE data because they can be built inline. However, certain Advanced Function Presentation data stream (AFPDS) commands in the data stream (for example, Invoke Medium Map) might reference named structured fields in the page definition or form definition that do not match those in the inline page definition and form definition.

Supported DDS keywords for line data

Below is a list of Data description specifications (DDS) keywords that are supported for line data. If you use DDS keywords that are not included on this list while processing line data, they will be ignored.

- ALIAS
- BLKFOLD
- CCSID
- DATE
- DATFMT
- DATSEP
- DFT
- DLTEDT
- EDTCDE
- EDTWRD
- FLTFIXDEC
- FLTPCN
- IGCALTTYP
- IGCANKCNV
- INDARA
- INDTXT
- INVDTAMAP
- MSGCON
- PAGNBR
- REF
- REFFLD

- SKIPA
- SKIPB
- SPACEA
- SPACEB
- TEXT
- TIME
- TIMFMT
- TIMSEP

Printer file restrictions when using line data or mixed data

- Externally described printer files (DDS SUPPORT) support both line and mixed data device types.
- In the printer file, if you specify *LINE or *AFPDSLIN for device type, you cannot specify SPOOL(*NO). If you specify one of these combinations, Message CPD7341, indicating that the value SPOOL(*NO) is not valid with device type, is issued.

Sending data from zSeries to IBM i

Use these instructions to receive and print data and resources from zSeries systems to your IBM i.

Communication with the zSeries system is important to determine how the zSeries system sends data to your IBM i system. When data is sent from a zSeries system to your IBM i system, it can go directly to the output queue of a designated user ID. Alternatively, it can go into your network files.

Notes:

1. You can send print data to the output queue of a user ID only when your host zSeries RSCS/JES subsystem is connected to the VM or z/OS bridge on IBM i.
2. To send data to another IBM i or zSeries system, you can use the Send Network Spooled File (SNDNETSPLF) command.

If you are sending print data, it can be sent directly to an output queue of a specified user ID on the IBM i. Advanced Function Presentation data stream (AFPDS) data can go to your network files. However, you must then use the Print Advanced Function Printer Data (PRTAFPDTA) command to put the file on an output queue. If you are sending resources, the data must go into your network files.

Related concepts:

“Receiving resources and AFPDS data sent to network files” on page 24

To make receiving resources and Advanced Function Presentation data stream (AFPDS) data as easy as possible, you should be aware of these points.

Related tasks:

“Receiving AFP resources from another system” on page 22

When you receive Advanced Function Presentation (AFP) resource data from an operating system other than IBM i, you typically cannot change the resource. If you want to change the resource, it must be changed on the originating operating system and then resent to IBM i.

Sending print data from VM to the output queue of a user ID

The examples in this topic show two ways to send print data from VM to an IBM i output queue.

A z/VM[®] can issue a PRINT or a PSF command to place a file directly into an IBM i user's output queue.

Note: By using the code examples, you agree to the terms of the “Code license and disclaimer information” on page 73.

Example: Using the PRINT command

These commands place the file REPORTS LETTER A into the output queue of USERONE on IBM i with the node ID AS4002.

```
CP TAG DEV PRT AS4002 USERONE
CP SPOOL PRT TO RSCS COPY 1
PRINT REPORTS LETTER A (NOCC
```

These commands place the file REPORTS LISTING A into the output queue of USERONE on IBM i with the node ID AS4002.

```
CP TAG DEV PRT AS4002 USERONE
CP SPOOL PRT RSCS COPY 1
PRINT REPORTS LISTING A
```

Example: Using the PSF command

These commands place the line data spooled file into an IBM i. They use these variables:

Spooled file name:

reports letter a

User ID that owns the output queue:

userone

Target node ID:

is002

A page definition will be used when the data is printed. When using the PSF command, you must place the characters P1 in front of the page definition name. When using a form definition, you must place the characters F1 in front of the form definition name. This example uses a page definition named P1MYFORM.

```
TAG DEV PRT is002 userone
SPOOL PRT TO RSCS COPY 1
PSF reports letter a (PAGEDEF (P1MYFORM RESOURCE A))
```

Sending print data from z/OS to an IBM i output queue

The example in this topic shows how to use JCL commands to send print data from z/OS to IBM i.

These commands, when issued by z/OS, place the Advanced Function Presentation data stream (AFPDS) spooled file into the output queue of the specified user on IBM i. These commands are job control language (JCL) commands. Do not place a P1 (for PAGEDEF) or an F1 (for FORMDEF) in the instructions.

In the following example, a form definition named MYFORM is used. The user is userone and the node name is is002.

```
//INSTR PROC NODE='is002',USER='userone'
        INFIL='dept265.userx.files(report) '
//SPOOL EXEC PGM=IEBGENER
//MYOUT OUTPUT DEST=NODE..USER,
        COPIES=1,
        FORMDEF=MYFORM
//SYSPRINT DD SYSOUT=*
//SYSIN DD DUMMY
//SYSUT1 DD DSN=,&,DISP=SHR,DCB=(RECFM=FBA);
//SYSUT2 DD SYSOUT=A,OUTPUT=*.MYOUT
// PEND
//STEP01 EXEC PROC=INSTR
```

Note: By using the code examples, you agree to the terms of the “Code license and disclaimer information” on page 73.

Sending data from zSeries to IBM i network files

The examples in this topic show how to send print data and resources from a zSeries system to an IBM i network file.

Advanced Function Presentation (AFP) resources sent from an a zSeries system to an IBM i system must be sent to network files.

Note: AFP data can also be sent to network files. However, this is not the recommended way to send this data to an IBM i system. If you choose this method, you must use the Print Advanced Function Presentation Data (PRTAFPDTA) command to put the file on an output queue.

Sending resources and AFPDS data from VM to network files

When issued by a VM system, this command places the specified file into the network files of userone on an IBM i system named is002.

```
SENDFILE fonts resource a TO userone AT is002
```

Sending resources and AFPDS data from z/OS to network files

When issued by a z/OS system, this command places the specified file into a user's network files. The user is userone and the IBM i system is named is002.

```
TRANSMIT is002.userone DSNAME('system.afp.resources(font)')
```

Related concepts:

“Receiving fonts from zSeries” on page 23

Fonts can be downloaded to IBM i from zSeries systems.

Related tasks:

“Printing data sent to IBM i from zSeries” on page 35

PSF can print data that was generated on zSeries. This data might be AFP, AFPDSLIN (AFP data mixed with line data), or line data. The data might be sent to network files or directly to an output queue.

“Receiving AFP resources from another system” on page 22

When you receive Advanced Function Presentation (AFP) resource data from an operating system other than IBM i, you typically cannot change the resource. If you want to change the resource, it must be changed on the originating operating system and then resent to IBM i.

Related reference:

“zSeries parameters and corresponding IBM i printer file parameters” on page 59

This topic briefly describes the zSeries printer parameters used on VM commands and z/OS JCL statements and indicates the equivalent IBM i printer file parameters.

AFP reference information

Look up information about PSF, such as the form definitions and page definitions included with your system, here.

This topic contains additional reference materials related to Advanced Function Presentation (AFP) printing.

Related concepts:

Printer file parameter considerations

This topic provides more detailed information about certain printer file parameters.

DDS for printer files

This topic describes how to code the data description specifications (DDS) for printer files.

Related reference:

Printing-related CL commands

This topic lists CL commands that are related to printing.

Form definitions included with the operating system

This topic lists the form definitions that are provided with IBM i in library QSYS.

Table 2. IBM-supplied form definitions

Name	Across (inches)	Down (inches)	Presentation	Direction	Bin	Duplex
F1A10110	1/6	1/6	Portrait	Across	1	No
F1A10111	1/6	1/6	Portrait	Across	1	Yes
F1A10112	1/6	1/6	Portrait	Across	1	Tumble
F1A10120	1/6	1/6	Portrait	Across	2	No
F1A10121	1/6	1/6	Portrait	Across	2	Yes
F1A10122	1/6	1/6	Portrait	Across	2	Tumble
F1C10110	1/6	1/6	Landscape	Down	1	No
F10101LA	0	1/2	Landscape	Across	1	No
F10101LD	0	1/2	Landscape	Down	1	No
F10101PA	0	1/2	Portrait	Across	1	No
F10101PD	0	1/2	Portrait	Down	1	No
F1OGL	0	0	Portrait	Across	1	No

Note: The IBM-supplied form definitions do not set the print quality for the 4224, 4230, 4234, and 4247 printers. You must set the print quality on the printer operator panel when using an IBM-supplied form definition.

Related concepts:

“Form definitions” on page 6

A form definition is an Advanced Function Presentation (AFP) resource object that defines the characteristics of the physical form to be printed on.

“Page segments” on page 9

Page segments are objects containing composed text and images that are prepared before formatting and included during printing.

Page definitions included with the operating system

This topic lists the page definitions that are provided with IBM i in library QSYS.

Table 3. IBM-supplied page definitions

Name	Size of form	Orientation on page	Description
P1A06462	8.5 x 11.0 inches	Portrait	Letter size. 6 lines per inch (LPI). 64 lines per page.
P1A08584 ¹	9.5 x 11.0 inches	Portrait	Continuous forms. 8 lines per inch (LPI). 85 lines per page.
P1A08682	8.5 x 11.0 inches	Portrait	Letter size. 8 lines per inch (LPI). 86 lines per page.
P1B04963	8.5 x 14.0 inches	Portrait	Legal size. 6 lines per inch (LPI). 82 lines per page.
P1B08262	8.5 x 14.0 inches	Portrait	Legal size. 6 lines per inch (LPI). 82 lines per page.

Table 3. IBM-supplied page definitions (continued)

Name	Size of form	Orientation on page	Description
P1B11082	8.5 x 14.0 inches	Portrait	Legal size. 8 lines per inch (LPI). 110 lines per page.
P1B06683	14.0 x 8.5 inches	Landscape	Legal size. 8 lines per inch (LPI). 66 lines per page.
P1C09182	8.27 x 11.69 inches	Portrait	Legal size. 8 lines per inch (LPI). 91 lines per page.
P1D08083	14.33 x 10.12 inches	Landscape	B4 Size forms. 8 lines per inch (LPI). 80 lines per page.
P1D08462	14.33 x 10.12 inches	Landscape	B4 size forms. 6 lines per inch (LPI). 84 lines per page.
P1D11382	10.12 x 14.33 inches	Portrait	B4 Size forms. 8 lines per inch (LPI). 113 lines per page.
P1J04964 ¹	12.0 x 8.5 inches	Landscape	Continuous forms. 6 lines per inch (LPI). 49 lines per page.
P1J06484 ¹	12.0 x 8.5 inches	Landscape	Continuous forms. 8 lines per inch (LPI). 64 lines per page.
P1L06464 ¹	14.88 x 11.0 inches	Landscape	Continuous forms. 6 lines per inch (LPI). 64 lines per page.
P1L08584 ¹	14.88 x 11.0 inches	Landscape	Continuous forms. 8 lines per inch (LPI). 85 lines per page.
P1V04863	8.27 x 11.00 inches	Portrait	Combined letter and A4 size forms. 6 lines per inch (LPI). 48 lines per page.
P1V06483	8.27 x 11.00 inches	Portrait	Combined letter and A4 size forms. 8 lines per inch (LPI). 64 lines per page.
P1V06683	8.27 x 11.00 inches	Portrait	Combined letter and A4 size forms. 8 lines per inch (LPI). 66 lines per page.
P1W120C2	8.27 x 11.00 inches	Portrait	Combined letter and A4 size forms using MULTIUP. 12 lines per inch. 120 lines printed per page. 2 logical pages printed on one physical page.
P1W12883	8.27 x 11.00 inches	Portrait	Combined letter and A4 size forms using MULTIUP. 8 lines per inch. 128 lines printed per page. 2 logical pages printed on one physical page.

Table 3. IBM-supplied page definitions (continued)

Name	Size of form	Orientation on page	Description
P1W240F3	8.27 x 11.00 inches	Portrait	Combined letter and A4 size forms using MULTIUP. 15 lines per inch. 240 lines printed per page. 4 logical pages printed on one physical page.
¹ Can only be used with the 4224, 4230, 4234, and 4247 printers.			

Related concepts:

“Page definitions” on page 8

Page definitions are resources that format and compose line data into logical pages.

CL commands for PSF configuration objects

There are several CL commands that you can use to create, change, display, and delete a PSF configuration object.

The following table provides a brief description of each command. For information about specific parameters of the configuration object, see the online help. You can also use the AFP Manager component of System i Navigator to create, change, and delete a PSF configuration object.

Table 4. CL commands for PSF configuration objects

Command	Description
Change PSF Configuration (CHGPSFCFG)	This command changes the PSF configuration object in the library specified on the command.
Create PSF Configuration (CRTPSFCFG)	This command lets you specify additional parameters for an Advanced Function Presentation (AFP) printer that are not supported in the Create Device Description (Printer) (CRTDEVPRT) command.
Delete PSF Configuration (DLTPSFCFG)	This command deletes a PSF configuration object from a specified library. If the PSF configuration object is found, it is deleted. If it is not found, a message is sent to the user indicating that the PSF configuration object cannot be found.
Display PSF Configuration (DSPPSFCFG)	This command lets you display or print the contents of a PSF configuration object.
Work with PSF Configuration (WRKPSFCFG)	This command lets the user work with all of the PSF configuration objects from the system libraries or the user libraries.

Related reference:

“Sharing print sessions” on page 44

You can specify printer-sharing properties on the PSF configuration object. This lets you limit the amount of time that you have a connection to the printer, control when the session is released, control when a new session is started, and specify how many times PSF tries to connect to the printer.

“Automatic session recovery” on page 45

PSF can try to resume printing when a session has been unexpectedly ended by a device.

Change PSF Configuration (CHGPSFCFG) CL command

Create PSF Configuration (CRTPSFCFG) CL command

Delete PSF Configuration (DLTPSFCFG) CL command

Display PSF Configuration (DSPPSFCFG) CL command

Work with PSF Configuration (WRKPSFCFG) CL command

CL commands for device descriptions

There are several CL commands that you can use to create or change a printer device description.

The following table provides a brief description about each command. For information about specific parameters of the configuration object, see the online help.

Table 5. CL commands for device descriptions

Command	Description
Change Device Description (Printer) (CHGDEVPRT)	This command lets you change a device description for a printer device. Before you change a printer device description, it is recommended that you do these: <ul style="list-style-type: none">• End the printer writer with the End Writer (ENDWTR) command.• Vary off the printer device with the Work with Configuration Status (WRKCFGSTS) command.
Create Device Description (Printer) (CRTDEVPRT)	This command lets you create a device description for a printer device. If you have a locally-attached Twinax device and the automatic configuration (QAUTOCFG) system value is *YES, the system will create printer device descriptions automatically.
Delete Device Description (DLTDEVD)	This command deletes a device description.
Display Device Description (DSPDEVD)	This command lets you display or print the contents of a device description.
Work with Device Descriptions (WRKDEVD)	This command lets a user display and work with device descriptions.

Related reference:

“Sharing print sessions” on page 44

You can specify printer-sharing properties on the PSF configuration object. This lets you limit the amount of time that you have a connection to the printer, control when the session is released, control when a new session is started, and specify how many times PSF tries to connect to the printer.

Change Device Description (Printer) (CHGDEVPRT) CL command

Create Device Description (Printer) (CRTDEVPRT) CL command

Delete Device Description (DLTDEVD) CL command

Display Device Description (DSPDEVD) CL command

Work with Device Descriptions (WRKDEVD) CL command

TrueType fonts on OS/400 V5R2

You can use TrueType fonts on V5R2 operating systems. However, there are some differences between using these fonts on a V5R2 operating system as compared to using the fonts on a later-level system.

One difference is that Print Services Facility (PSF) does not support TrueType fonts on V5R2 operating systems, only Host Print Transform does. Also, there is no resource access table available on V5R2 operating systems. Instead, the operating system maintains index tables that map the full font names to the actual font files stored in the integrated file system. The index table is built for all TrueType fonts contained in these directories:

- QIBM/ProdData/OS400/Fonts/TTFonts
- QIBM/UserData/OS400/Fonts/TTFonts

Because there is no resource access table on V5R2 operating systems, linked fonts and font capturing are not supported on V5R2.

Migration notes

For fonts in the /QIBM/UserData/OS400/Fonts/TTFonts directory, the base implementation on V5R3 and later-level systems functions exactly the same as V5R2. Customers who use TrueType fonts on V5R2 and do not want to use resource access tables do not need to change anything when they migrate to a later-level system. However, customers can access all of the TrueType functions by using InfoPrint AFP Resource Installer (program number 5639-EE2) or Font Installer for AFP Systems to install the fonts. Font Installer for AFP Systems is a feature of the IBM Infoprint Fonts for Multiplatforms licensed program. This program generates a resource access table when TrueType fonts are installed, and this enables the extended functions.

On V5R3 and later-level operating systems, the search order for full font names follows:

1. Search the resource access table (if it exists) in /QIBM/UserData/OS400/Fonts/TTFonts.
2. Search the resource access table (if it exists) in /QIBM/ProdData/OS400/Fonts/TTFonts.
3. Search all the TrueType font files in /QIBM/UserData/OS400/Fonts/TTFonts.
4. Search all the TrueType font files in /QIBM/ProdData/OS400/Fonts/TTFonts.

This lets the resource access table take precedence over the V5R2 search method. If there is no resource access table, the old method still works.

Related concepts:

“Specifying a TrueType or OpenType font” on page 29

You can specify a TrueType font anywhere that you can specify an Advanced Function Presentation (AFP) font. You can also mix references to TrueType and AFP fonts. However, TrueType fonts are referenced differently than AFP fonts.

zSeries parameters and corresponding IBM i printer file parameters

This topic briefly describes the zSeries printer parameters used on VM commands and z/OS JCL statements and indicates the equivalent IBM i printer file parameters.

Be aware of these special considerations when working with these zSeries (VM and z/OS) parameters:

FCB If you specify the FCB parameter on VM or z/OS, IBM i uses the printer file of that name. IBM i uses the library list of the user receiving the spooled file to find the printer file. If the FCB parameter is not specified, the IBM i printer file QSYSPRT is used.

BIN and DUPLEX

The values for the DRAWER and DUPLEX parameters are taken from the printer file specified in the FCB parameter if both of these are true:

- The BIN and DUPLEX parameter values are not specified from VM and z/OS
- The form definition is not specified from VM or z/OS

If the FCB parameter is not specified, the DRAWER and DUPLEX values are set to *FORMDEF. This means that the values are taken from the form definition.

FORMDEF

If the form definition (FORMDEF) parameter is not specified from VM or z/OS, the IBM i form definition parameter is set to *DEVDD, and *LIBL is used for the library. *DEVDD means that the form definition used is the one specified in the device description for the printer you want to use.

These zSeries parameters are supported when a zSeries user sends data directly to the output queue of a user on IBM i.

The zSeries parameter is ignored when the data is printed on IBM i when both of these are true:

- The zSeries printer parameter is not one that is specified in this table.
- No matching or equivalent IBM i printer file parameter exists.

Table 6. VM parameters

zSeries printer parameter	VM commands	Function	IBM i printer file parameter
BIN	PSF	Specifies which drawer to take the paper from.	DRAWER
CC	PRINT, PSF	Specifies control characters.	CTLCHAR ¹
CHARS	SPOOL	Specifies a table of coded fonts.	AFPCHARS
COPY	SPOOL	Specifies the number of copies.	COPIES
DATAACK	PSF	Specifies whether the printer blocks print positioning and incorrect character errors. Printers will always block these unless the printer file that is used to create the spooled file specifies *ABSOLUTE for fidelity.	
DEST	TAG	Specifies node and user ID.	
DUPLEX	PSF	Specifies whether duplex printing is used.	DUPLEX
FCB	SPOOL, TAG	Specifies the printer file used.	FILE
FORM	SPOOL	Specifies the form type used.	FORMTYPE
FORMDEF	PSF	Specifies the form definition used.	FORMDF
PAGEDEF	PSF	Specifies the page definition used.	PAGDFN
PRMODE ²	PSF	Specifies the device type, double-byte character data, processing shift-out, shift-in characters.	DEVTYPE, IGCDDTA, IGCSOSI
TRC	PRINT, PSF	Specifies whether the data stream contains table reference codes.	TBLREFCHR

¹ To correctly print zSeries line data with first-character forms control, each channel value specified in the CTLCHAR parameter must have a unique line number associated with that channel value.

² Only PRMODE values of PAGE, LINE, SOSI1, SOSI2, and SOSI3 are supported. The supported PRMODE values translate to device types of *AFPDS, *LINE, or *AFPDSL. See Network Job Entry Formats and Protocols for more specific information.

Table 7. z/OS parameters

zSeries printer parameter	z/OS JCL statements	Function	IBM i printer file parameter
CHARS	DD, OUTPUT	Specifies a table of coded fonts.	AFPCHARS
CONTROL	OUTPUT	Specifies line spacing	

Table 7. z/OS parameters (continued)

zSeries printer parameter	z/OS JCL statements	Function	IBM i printer file parameter
COPIES	DD, OUTPUT	Specifies the number of copies.	COPIES
DATAACK	OUTPUT	Specifies whether the printer blocks print positioning and incorrect character errors. Printers will always block these unless the printer file that is used to create the spooled file specifies *ABSOLUTE for fidelity.	
DCB=RECFM	DD	Specifies control characters.	CTLCHAR ¹
DEST	DD, OUTPUT	Specifies node and user ID.	
FCB	DD, OUTPUT	Specifies the printer file used.	FILE
FORMDEF	OUTPUT	Specifies the form definition used.	FORMDF
FORMS	OUTPUT	Specifies the form type used.	FORMTYPE
PAGEDEF	OUTPUT	Specifies the page definition used.	PAGDFN
PRMODE ²	OUTPUT	Specifies the device type, double-byte character data, processing shift-out, shift-in characters.	DEVTYPE, IGCDDTA, IGCSOSI
TRC	OUTPUT	Specifies whether the data stream contains table reference codes.	TBLREFCHR
<p>¹ To correctly print zSeries line data with first-character forms control, each channel value specified in the CTLCHAR parameter must have a unique line number associated with that channel value.</p> <p>² Only PRMODE values of PAGE, LINE, SOSI1, SOSI2, and SOSI3 are supported. The supported PRMODE values translate to device types of *AFPDS, *LINE, or *AFPDSLIN. See Network Job Entry Formats and Protocols for more specific information.</p>			

Related concepts:

“Sending data from zSeries to IBM i network files” on page 54

The examples in this topic show how to send print data and resources from a zSeries system to an IBM i network file.

Related information:



Network Job Entry Formats and Protocols PDF

American National Standard carriage control characters

This topic lists the American National Standard carriage control characters for line or mixed data. It also describes what each is used for.

Table 8. American National Standard carriage control characters and their functions

Control character value (in hexadecimal)	Function
X'40' (blank)	Space one line, and then print (single spacing).
X'F0' (zero)	Space two lines, and then print (double spacing).
X'60' (dash)	Space three lines, and then print (triple spacing).
X'4E' (plus sign)	Suppress spacing, and then print (type over previous line).
X'F1'	Print the data at the line position defined as Channel 1 (by convention, the first line on a new page).
X'F2'	Print the data at the line position defined as Channel 2.
X'F3'	Print the data at the line position defined as Channel 3.
X'F4'	Print the data at the line position defined as Channel 4.
X'F5'	Print the data at the line position defined as Channel 5.
X'F6'	Print the data at the line position defined as Channel 6.
X'F7'	Print the data at the line position defined as Channel 7.
X'F8'	Print the data at the line position defined as Channel 8.
X'F9'	Print the data at the line position defined as Channel 9.
X'C1'	Print the data at the line position defined as Channel 10.
X'C2'	Print the data at the line position defined as Channel 11.
X'C3'	Print the data at the line position defined as Channel 12.
<p>Note: When American National Standard carriage controls are used, only the values that appear in this table are considered valid by Print Services Facility (PSF). PSF treats any other American National Standard carriage control value as not valid and uses single spacing to print any data on the line.</p>	

Related concepts:

“Special characters used with line data” on page 48

There are two types of special characters that can be used with line data; carriage control characters (CC) and table reference characters (TRC).

Machine code carriage control characters

This topic lists the carriage control characters for line or mixed data in IBM machine code. It also describes what each character is used for.

Table 9. Carriage control characters in IBM machine code and their functions

Control character value (in hexadecimal)	Function
X'03'	No operation.
X'09'	Print, and then space one line (single spacing).
X'11'	Print, and then space two lines (double spacing).
X'19'	Print, and then space three lines (triple spacing).
X'01'	Print without spacing.
X'89'	Print the data, then skip to the line position defined as Channel 1 (by convention, the first line on a new page).
X'91'	Print the data, then skip to the line position defined as Channel 2.
X'99'	Print the data, then skip to the line position defined as Channel 3.
X'A1'	Print the data, then skip to the line position defined as Channel 4.

Table 9. Carriage control characters in IBM machine code and their functions (continued)

Control character value (in hexadecimal)	Function
X'A9'	Print the data, then skip to the line position defined as Channel 5.
X'B1'	Print the data, then skip to the line position defined as Channel 6.
X'B9'	Print the data, then skip to the line position defined as Channel 7.
X'C1'	Print the data, then skip to the line position defined as Channel 8.
X'C9'	Print the data, then skip to the line position defined as Channel 9.
X'D1'	Print the data, then skip to the line position defined as Channel 10.
X'D9'	Print the data, then skip to the line position defined as Channel 11.
X'E1'	Print the data, then skip to the line position defined as Channel 12.
X'0B'	Space one line without printing.
X'13'	Space two lines without printing.
X'1B'	Space three lines without printing.
X'8B'	Skip to Channel 1 immediately (by convention, the first line on a new page).
X'93'	Skip to the Channel 2 position immediately.
X'9B'	Skip to the Channel 3 position immediately.
X'A3'	Skip to the Channel 4 position immediately.
X'AB'	Skip to the Channel 5 position immediately.
X'B3'	Skip to the Channel 6 position immediately.
X'BB'	Skip to the Channel 7 position immediately.
X'C3'	Skip to the Channel 8 position immediately.
X'CB'	Skip to the Channel 9 position immediately.
X'D3'	Skip to the Channel 10 position immediately.
X'DB'	Skip to the Channel 11 position immediately.
X'E3'	Skip to the Channel 12 position immediately.
<p>Note: Print Services Facility (PSF) ignores these hexadecimal machine code carriage control characters and does not print lines containing them: X'02' through X'07', X'0A', X'12', X'23', X'43', X'63', X'6B', X'73', X'7B', X'EB', X'F3', and X'FB'. PSF treats any other carriage control value as not valid and prints any data on the line using single spacing.</p>	


Related concepts:

“Special characters used with line data” on page 48

There are two types of special characters that can be used with line data; carriage control characters (CC) and table reference characters (TRC).

Troubleshooting AFP

Find help for resolving AFP printing problems.

- | For help troubleshooting problems with Advanced Function Presentation (AFP), see InfoPrint Solutions Company: Support & Maintain: Hardware and Software Support  (www.infoprintsolutionscompany.com/internet/wwsites.nsf/vwwebpublished/sm_ohsshhome_us).

| Troubleshooting mapping problems

- | There are several ways to help you troubleshoot your PDF mapping programs.

| **Error message reason codes**

| The reason codes returned with error messages PQT4140 and PQT4151 can identify problems with PSF mapping programs.

| **The diagnostic spool file (PSFTRACE)**

| The diagnostic spooled file contains in-depth information about your mapping program. Use it with the reason code issued with message PQT4140 or PQT4151 to diagnose problems with your mapping program.

| PSF automatically produces a spooled file called PSFTRACE whenever message PQT4140 or PQT4151 is issued, except when the reason code is 15 for PQT4140. The PSFTRACE spooled file lists the fields that PSF finds to be in error. You might get several diagnostic spooled files if there are several errors in the mapping program.

| You can also request PSF to write a PSFTRACE spooled file that lists only the fields used by your mapping program. If you request a PSFTRACE spooled file and PSF also finds errors, it writes one spooled file with both sets of information: first the user-requested information and then the error information.

| To find PSFTRACE, use the command WRKSPLF QSPLJOB. The spooled file has the same job number as the PDJ job (one of the three PSF jobs). If a file is respooled or segments within a spooled file are processed and the mapping program is called, the PSFTRACE dump of the mapping program interface is generated for the WTR job. Check for PSFTRACE after the writer has ended.

| **Requesting the diagnostic spool file:**

| You can request PSF to write information passed to and received from a mapping program to a diagnostic spooled file called PSFTRACE.

| To request the PSFTRACE file:

| 1. Create a data area. Enter this command:

```
| CRTDTAARA DTAARA(QGPL/printer_device_name) TYPE(*CHAR) LEN(40) AUT(*ALL)  
| VALUE(X'E6E6D7C4E3D9C8D98000000000000080000000000000000320000000000000000000000')
```

- | • The data area must be created before starting the printer writer.
- | • The data area must be created in QGPL.
- | • The name of the data area must match that of the printer device description being used for printing.

| 2. To verify the value in the data area, display the data area using *HEX representation:

```
| DSPDTAARA DTAARA(QGPL/printer_device_name) UTFMT(*HEX) The data area must look like this:  
| E6E6D7C4E3D9C8D9800000000000008000000000  
| 00000000320000000000000000000000000000
```

| The first eight characters of the value of the data area must be WWPDRHR.

| 3. When you no longer need the PSFTRACE file, delete the data area. Enter this command:

```
| DLDTAARA DTAARA(QGPL/printer_device_name)
```

| **Format of the diagnostic spool file:**

| The first eight characters of each line in the diagnostic spooled file (PSFTRACE) describe the data that follows, except for lines that continue actual input or output data. Each line except data continuation lines has a time stamp.

| If a keyword is marked **(hex offset)**, when the data following that keyword is hexadecimal, the hexadecimal offset of the data appears on the left. You can use these hexadecimal offsets to find specific fields.

| The keywords that describe data are:

| **AFP OUTQ (hex offset)**

| Spooled File AFPDS Distribution format.

| **ATTACH (hex offset)**

| Attachments.

| **BCC (hex offset)**

| The specified BCC e-mail address.

| **BODY FIL (hex offset)**

| Body files.

| **CC (hex offset)**

| The specified CC e-mail address.

| **DIR PATH**

| The specified directory for files.

| **EXT AREA**

| Extension Area format.

| **INPUT (hex offset)**

| Mapping Program Input information format.

| **ISF FORM**

| Individual Stream File Information format.

| **MAP OBJ**

| The name of the PDF map object, if used.

| **MAP PGM**

| The library-qualified name of the mapping program.

| **MSG TEXT (hex offset)**

| Message text specified at an offset.

| **OFFSET**

| The offset at which the field in error is found in the mapping program. This value is written in decimal and hexadecimal.

| **OUTPUT (hex offset)**

| Mapping Program Output format.

| **PDF MAIL (hex offset)**

| The name of a PDF file attached to e-mail.

| **PDF OUTQ (hex offset)**

| Spooled File PDF Distribution format.

| **PUB AUT (hex offset)**

| The public authority of a PDF file written to the integrated file system.

| **RC** The reason code from message PQT4140 or PQT4151. If the reason code is AA, FF or GG, a user requested this spooled file:

| **AA** The spooled file was written by the WTR job. Map programs requesting the respooling of AFP are called at this point.

| **FF** The spooled file was written by the PDJ job. Map programs are always called at this point.

| **GG** The spooled file was written by the WTR job. Map programs are called at this point when
| segments within a spooled file are processed. If a spooled file contains segments, PSF processes
| them when a PSF configuration object specifies PDFMULT(*YES *SPLIT).

| **RELEASE**

| The release of the operating system on which the trace was taken.

| **REPLYTO (hex offset)**

| The specified REPLYTO e-mail address.

| **SENDER**

| The sender of the e-mail.

| **SF FORM**

| Stream File format.

| **STMF (hex offset)**

| The name of the PDF file written to integrated file system.

| **SUBJECT (hex offset)**

| The subject of the e-mail.

| **TO (hex offset)**

| The specified TO e-mail address.

| **USR VALU**

| The value specified in the mapping program. Depending upon the field, this value can be either
| character or numeric (decimal and hexadecimal).

| **VALID**

| The valid values for the field in error.

| **Note:** Formats (such as Spooled File AFPDS Distribution format) correspond to values in the mapping
| program template. For more information about any of these formats, see *Infoprint Server for iSeries*
| *User's Guide*.

| **Automatically generated PSFTRACE file:**

| This is an example of a diagnostic spooled file (PSFTRACE) that PSF created because it detected an error
| in the mapping program.

| The diagnostic spooled file contains this information:

- | • The name of the mapping program is QPQMAPEXIT. It is in library QSYS.
- | • The name of the map object is TEMA1. It is in library QGPL.
- | • The release on which this trace was taken is V6R1M0.
- | • The reason code issued with error message PQT4140 is 9, "When using SNDDST, all fields for
| specifying ReplyTo, CC, BCC, body files, attachments, and directory names must be 0."
- | • The input to the mapping program (Mapping Program Input Information format) is presented in
| hexadecimal representation. At the end of each line is the EBCDIC representation of the input. Not all
| characters can be displayed. Characters that cannot be displayed are represented by a period (.).
- | • An error was found in the mapping program in the Extension Area format at offset 00000012 (decimal)
| or 0000000C (hexadecimal). The value in that field is 00000448 (decimal) or 000001C0 (hexadecimal). To
| determine what field that is in the mapping program and what the appropriate values are, see the
| Mapping Program appendix in the *Infoprint Server for iSeries User's Guide*. In this case, the field is Offset
| to ReplyTo e-mail address. It has a value of 448 (decimal).
- | • Ten errors were found. Each error starts with the text OFFSET.
- | • The valid value for all of these fields is 0.

- The output from the mapping program (Mapping Program Output format) is presented in hexadecimal representation. At the end of each line is the EBCDIC representation of the input. Not all characters can be displayed. Characters that cannot be displayed are represented by a period (.).
- The output from the Extension Area format is presented in hexadecimal representation. At the end of each line is the EBCDIC representation of the input. Not all characters can be displayed. Characters that cannot be displayed are represented by a period (.).

```

***** 10:59:17.724 *****
MAP PGM 10:59:17.724 QSYS QPQMAPEXIT
MAP OBJ 10:59:17.724 QGPL TEMA1
RELEASE 10:59:17.725 V6RIM0
RC 10:59:17.725 09
INPUT 10:59:17.725
000000 C4D3E3C4 C9D94040 4040D1D2 D3C1D940 40404040 F0F7F1F8 F1F4C4D3 E3C4C9D9 DLTDIR....JKLAR....071814DLTDIR
000020 40404040 00000001 40404040 40404040 40404040 40404040 40404040 40404040 .....
000040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000060 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000080 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
0000A0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
0000C0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
0000E0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000100 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000120 404061D7 E2C6F4F0 F061F0F7 F1F9F7F0 61C4D3E3 C4C9D961 D1D2D3C1 D961F0F7 ./PSF400/071970/DLTDIR/JKLAR/07
000140 F1F8F1F4 6DF0F0F0 F0F0F16D C4D3E3C4 C9D96DF0 F7F3F1F2 F0F0F96D F0F0F0F0 1814_000001_DLTDIR_07312009_0000
000160 F0F14BD7 C4C64040 40404040 40404040 40404040 40404040 40404040 40404040 01.PDF.....
000180 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
0001A0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
0001C0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
0001E0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000200 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000220 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000240 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000260 40404040 40404040 40404040 40404040 40404040 4040F140 0000FFFF D1D2D3C1 .....1.....JKLA
000280 D9404040 40404040 40404040 40404040 C2D3C4C1 E2F6F140 912ED0B5 92E8C001 R.....BLDAS61.j...kY..
0002A0 D1D2D7C4 C6404040 4040D8E4 E2D9E2E8 E2404040 E3C5D4C1 F1404040 4040D8C7 JKPDF....QUSRSYS...TEMA1....QG
0002C0 D7D34040 40404040 5CE2E3C4 40404040 4040 OFFSET 11:05:39.349 EXT AREA 00000012 HEX: 0000000C
USR VALU 11:05:39.349 00000448 HEX: 000001C0 OFFSET 11:05:39.349 EXT AREA 00000016 HEX: 00000010
USR VALU 11:05:39.349 00000021 HEX: 00000015 OFFSET 11:05:39.349 EXT AREA 00000020 HEX: 00000014
USR VALU 11:05:39.349 00000000 HEX: 00000000 OFFSET 11:05:39.349 EXT AREA 00000024 HEX: 00000018
USR VALU 11:05:39.349 00000000 HEX: 00000000 OFFSET 11:05:39.349 EXT AREA 00000028 HEX: 0000001C
USR VALU 11:05:39.349 00000000 HEX: 00000000 OFFSET 11:05:39.349 EXT AREA 00000032 HEX: 00000020
USR VALU 11:05:39.349 00000000 HEX: 00000000 OFFSET 11:05:39.349 EXT AREA 00000036 HEX: 00000024
USR VALU 11:05:39.349 00000000 HEX: 00000000 OFFSET 11:05:39.349 EXT AREA 00000040 HEX: 00000028
USR VALU 11:05:39.349 00000000 HEX: 00000000 OFFSET 11:05:39.349 EXT AREA 00000044 HEX: 0000002C
USR VALU 11:05:39.349 00000000 HEX: 00000000 OFFSET 11:05:39.349 EXT AREA 00000048 HEX: 00000030
USR VALU 11:05:39.349 00000000 HEX: 00000000
VALID 11:05:39.357 0
OUTPUT 11:05:39.357
000000 F1F00000 000000FF 0000001C D7938581 A2854099 85818440 A38889A2 40998597 10.....Please.read.this.rep
000020 9699A340 82A840F1 F540C1A4 87A4A2A3 40404040 40404040 40404040 40404040 ort.by.15.August.....
000040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000060 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000080 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
0000A0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
0000C0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
0000E0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000100 40404040 40404040 404040F1 0000013B 00000000 F0F0F0F0 00000000 000000 .....1.....0000.....
EXT AREA 11:05:39.357
000000 00000070 000001AB 00000015 000001C0 00000015 00000000 00000000 00000000 .....
000020 00000000 00000000 00000000 00000000 00000000 00000000 00000000 .....
000040 00000000 00000000 00000000 00000000 00000000 00000000 0000001D5 .....N
000060 00000047 00000000 00000000 0000F0F0 .....00
***** 10:59:17.744 *****

```

User-requested PSFTRACE file:

This is an example of a diagnostic spooled file (PSFTRACE) that PSF created because a user requested it.

The user-requested diagnostic spooled file contains only the information specified by a mapping program. In this example, a mapping program specifies almost all distribution options. All data is presented in hexadecimal representation. At the end of each line is the EBCDIC representation of the data. Not all characters can be displayed. Characters that cannot be displayed are represented by a period (.).

The diagnostic spooled file contains this information:

- The mapping program is QPQMAPEXIT in library QSYS.
- The map object is TEST in library JKLAR.
- The release on which this trace was taken is V6R1M0.
- The reason code is listed as AA, FF or GG, which indicates that this information was user-requested.
 - AA indicates that the spooled file was written by the WTR job when processing a request to respool AFPDS.
 - FF indicates that the spooled file was written by the PDJ job.
 - GG indicates that the spooled file was written by the WTR job when processing a spooled file with segments to be split.
- The data in the various mapping program formats is displayed. The formats displayed depend on what the user requests. This example contains the following formats:
 - Mapping Program Input Information format
 - Mapping Program Output format
 - Extension Area format
 - Subject
 - Reply-to e-mail address
 - CC e-mail address
 - BCC e-mail address
 - Name of the PDF stream file written to the integrated file system
 - Name of the PDF file attached to the e-mail
 - Public authority for the PDF file
 - Spooled File PDF Distribution format
 - Spooled File AFPDS Distribution format
 - PDF Encryption format
 - Mail sender (found in the Extension Area format)
 - Stream File format
 - Individual Stream File Information format (a stream file to include in the body of the e-mail)
 - Stream File format
 - Individual Stream File Information format (a stream file to include as an attachment to the e-mail)

```

12:49:04.591 BEFORE CALL TO MAP PROGRAM
12:49:04.591 LENGTH OF INPUT INFORMATION 0722 , 000002D2 HEX
12:49:04.591 LENGTH OF OUTPUT INFORMATION BUFFER 5000 , 00001388 HEX
12:49:04.591 LENGTH OF OUTPUT INFORMATION AVAILABLE 0000 , 00000000 HEX
12:49:06.548 AFTER CALL TO MAP PROGRAM
12:49:06.548 LENGTH OF INPUT INFORMATION 0722 , 000002D2 HEX
12:49:06.548 LENGTH OF OUTPUT INFORMATION BUFFER 5000 , 00001388 HEX
12:49:06.548 LENGTH OF OUTPUT INFORMATION AVAILABLE 0000 , 00000000 HEX
***** 12:49:06.548 *****
MAP PGM 12:49:06.548 QSYS QPQMAPEXIT
MAP OBJ 12:49:06.548 JKLAR TEST
RELEASE 12:49:06.548 V6R1M0
RC 12:49:06.548 FF
INPUT 12:49:06.548
000000 D8D7C1C4 C5E5F0F0 F0C4D1D2 D3C1D940 40404040 F0F6F5F7 F6F3C5C5 E2F0F1F0 QPADEV000DJKLAR.....065763EES010
000020 40404040 0000000A 9196A285 4B828199 99818281 A27C9985 86A48789 964B85A2 .....jose.barrabas@refugio.es
000040 4B839694 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....com.....
000060 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000080 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
0000A0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....

```

```



0000C0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
0000E0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000100 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000120 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000140 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000160 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000180 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
0001A0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
0001C0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
0001E0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000200 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000220 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000240 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 .....
000260 40404040 40404040 40404040 40404040 40404040 4040F240 0000FFFF D1D2D3C1 .....2.....JKLA
000280 D9404040 40404040 40404040 40404040 C2D3C4C1 E2F6F140 911CE3C7 5EE61001 R.....BLDAS61.j.TG;W..
0002A0 D1D2D7C4 C6404040 4040D8E4 E2D9E2E8 E2404040 E3C5E2E3 40404040 4040D1D2 JKPDF.....QUSRSYS...TEST.....JK
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TO 12:49:06.549
000000 8281A289 937CA381 97978195 A985854B 839694 basil@tappanzee.com
EXT AREA 12:49:06.549
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000020 00000012 00000000 00000000 00000000 00000000 00000251 00000013 000001C9 .....I
000040 0000001F 00000264 00000008 0000026C 00000131 00000000 00000000 0000020A .....%.
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CC 12:49:06.549
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PDF OUTQ 12:49:06.549
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000020 00000000 00000000 00000000 00000000 00000000 00000000 00000000 .....
000040 F0F0F1F2 F0F0F0 0012000
SENDER 12:49:06.594
000000 D9C4C5D5 C1D3C940 4040 RDENALI...
***** 12:49:06.594 *****














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