
Xerox DocuPrint IPS Solutions Guide

**THE DOCUMENT COMPANY
XEROX**

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Xerox Corporation
Global Knowledge and Language Services
701 South Aviation Boulevard, ESM1-058
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The DocuPrint IPDS Printing System (IPS) series of printers is a full family of Xerox production printers for printing in an Advanced Function Presentation (AFP) environment. DocuPrint IPS printers provide a variety of features that add value to enterprise printing operations.

To ensure that customers maximize their investment in Xerox technology, this document provides expanded information about performing specific tasks or following certain procedures beyond those found in the IPS user documentation. Specifically, this document has been designed to:

- provide an overview of the Xerox DocuPrint IPS printers
- provide an overview of AFP
- highlight valuable features of DocuPrint IPS printers
- describe special considerations that optimize the quality of customers' output
- explain how customers can enable value-added features to benefit their business
- provide answers to some commonly asked questions.

DocuPrint IPS 7.1 new features

DocuPrint IPS 7.1 implements the following features:

- Mixed Plex
- Support of Sun PCI Bus platform
- Password protected Configuration menu:
 - Introduces four privilege modes for IPS operations: User, Operator, Administrator and Service Mode
- Process parameter integration
- Remote diagnostics
 - This tool allows service personnel to connect with a customer system remotely and evaluate its performance while it is being used. With Sixth Sense technology, patches can be transferred, applied, and removed remotely.
- Support of InfoPrint Manager
 - IPS supports InfoPrint Manager to a functionality equivalent to PSF for AIX. InfoPrint Manager replaces PSF for AIX, which is no longer marketed by IBM.
- Face-up delivery of duplex and mixed plex jobs through Bypass Transport.

DocuPrint IPS 7.1 features (continued)

- DFA segment management
- Front end resolution setting for print datastream
- Alternate shading.

Document scope and organization

This document provides expanded information for a variety of topics relating to the DocuPrint IPS software, version 7.1. Some topics are discussed in sufficient detail to allow the reader to complete tasks without additional documentation. Other topics contain key information, then point to detailed documentation so the task may be completed.

Below is a brief description of each section in this document:

- The first section, “DocuPrint IPS overview,” provides a brief description of the DocuPrint IPS printers and sample applications that incorporate the value-added features of these printers.
- Next, “AFP summary” briefly describes the AFP printing environment and architecture.
- The “DocuPrint IPS system” section provides a more detailed description of the DocuPrint IPS systems and how they interpret AFP data streams.
- The next section, “IPS application migration,” details the modifications required to migrate your existing applications for printing on the DocuPrint IPS printers.
- “Incorporating Xerox value-added features” explains how to incorporate the IPS value-added features into your existing documents.
- The “Commonly asked questions” section provides answers to some of the questions which customers ask about the DocuPrint IPS printers.
- This guide includes four appendixes that provide:
 - tables explaining the DocuPrint IPS printer capabilities
 - tables that list some of the resource creation and conversion programs available
 - current limitations of the DocuPrint IPS printers
 - an explanation of the AFP print flows for the different host platforms.

Intended audience

The primary audience for this document is the systems analyst or application programmer who:

- is responsible for migrating existing and/or creating new AFP applications to effectively use the unique features of the Xerox DocuPrint IPS series of printers.
- defines enterprise production printing goals and objectives.
- installs, customizes, maintains, and troubleshoots Xerox DocuPrint IPS printer applications.
- supports end-user groups in application development and in optimizing the use of the DocuPrint IPS as a production printing resource.

For additional information...

Additional documentation related to the DocuPrint IPS printers is available from Xerox. You can request these publications from your Xerox representative. Note that the publication numbers shown are current as of the date this document was published. For the most current publication numbers, contact your Xerox representative.

You may also obtain information about DocuPrint IPS printers from the Xerox Corporation web page at this URL: www.xerox.com/xps/products/dpips.

Xerox reference manuals

General documents

Generic MICR Fundamentals Guide (720P14082) provides basic information on working with MICR fonts and printing to Xerox MICR printers.

Installing Xerox AFP MICR Fonts (720P24483) provides information on installing the E13B MICR font for use on the DocuPrint 96, 4635, and 180 MICR IPS printer.

Xerox Helpful Facts About Paper (721P82492) provides basic information on the different types of paper you can use in Xerox printers.

Xerox IPS Messages Guide (721P88950) lists the messages issued by DocuPrint IPS printers and provides an explanation for each message.

DocuPrint 4850/4890/92C

Xerox DocuPrint 4850/4890 IPS Installation Planning Guide (721P890700) helps you plan the installation of DocuPrint 4850 and/or 4890 printers at your site. (This is 721P89200 for the 92C IPS.)

Xerox DocuPrint 4850/4890 IPS Guide to Configuring and Managing the System (721P89080) explains how to configure the DocuPrint 4850 and/or 4890 printers and how to manage the system when printing. (This is 721P89180 for the 92C IPS.)

Xerox DocuPrint 4850/4890 IPS System Overview Guide (721P89090) describes the features and functions of the DocuPrint 4850 and 4890 printers. (This is 721P89130 for the 92C IPS.)

Xerox DocuPrint 4850/4890 IPS Guide to Performing Routine Maintenance (721P89110) explains how to perform routine maintenance on your DocuPrint 4850 and/or 4890 printers. (This is 721P89140 for the 92C IPS.)

Xerox DocuPrint 4850/4890 IPS Troubleshooting Guide (721P89100) includes information on troubleshooting problems you may encounter. (This is 721P89160 for the 92C IPS.)

Xerox DocuPrint 4850/4890 IPS Customer Information Quick Reference Card (721P88870) includes readily available configuration information regarding the DocuPrint 4850/4890 IPS printers. (This is 721P89170 for the 92C IPS.)

DocuPrint 96/4635/180 *Xerox DocuPrint 96/4635/180 IPS Installation Planning Guide* (721P88230) helps you plan the installation of DocuPrint 96, 4635 and/or 180 printers at your site.

Xerox DocuPrint 96/4635/180 IPS Guide to Configuring and Managing the System (721P88170) explains how to configure the DocuPrint 96, 4635 and/or 180 printers and how to manage the system when printing.

Xerox DocuPrint 96/4635/180 IPS System Overview Guide (721P88150) describes the features and functions of the DocuPrint 96, 4635 and 180 printers.

Xerox DocuPrint 96/4635/180 IPS Guide to Performing Routine Maintenance (721P88160) explains how to perform routine maintenance on your DocuPrint 96, 4635 and/or 180 printers.

Xerox DocuPrint 96/4635/180 IPS Troubleshooting Guide (721P88190) includes information on troubleshooting problems you may encounter.

DocuPrint 4050/4090 *Xerox DocuPrint 4050/4090 IPS Installation Planning Guide* (721P89020) helps you plan the installation of DocuPrint 4050 and/or 4090 printers at your site.

Xerox DocuPrint 4050/4090 IPS Guide to Configuring and Managing the System (721P89030) explains how to configure the DocuPrint 4050 and/or 4090 printers and how to manage the system when printing.

Xerox DocuPrint 4050/4090 IPS System Overview Guide (721P89040) describes the features and functions of the DocuPrint 4050 and 4090 printers.

Xerox DocuPrint 4050/4090 IPS Guide to Performing Routine Maintenance (721P89060) explains how to perform routine maintenance on your DocuPrint 4050 and/or 4090 printers.

Xerox DocuPrint 4050/4090 IPS Troubleshooting Guide (721P89050) includes information on troubleshooting problems you may encounter.

IBM reference manuals

If you require further information about the various AFP products and system architectures, refer to these IBM publications. Note that the publication numbers shown are current as of the date this document was published. For the most current publication numbers, contact IBM.

Guide to Advanced Function Presentation (G544-3876-00) contains a comprehensive overview of AFP and AFP concepts.

Mixed Object Document Content Architecture Reference (SC31-6802-04) describes the functions and elements that make up MO:DCA data streams.

Page Printer Formatting Aid/370: User's Guide (S544-5284-03) contains information about the PPFA product that is used to create AFP page definitions and form definitions.

Page Printer Formatting Aid/370: Command Quick Reference (G544-3701-04) provides general information about Page Printer Formatting Aid/370 (PPFA/370). It contains information on program invocation, symbolic information, syntax rules, and the command syntax for the PPFA/370 commands.

Overlay Generation Language/370 User's Guide and Reference (S544-3702-03) summarizes the basic information required to define and to generate an overlay using the IBM Overlay Generation Language/370 (OGL/ 370) licensed program. It also includes information on program invocation (in MVS, VSE, and VM), symbolics, syntax rules, and the command syntax for the OGL/370 commands.

The Continuing Evolution of Advanced Function Printing (by Howarth and Plate, IBM Systems Journal, VOL 32, NO 4, 1993) traces the continuing evolution of AFP, its usage, and how it addresses the presentation requirements of businesses in the 1990's.

Advanced Function Printing-From Print to Presentation (G321-5528-00), describes some of the software products and how they use the architecture. It also describes possible future directions for AFP and related technologies.

Advanced Function Presentation: Printer Summary (G544-3135-10) contains detailed characteristics of IBM's page printers.

Advanced Function Presentation Workbench for Windows: Using the Viewer Application (G544-3813-00) contains information about using this product with the AFP application programming interface.

Advanced Function Presentation Conversion and Indexing Facility: Application Programming Guide (G544-3824-01) contains information about using the AFP Conversion and Indexing Facility (ACIF).

Advanced Function Presentation: Programming Guide and Reference (S544-3884-01) contains information about using the AFP application programming interface.

Distributing AFP Printing from a Host System (GG24-4493-00) explains the different ways of distributing print jobs from a host system to remote sites.

AFP Printing in an IBM Cross-System Environment (GG24-3765-00) explains how to print AFP documents in a multiple host environment and how to handle resources in the different the environments.

Intelligent Printer Data Stream Reference (S544-3417-05) describes the functions and composition of elements sent to printers that support the IPDS architecture.

Bar Code Object Content Architecture Reference (S544-3766-02) describes the functions and services associated with Bar Code Object Content Architecture (BCOCA).

Font Object Content Architecture Reference (S544-3285-03) describes the functions and services associated with Font Object Content Architecture (FOCA).

Graphics Object Content Architecture Reference (S544-5498-00) describes the functions and services associated with Graphics Object Content Architecture (GOCA).

Image Object Content Architecture Reference (SC31-6805-04) describes the functions and services associated with Image Object Content Architecture (IOCA).

Presentation Text Object Content Architecture Reference (SC31-6803-02) describes the functions and services associated with Presentation Text Object Content Architecture (PTOCA).

Print Service Facility/MVS: Application Programming Guide (S544-3673-03) provides information about using PSF in an MVS environment.

Print Service Facility/VM: Application Programming Guide (S544-3677-00) provides information about using PSF in a VM environment.

Print Service Facility/VSE: Application Programming Guide (S544-3666-01) provides information about using PSF in a VSE environment.

Print Service Facility/2: Getting Started (G544-3767-01) provides the basic information required for using PSF in an OS/2 environment.

IBM AIX Print Service Facility/6000: Print Service Facility for AIX Users (G544-3814-01) provides information about using PSF for AIX in an RS/6000 environment.

AS/400 Information Directory (GC21-9678-03) provides information on using the AS/400 system.

Attachment Configuration Handbook (30H7322) provides information about attaching your printer to a host system (MVS, VM, VSE, AS/400, PS/2).

PSF V3R1 for OS/390: User's Guide (S544-5630-00) describes the JCL to use and how to use AFP resources such as form definitions, page definitions, color map tables, fonts, and so on.

InfoPrint Manager for AIX User's and Operator's Guide (S544-5596-01) provides syntax for commands and utilities, and detailed information on IPS attributes and values. This publication can be used as a reference for end users, print operators, and administrators.

IBM InfoPrint Manager for AIX: PSF Direct (S544-5486-00) provides information about using InfoPrint Manager for AIX.

1. DocuPrint IPS overview

In many instances, the documents your company generates are the only contact you have with your customers. Therefore, you need to be able to use the most effective and high quality printer features available to maintain a competitive edge.

Your company may also produce reports for internal use. Your print shop personnel may work around the clock in order to provide the high volume of documents for distribution throughout the company.

It's times like these when the DocuPrint IPS printers can make a difference between keeping a customer or losing one, between completing your internal documents before the deadline or missing that deadline.

The DocuPrint IPDS Printing System (IPS) series consists of a full range of Xerox production printers for Advanced Function Presentation (AFP) printing. If your company prints AFP applications originally created to print on IBM Group 3 compatible printers, you can use any of the DocuPrint IPS printers to print those applications with little or no modification. In addition, you can incorporate many Xerox printer value-added features into your existing applications, including:

- data driven color to create powerful business documents
 - 8 colors supported by PSF
 - Xerox highlight colors
 - conditional color applications
 - color support by third-party tools (from Elixir and ISIS)
 - personalized and customized documents
- multiple input trays to improve printer productivity
 - up to 6 input trays, including roll to cut sheet feeding device
 - multiple stock applications
- superior resolution at 300 and 600 dpi to enhance production documents
- stitching to finish production
 - up to 50 pages stitched per set for the Xerox stitcher/stacker
 - use of the PSF MarkForm command
 - use of the PSF JOG command
- Document Feeding and Finishing Architecture (DFA) to support a wide range of third-party document feeding and finishing devices, including roll feed to cut sheet input
- MICR printing for checks and explanation of benefits (EOBs).

DocuPrint IPS printer capabilities

For a summary of printer specifications for the DocuPrint IPS printer series, refer to Appendix A, “DocuPrint IPS printer capabilities.”

Application examples

How can your company benefit from the unique Xerox value-added features available on DocuPrint IPS printers? Some examples include:

- Highlight color conditionally invoked by variable data can offer a competitive advantage.
- Although 240 dpi printing has been acceptable in the past, the future holds a different outlook. The 300 dpi and 600 dpi resolutions can be a key factor in your maintaining a competitive advantage.
- Access to additional input trays can improve throughput and provide application flexibility for complex documents with up to 6 different paper stocks. This access also allows operators to change or load paper stocks without having to stop the printers.
- Support for inline third-party feeding and finishing equipment provides additional document post-print handling.
- Stitching documents speeds up distribution and reduces the occurrences of lost sheets or reports.
- Add to all of this the Xerox reputation for dependability and maintenance.

This section provides examples that incorporate the features in ways you might not have discovered.

Insurance

Let’s discuss an example that could be used by an insurance company. You are responsible for printing insurance policies, customer correspondence, premium invoices, and distributing reimbursement checks to clients. Using the DocuPrint 96 MICR, 4635 MICR, 180 MICR IPS printers, you can print any of these documents with ease.

For example, you may need to print reimbursement checks that use MICR fonts and print variable information on each check. You could create an application for a check form, either with IBM-supplied utilities or using Elixir or another third-party package, that includes these elements:

- fixed information (date line, amount lines, payee line, signature line, financial institution name, etc.)
- variable information (customer name, check number, check amount, signature font)
- MICR line (machine-readable information printed at the bottom of each check).

For this application, you could use the DocuPrint 4850 IPS or 4890 IPS printers. These printers accept the AFP IPDS data stream and print the policies, duplex or simplex, normal or tumble, with full-page highlight color, even in stapled booklets, at up to 92 images per minute. The printed policies are then ready for immediate processing by automated distribution equipment.

How does this functionality benefit your company? By adding highlight color to graphs and charts within the documents, customers can understand the information more easily, thus lessening calls to your company. Better understanding and fewer calls add up to cost savings for you!

WORLD WIDE INSURANCE COMPANY



This document printed on a Xerox DocuPrint 4890 IPS

Policy Number: BA87659599 Policy Set Number: 2

Page 1 of 5

The individual forms in this document were produced using Elixir for AFP. Variable data was merged and pages collated using DocuMerge, the standard in document collation and distribution software by Image Sciences, Inc., Dallas Texas (214-891-6532). The final assembled document was printed on a Xerox DocuPrint 4890 IPS Printer with the highlight color option.

If the Insured dies while this policy is in force, we will pay the Sum Insured to the beneficiary, when we received at our Home Office due proof of the Insured's death, subject to the provisions of this Policy.

Policy Detail

Right to Examine and Return Policy Within 10 days

You may, at any time within 10 days after receipt of this Policy, return it to us at our Home office or to the Agent through whom it was purchased, and we will cancel it. The return of the policy will void it from the beginning and any premium paid will be refunded to the owner.

Insured: John Smith

Age and Sex: 31 MALE

Policy Number: BA87659599

Policy Date: 09/24/96

Sum Insured: 1022.8

Premium Class: CLASS AA

James R. Smith
SECRETARY

John R. Williams
PRESIDENT

Manufacturing

For this example, let's assume you have customers in North America and in Europe. Your customers in North America expect to receive the documentation you provide with your parts on US letter (8-1/2 by 11 inch) paper. However, your customers in Europe have requested that they receive their documentation on A4 paper. In addition, the document covers need to be printed on a card stock heavier than the rest of the pages, and the whole should be a stapled document.

Your application programmers have created an application that can print on either US letter or A4 paper. They also have added a conditional processing statement to check for the country to which the document will be sent. It also includes a condition for the first page to pull from the bin that has the card stock loaded.

Your document also contains many detailed drawings of the various parts you supply. Several of the drawings contain highlight color to show the specific item being discussed in the documentation.

This application requires that the printer be able to:

- pull stock from multiple bins
- print highlight color
- stitch the document when complete.

The DocuPrint 4850 IPS and 4890 IPS printers can print this type of application easily. You can place US letter paper in tray 1, A4 paper in tray 2, US letter cover stock in tray 3, and A4 cover stock in tray 4. You can select which highlight color to use for the document based on the type of color housing you load into the printer. And, as each document is printed, the printer will staple the document before placing it in the output bin for you to retrieve.

Banking

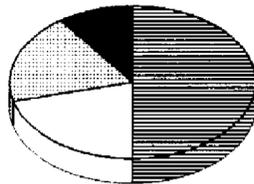
Many banks now handle mutual fund or financing and investment accounts for their customers. As a result, the customers are requesting more detailed and easier to read statements. The DocuPrint IPS printers allow you to incorporate highlight color printing to highlight critical information that needs to be pointed out to the customer. Also, the higher print resolution of DocuPrint IPS printers allows you to create high quality color graphics to help the customer better understand the information.

Along with these statements, you can print check image applications running in the AFP environment on the DocuPrint 96 MICR, 4635 MICR, and 180 MICR IPS printers at 600 dpi. This functionality provides excellent document quality for your customers, thus helping to improve your customer satisfaction rating.

Current Portfolio Allocation

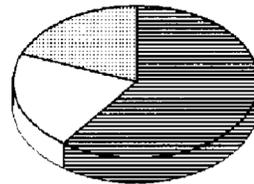
INVESTMENTS	INVESTMENT ELECTIONS	SHARES OWNED	SHARE PRICE	ENDING BALANCE AS OF 3/31/95
Plaza Equity Income Fund	15%	226.999	23.504	\$5,335.38
Plaza Growth Stock Fund	30%	527.947	20.306	\$10,720.49
Plaza International Equity Fund	25%	251.663	39.548	\$9,952.77
Plaza Bond Fund	30%	410.470	63.370	\$26,011.50
Plaza Money Market Fund	0%	N/A	N/A	\$0.00
Ending Balance				\$52,020.15

Allocation by Fund



-  50% Plaza Bond Fund
-  21% Plaza Growth Stock Fund
-  19% Plaza International Equity Fund
-  10% Plaza Equity Income Fund
-  0% Plaza Money Market Fund

Allocation by Investment Objective



-  60% Income
-  21% Growth
-  19% Aggressive Growth
-  0% Capital Preservation

Document types

You can create several different types of documents using AFP and then print them on DocuPrint IPS printers. This section describes some of these documents and how the Xerox value-added features can be used.

Policy production

Insurance policies can be very complicated documents to produce. You may choose to use different stocks of paper for different policies, or even within the same policy. With the printer's ability to incorporate multiple paper stocks in one policy package—including ID cards—in a single run, the DocuPrint 4890 IPS or 4635 IPS printers allow you to create such complicated policies with ease.

The computer system assembles the policy, generates the AFP data stream, and prints it on a DocuPrint 4890 IPS printer, duplex or simplex, with highlight color at up to 92 images per minute, at costs comparable to black and white printing. These components combine to produce a finished policy that can be shipped directly to customers, agents, and the home office with little or no human intervention.

EOBs with check

Handling insurance claims can be a costly and complicated process. Sending an explanation of benefits (EOB) separately from a reimbursement check can confuse the customer, which may lead to customer service questions or complaints. To solve this problem, you can create a document that integrates the EOB with a check by extracting data from a host recordkeeping system and client database from platforms such as an IBM S/390 or AS/400.

The AS/400 supports a variety of tools that create AFP forms and documents. You can then transmit the fully-composed print streams to the DocuPrint 96 MICR, 4635 MICR, and 180 MICR IPS printers from the AS/400.

With a Xerox MICR printing system, you can securely generate checks from blank check stock at the same time as you generate EOBs or cover letters. Your application can issue "pulls" from the various input bins for the appropriate stocks. For information on the security features with IPS, refer to "*Security features*".

A variety of inline post-processing and finishing solutions are available from the Xerox finishing partners, allowing you to mail these documents in one envelope. These applications are supported on the DocuPrint IPS printers via Document Feeding and Finishing Architecture (DFA).

What effect does all this have on your business? Savings to your company as a result of reduced check printing and storage costs and improved customer satisfaction, which in turn reduces your customer support costs!

This chapter provides a summary of IBM's Advanced Function Presentation (AFP) architecture and the AFP features supported by Xerox DocuPrint IPS printers.

What is AFP?

AFP is a collection of programs used to format and print documents. Using these programs, you can define the exact placement of elements on a printed page, assign characteristics to the various elements, and instruct the printer to print one or more copies of the document. Data can be placed at any addressable point on the page, a capability known as all-points addressability (APA).

AFP allows you to place these types of data on a page and orient them in different directions:

- fonts (either proportional, monospaced, or MICR)
- graphics (plotting-type applications such as CAD/CAM)
- images (such as logos, signatures, and pictures)
- bar codes
- electronic forms
- formatted pages of text.

AFP resources

You can use different AFP resources to create your document. For example, you may wish to create an application that includes an electronically created form (overlay), variable data, constant data, a signature, and your company logo.

Using AFP programs, you can create applications that include these resources:

- page definitions
- form definitions
- page segments
- overlays
- fonts.

For a listing of resource generation packages, refer to Appendix B, “Resource creation and conversion programs.”

Page definitions (PageDefs)

Page definitions control the formatting of variable data within a document. PageDefs specify the dimensions and print direction of the logical page, provide the formatting instructions for individual lines and specific fields within a line, define the font(s) to be used, define the number of lines for each logical page, call page segments and overlays, specify any color usage, generate bar codes, and apply conditional formatting to specific fields.

Page definitions are typically generated using IBM's Page Printer Formatting Aid (PPFA), Elixir's AppBuilder for AFP, or ISIS' Overview AFP Designer.

Form definitions (FormDefs)

Form definitions control the physical characteristics of the printed page. For example, they specify the position of the logical page on the physical page, whether to print the document in duplex, which overlay to use, which input tray to use, how many copies of the document to print, and whether to use offset-stacking or multiple paper sources. FormDefs can also call overlays that contain page segments to be included within the document.

Form definitions can be used to print N-up, where a page is divided into several partitions. With enhanced N-up, you have control over the size of the partitions and the order of their placement on the page.

Form definitions are typically generated using IBM's PPFA, Elixir's AppBuilder for AFP, or ISIS' Overview AFP Designer.

Page segments

Page segments are mappable raster images that may consist of logos and signatures. You may use either color or black and white page segments in your documents. To include a page segment in a document, you can either include it or reference it in an overlay. You can also call page segments via PageDefs or code them dynamically within an AFP application.

Page segments are typically created or modified using IBM's Graphical Data Display Manager (GDDM), AFP Utilities/400, and AFP Windows Driver, Elixir's ElixirImage for AFP, or ISIS' OverView Font & Image Editor.

Overlays

Overlays are electronic forms that may contain lines, boxes, constant text, and page segments. To include an overlay in a document, you can reference it in a PageDef or FormDef or via a mixed-mode or fully-composed AFPDS application.

Overlays are generated using IBM's Overlay Generation Language (OGL), AFP Utilities/400, and AFP Windows Driver, Elixir's ElixirForm for AFP, or ISIS' Papyrus Designer. You may also be able to use some of these products to add color to your overlays. For example, Elixir's ElixirForm for AFP allows you to add highlight color to overlays.

Fonts

Fonts are the characters that make up the text included in a document. AFP uses many different types of fonts, such as compatibility, sonoran (standard), outline, and core interchange. For more information about using fonts with DocuPrint IPS printers, refer to Chapter 4, "IPS application migration."

IBM also offers the AFP Font Collection, which contains over 1000 fonts including Times New Roman, Helvetica, and Courier. These fonts are supplied in raster and outline formats. The raster version fonts come in various sizes and resolutions while the outline fonts are independent of printer resolution.

Fonts can be created or modified using IBM's Font Library Services Facility (FLSF), Elixir's ElixirFont for AFP, or ISIS' OverView Font & Image Editor.

AFP architecture

The AFP system is a sub-architecture of the Systems Application Architecture (SAA). The AFP print platform consists of architected data streams for three areas: applications, print resources, and printers. This structure provides the foundation for keeping the applications independent from specific printer hardware requirements. This independence helps to reduce the cost of application development and maintenance.

Like other SAA architectures, AFP and Intelligent Print Data Streams (IPDS) are components of IBM's Open Blueprint architecture. As the successor to SAA, Open Blueprint is a truly open architecture that helps IBM and others deliver integrated, interoperable products and solutions.

AFP combines the data types (resources) described previously to create data streams. This section describes the architectures and data streams as recognized by the DocuPrint IPS printers.

Object Content Architectures

Documents are made up of different kinds of data, such as text, graphics, images, and bar codes. Object Content Architectures (OCAs) describe the structure and content of each type of data format that exists in a document and appears in a data stream.

The object content architectures, also known as transmission objects, are:

- Bar Code Object Content Architecture (BCOCA), which describes a predetermined pattern of bars and spaces, known as bar codes, that represent alphanumeric data in a machine-readable format.
- Formatted Data Object Content Architecture (FD:OCA), which allows you to interchange data that has already been formatted.
- Font Object Content Architecture (FOCA), which describes the structure and contents of fonts. It also allows you to interchange the font descriptions and specify color.
- Graphics Object Content Architecture (GOCA), which describes vector or object-oriented graphics. It also allows you to interchange and present graphics data and specify color.
- Image Object Content Architecture (IOCA), which describes bitmapped image objects, including data compression, gray-scale, encoding, and other recording data. It also allows you to interchange and present images.
- Presentation Text Object Content Architecture (PTOCA), which describes text objects formatted for all-points addressable presentations, including font, text color, and other visual attributes. It also allows you to interchange and present presentation text data, lines, and boxes.

Data streams

Data streams define the structure and content of an application. Three types of data streams used by AFP are:

- Mixed Object Document Content Architecture (MO:DCA) data streams, which are generated by an application and are device independent. These data streams describe documents and object envelopes for interchange with other applications and application services.
- Intelligent Printer Data Stream (IPDS), which is a device-bound data stream that has been processed into printer-specific data, normally by PSF. This is the native language of DocuPrint IPS printers. These data streams perform printer control functions and share job status information.
- Advanced Function Presentation Data Stream (AFPDS), which is an architected presentation function set of MO:DCA. Also known as MO:DCA-Presentation (MO:DCA-P), it consists of data objects and data structures that define a document's layout.

While there are other data streams associated with AFP documents, you will use the MO:DCA and IPDS data streams most frequently when printing to DocuPrint IPS printers. You can also print AFPDS to DocuPrint IPS printers, but the data stream must be converted to IPDS before being submitted.

Data towers

What makes a printer an IPDS printer? IPDS printers have these features:

- implementation of a subset of the Device Control command set
- implementation of one or more of these IPDS command sets and their corresponding "tower"
 - PT1, PT2, and PT3 (text)
 - IM/1 (uncompressed images)
 - IO/1 (compressed images)
 - DR/1 and DR/2 (graphics)
 - BC/1 (bar codes)
- generation of IPDS exceptions according to a set of predefined IPDS rules

The DocuPrint IPS printers are compliant with the PSF data towers. For more information on the data and resource towers implemented in IPS, refer to "Object Content Architectures" on page 2-4.

PSF platforms

You have several options for connecting your DocuPrint IPS printers to the host. Each platform determines how IBM's Print Services Facility (PSF) program interacts with the DocuPrint IPS printer.

PSF is a print driver and resource manager that resides on the host. You can connect the host system to printers either locally or remotely using any of the platforms shown in this table:

Table 2-1. **Supported PSF levels**

Platform	Operating system	Minimum supported PSF level ¹
Mainframe (System/370 or System/390)	MVS	PSF/MVS V2.2
	VM	PSF/VM V2.1
	VSE	PSF/VSE V2.2
AS/400	OS/400	PSF/400 V3.1
RS/6000	AIX	InfoPrint Manager V3.1 ² PSF/6000 V1.2, PSF for AIX V 1.2, or
PS/2	OS/2	PSF/2 V1.1

1. The minimum levels listed are for TCP/IP connectivity using either Token Ring or Ethernet.
2. IBM withdrew PSF/6000 and PSF for AIX from marketing. Customers must now use InfoPrint Manager as it is IBM's replacement product. IPS shall support InfoPrint Manager to a functionality level equivalent to PSF for AIX.

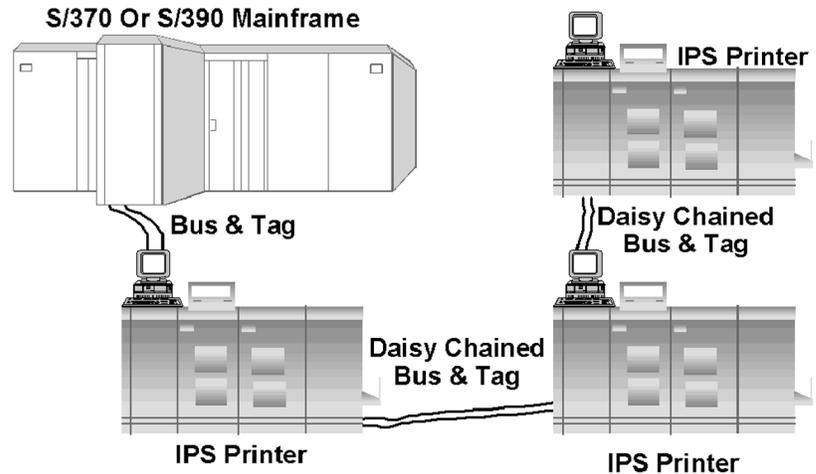
Mainframe connections

You may use several different formats to connect your mainframe to the DocuPrint IPS printer. The various connection formats are described and pictured in this section.

Note that on this platform, the PSF control functions are IPDS emitters only.

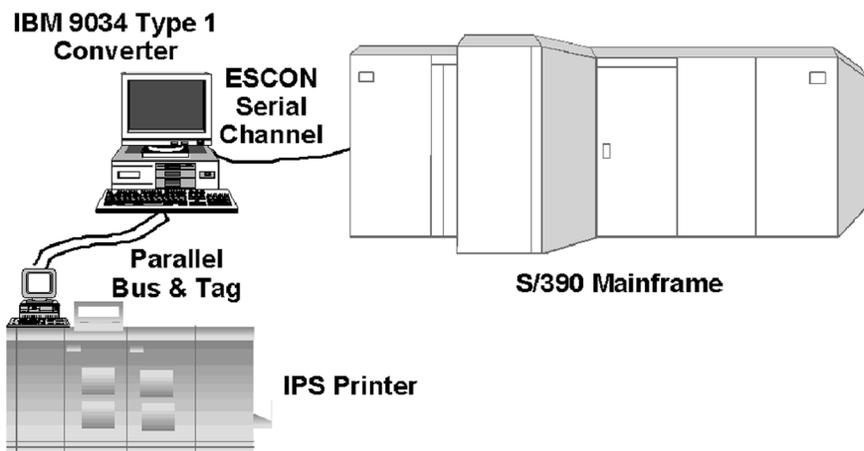
Direct Bus and Tag

The simplest connection format is the Direct Bus and Tag. For this solution, the printer is connected directly to the host via Bus and Tag cables.



ESCON connection

This format uses fiber optic cable and the ESCON protocol as the channel connection to the host. Using this solution, the printer is connected to an IBM 9034 Type 1 converter. The converter is then connected to the System/390 mainframe through a fiber optic serial cable.

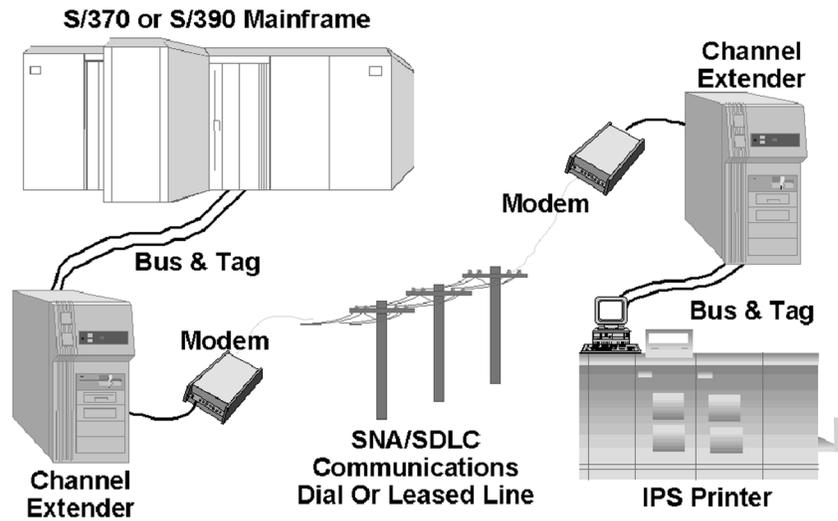


Remote connection: channel extender

For the channel extender connection, the printer is connected directly to the channel extension device. The channel extender is then connected to another channel extender through telecommunication lines. Finally, the upstream channel extender is connected to the System/370 or System/390 mainframe.

Channel extenders allow for long distance communication between the host mainframe and the DocuPrint IPS printers. In addition, channel extenders also have these characteristics:

- no spooling of jobs
- remote operator can control jobs via a 3270 session with the host
- no resource storage.

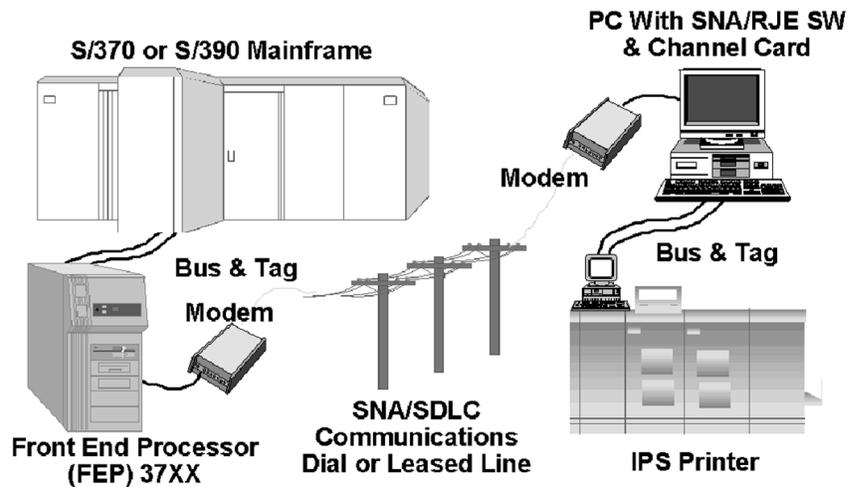


Remote connection: BARR/RJE

Using the remote BARR/RJE connection, the printer is attached to a PC containing BARR software and hardware. The PC is connected to a Front End Processor (FEP) through telecommunication lines. The FEP is then attached to the System/370 or System/390 mainframe.

For DocuPrint IPS printers, the BARR software supports remote connectivity, such as Remote Job Entry (RJE). The remote operator can communicate to the host, and the host operator can communicate with the remote device.

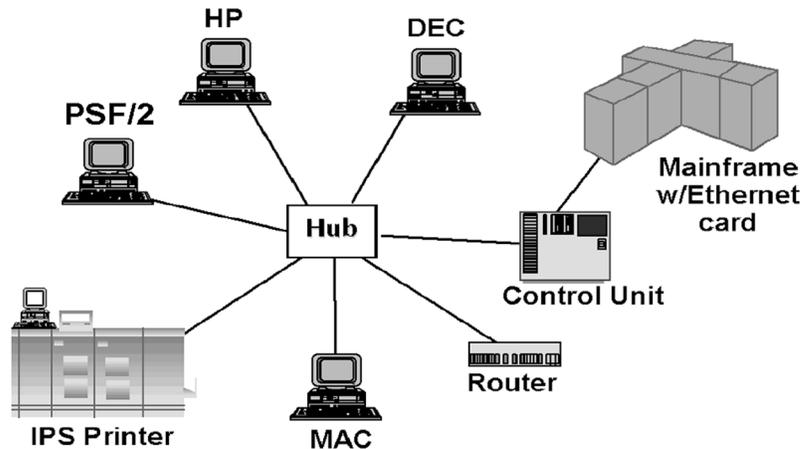
The BARR/RJE spooler can accept data from multiple sources and drive multiple printers simultaneously.



TCP/IP connection: Ethernet

For TCP/IP connectivity via an Ethernet, the mainframe is connected to either a 3172 or 3745 IBM control unit. The control unit is connected to a router, which in turn connects the various workstations and printers on the LAN.

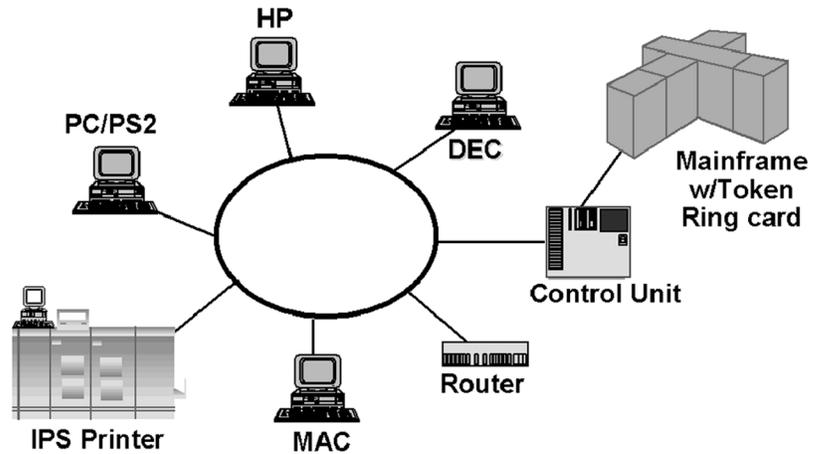
Each device (mainframe, control unit, router, workstation, printer) must have an Ethernet card installed in the device.



TCP/IP connection: Token Ring

For TCP/IP connectivity via a Token Ring, the mainframe is connected to a 3174 or 3745 IBM control unit. The control unit is connected to a modular access unit (MAU), which acts as the Token Ring. The MAU connects the router, workstations, and printers to the Token Ring.

Each device on the Token Ring (mainframe, control unit, router, workstation, printer) must have a Token Ring card installed in the device.



AS/400 connections

The AS/400 Host is similar to the larger mainframe host types. On this platform, the PSF control functions are IPDS emitters only. PSF/400 accepts MO:DCA-P data streams, as well as SNA Character String (SCS) data streams with Data Description Specification (DDS), IPDS, and line data. It outputs only IPDS data streams.

The Advanced Function Printing Utilities (AFPU) allow you to create formatting objects called Printout Format Definition (PFD). AFPU uses PFD objects as formatting resources when printing a database file. Note that a PFD is not the same as a page definition.

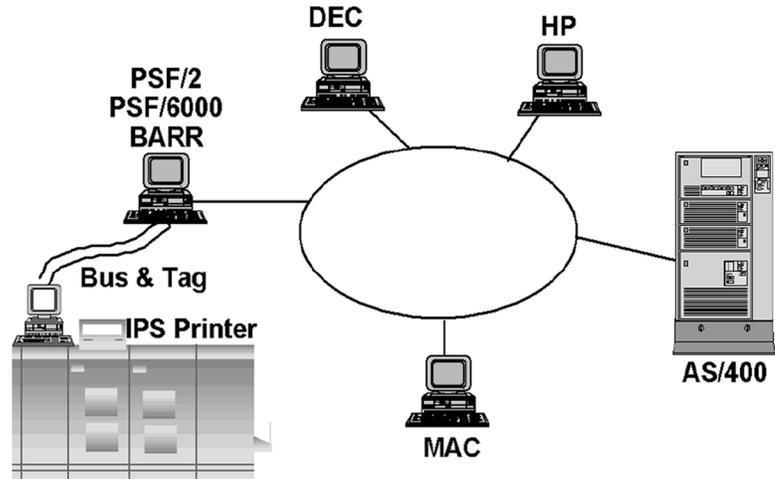
The primary application software programs used by PSF/400 are OfficeVision/400 and WordPerfect/400. You can also use the AFP Print Suite which contains tools for creating AFP applications on the AS/400. These tools are:

- Advanced Print Utility (APU)
- PPFA for AS/400
- AFP Toolbox.

AS/400 remote connection

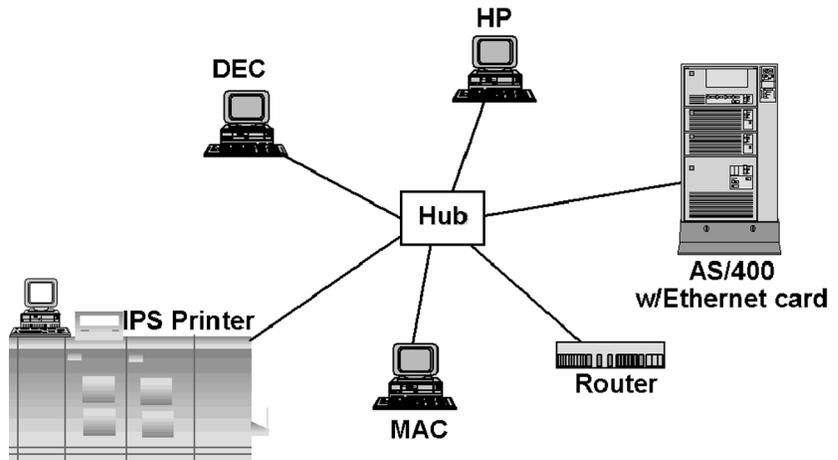
AS/400 does not use a direct Bus & Tag connection. Instead, you must set up a remote PSF/2, PSF for AIX, or BARR/AFP connection.

An AS/400 channel connection requires either BARR/AFP or a PSF/2. BARR/AFP uses an LU 6.2 connection to carry real-time, bi-directional traffic from the host to IPDS Group 3 printers. The LU6.2 connection can be either SDLC or Token Ring. Because the IPDS protocol allows the printer to feed its status back to the host in real time, BARR/AFP does not spool the AFP data. Instead, jobs are printed as they are received from the host.



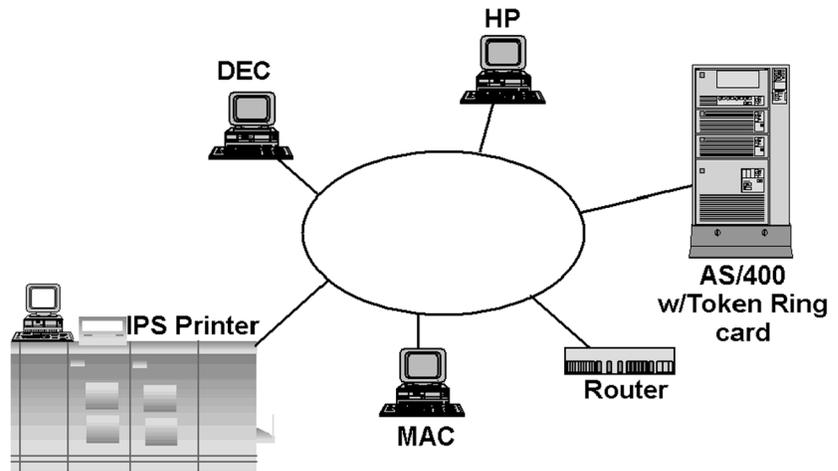
TCP/IP connection: Ethernet

For the Ethernet TCP/IP connection, you must have an Ethernet card installed inside the AS/400. A router directs the jobs being run on the Ethernet to the appropriate device.



TCP/IP connection: Token Ring

For the Token Ring TCP/IP connection, you must have a Token Ring card installed inside the AS/400. A router directs the jobs being run on the Token Ring to the appropriate device.



RS/6000 connections

The RS/6000 connections are remote connections. You may connect your RS/6000 system to the DocuPrint IPS printers using one of the options described in this section.

Note that you cannot daisy-chain printers in the RS/6000 environment. Each printer must have its own Micro Channel Adapter (MCA) card.

The following sections apply to the InfoPrint Manager V 3.1 as well as PSF/6000, and PSF for AIX systems.



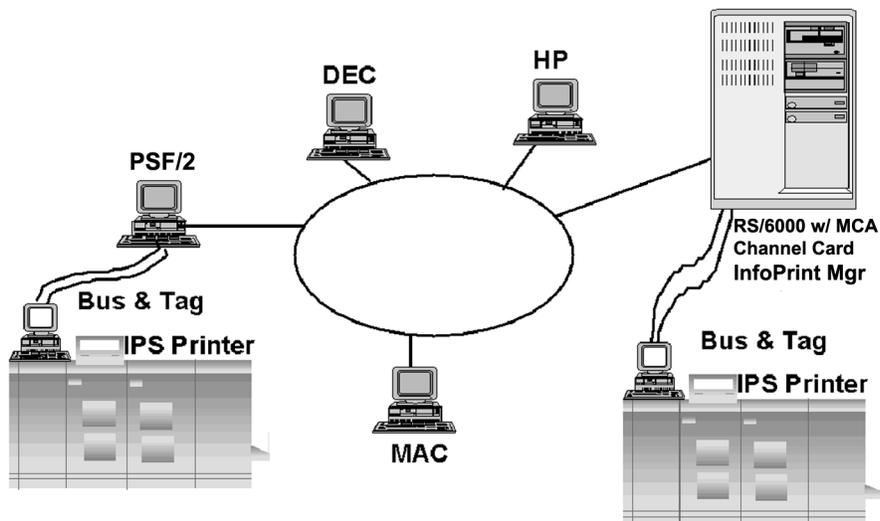
Note: PSF for AIX has been incorporated into the InfoPrint Manager V 3.1 product. As of December 1998, PSF/6000 and PSF for AIX were no longer marketed by IBM as a separate product. Complete support of PSF for AIX will be withdrawn by January 31, 2001. □

InfoPrint Manager stand-alone connection

The simplest way to connect your DocuPrint IPS printers to an RS/6000 is through a stand-alone system. If you choose this connection, you may need to offload your resources and data streams from the host and upload them onto the RS/6000 system. Once loaded onto the RS/6000, you can print AFP documents to the DocuPrint IPS printer through InfoPrint Manager.

InfoPrint Manager remote connection

Using the remote InfoPrint Manager solution, the printer is attached to an RS/6000 system containing an MCA Channel Card and running InfoPrint Manager. The RS/6000 is connected to a communications controller through telecommunication lines.

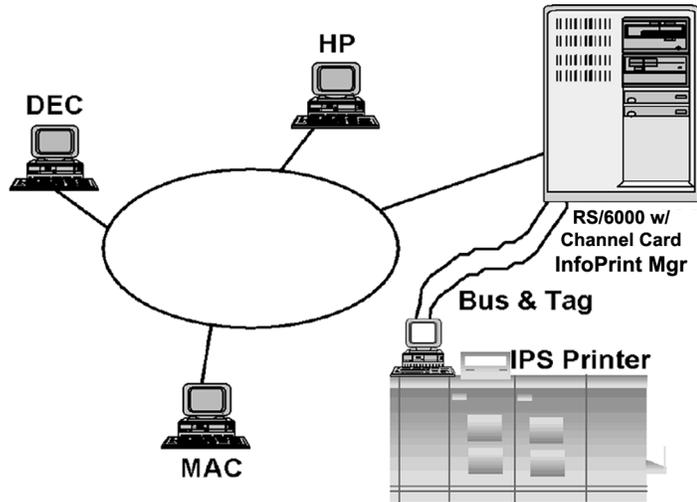


For DocuPrint IPS printers, the remote InfoPrint Manager connection has these characteristics:

- remote operator can communicate to the host only
- can attach only one printer per channel card
- with PSF for AIX in direct mode:
 - no spooling of jobs
 - no resource storage
 - supports AFP data streams only; does not transform other data streams such as PCL and PostScript
- with PSF for AIX in non-direct mode:
 - the first page is spooled
 - you can manage your resources via:
 - manually loading resources to the RS/6000
 - using Network Filing System (NFS) Mount, which allows access to host resources
 - including resources in the data stream (for example, using ACIF).

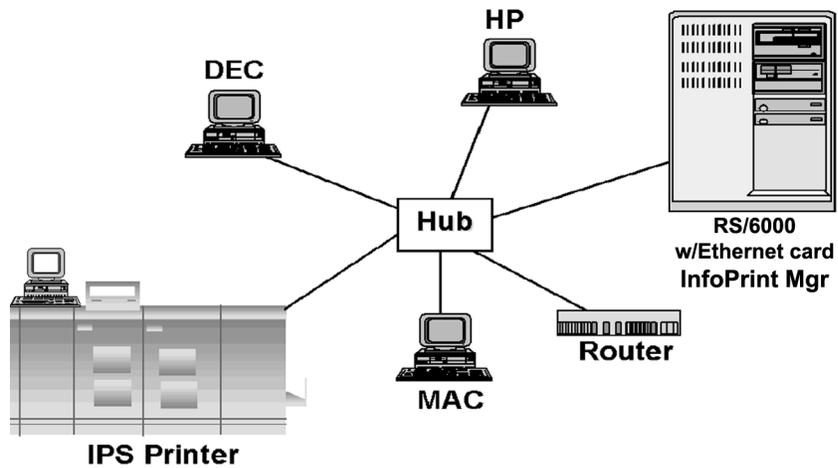
InfoPrint Manager LAN connection

You must use the TCP/IP network protocol to connect your DocuPrint IPS printers by a LAN through InfoPrint Manager. No other network protocol is supported.



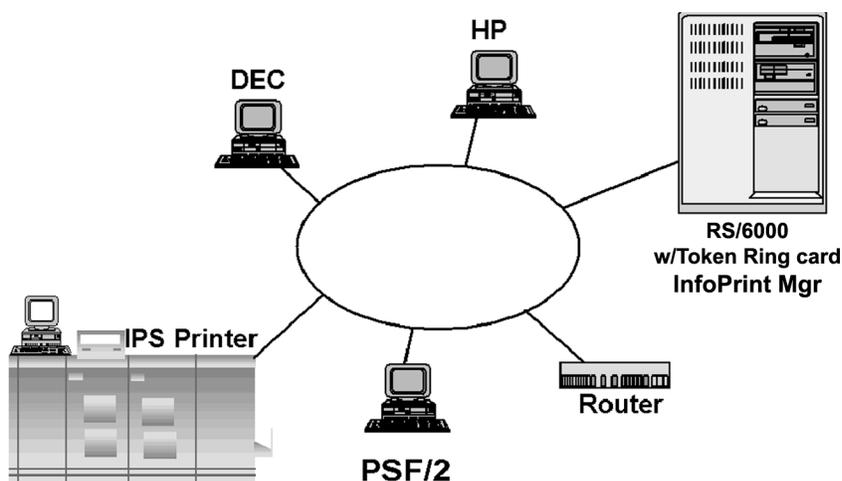
TCP/IP connection: Ethernet

For the Ethernet TCP/IP connection, you must have an Ethernet card installed inside the RS/6000. A router directs the jobs being run on the Ethernet to the appropriate device.



TCP/IP connection: Token Ring

For the Token Ring TCP/IP connection, you must have a Token Ring card installed inside the RS/400. A router directs the jobs being run on the Token Ring to the appropriate device.



PS/2 connections

You can connect your PS/2 system to the DocuPrint IPS printers using any of the remote connection methods described in this section.

Stand-alone PSF/2

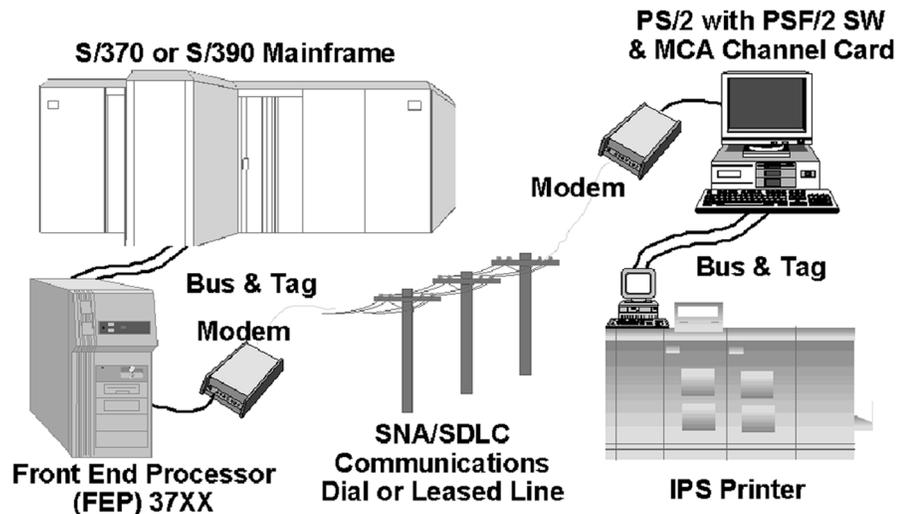
The simplest way to connect your DocuPrint IPS printers to a PS/2 is through a stand-alone system. If you choose this connection, you may need to offload your resources and data streams from the host and upload them onto the PS/2 system. Then, you can print AFP documents to the DocuPrint IPS printer through PSF/2 via a channel card in the PS/2.

PSF/2

You can attach the DocuPrint IPS printer to a PS/2 PC that has an MCA Channel Card installed and is running PSF/2. The PS/2 is connected to a Front End Processor (FEP) through telecommunication lines. PS/2 can connect to the System/370 or System/390 mainframe from the network using the FEP (for SNA/SDLC connection) or a 3172 communications controller (for TCP/IP connection).

DocuPrint IPS printers connected through remote PSF/2 have these characteristics:

- remote operator cannot communicate to the host
- for PSF/2 Direct:
 - no spooling of jobs
 - no resource storage
 - can download AFP data streams only; cannot transform other data streams (such as PCL and PostScript)
- for PSF/2 Distributed Print Function (DPF):
 - spools first page of job only
 - can store font resources residing in the DPF resources library and downloaded by PSF/MVS.

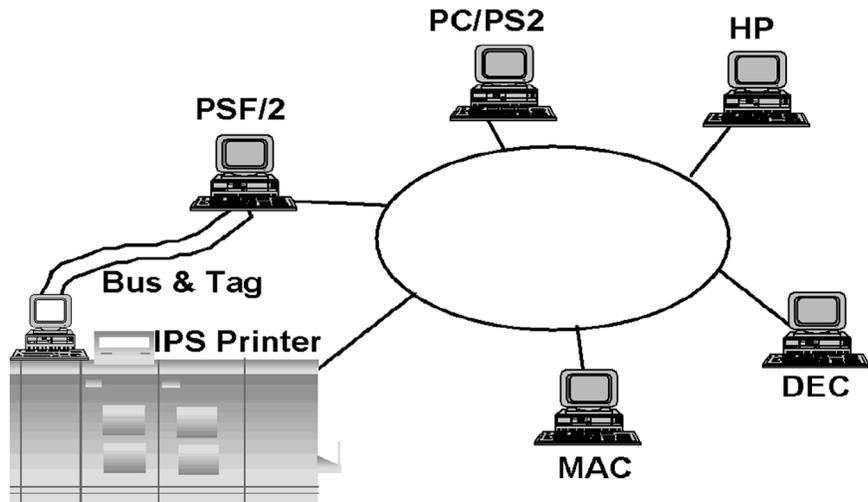


While the PSF/2 solution does not support PageDefs, you can use IBM's AFP Conversion and Indexing Facility (ACIF) on an available system (MVS, VM, VSE, or AIX platforms).

PSF/2 LAN

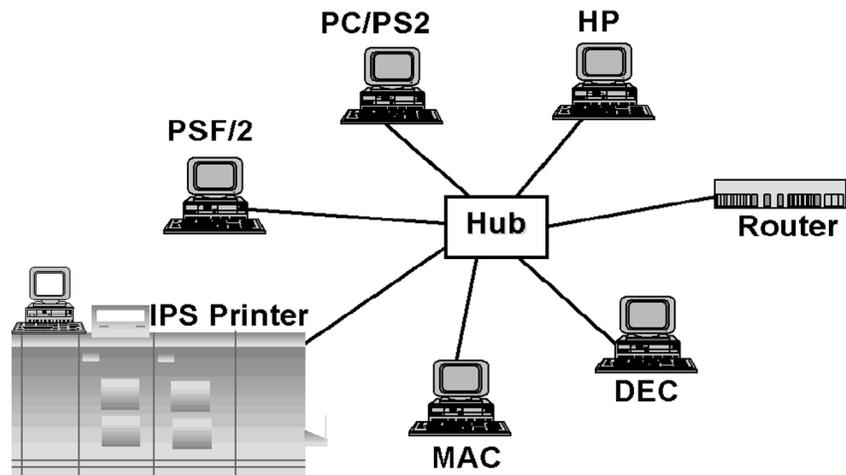
Another option is to connect your DocuPrint IPS printers to a local area network (LAN). When connected through PSF/2, you can use TCP/IP, OS/2 LAN Manager, or Novell as the network protocol.

Using this connection, you can join OS/2, DOS, AIX, and other types of workstations together.



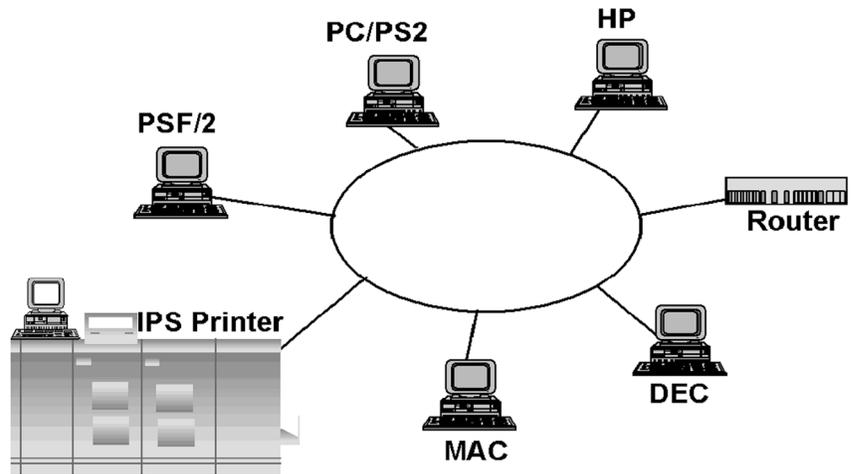
PSF/2 Ethernet TCP/IP

For the Ethernet TCP/IP connection, you must have an Ethernet card installed inside the PS/2. A router directs the jobs being run on the Ethernet to the appropriate device.



PSF/2 Token Ring TCP/IP

For the Token Ring TCP/IP connection, you must have a Token Ring card installed inside the PS/2. A router directs the jobs being run on the Token Ring to the appropriate device.



3. DocuPrint IPS system

This chapter provides an overview of the DocuPrint IPS series. It describes the features, functions, and limitations of this product.

DocuPrint IPS summary

The DocuPrint IPS printers are true IPDS printers, emulating an IBM Group 3 IPDS page printer. The DocuPrint 96 MICR, 4635 MICR, and 180 MICR IPS are similar to an IBM 3828 MICR printer. The DocuPrint IPS printers are IPDS compliant.

DocuPrint IPS printers allow you to access Xerox feature enhancements as permitted by the available IPDS commands.

Hardware

A DocuPrint IPS printer consists of these components:

- A Host Control Unit (HCU), which functions as a channel interface between the host and the IPS front-end (Sun SPARCstation). Output from the HCU is transferred through a SCSI interface to the workstation.



Note: If you plan to use the TCP/IP Token Ring or Ethernet connections, the HCU is not necessary. □

- A Sun UltraSPARC workstation running IPS 7.1 or above and Solaris software. You may use one of these UltraSPARC models:
 - Ultra1
 - Ultra2 (Ethernet 10-BaseT and 100-BaseT)
 - Ultra60 (Ethernet 10-BaseT and 100-BaseT)



Note: Note that the Ethernet connectivity hardware is delivered as an integral part of the SPARCstation. If you wish to use the Token Ring connectivity, you must order the Token Ring board separately. □

- An input/output terminal (IOT). The IOT is the actual printer hardware system.

Software

The IPS software resides on the Sun SPARCstation processor. It consists of these software components:

- input, imager and output processes
- IOT device driver
- print engine monitor process
- test pattern process
- user interface.

No additional software is required on the host to implement the IPS series printers.

Processing overview

For software releases at IPS 5.0 or later, the IBM data stream is passed directly to the Sun SPARCstation and interpreted by the software installed on the SPARC. The software converts the drawing orders to bit-map images.

For all releases, the bitmap images are delivered to the IOT by the IPS software, which also manages jam recovery and local user interface functions.

IPS printing environment

The AFP and IPDS environment uses resources and variable data to print a document. This information, along with device (printer) control information, is handled by Print Service Facility (PSF), IBM's device driver for the system.

The intelligence of the page formatting commands and structuring is performed on the host by an application and, ultimately, by PSF.

Additional printing environments do exist, for example PReS from PrintSoft. Other environments are supported provided they are fully compliant with IBM's specifications.

DocuPrint IPS printers

The DocuPrint IPS printers include these models:

- DP180
- DP180 MICR
- DP96
- DP96 MICR
- 4050
- 4090
- 4635
- 4635 MICR
- 4850 (Highlight Color)
- 4890 (Highlight Color)
- 92C (Highlight Color).

Enterprise Printing Option

If your applications require you to print both IPDS and PostScript/PCL data streams but you do not have enough volume to support two production printers, the DocuPrint IPS printers provide part of the perfect solution. Using the Enterprise Printing Option (also known as Dual Mode Option), you can print either PostScript and PCL data streams from a network or IPDS data streams via a channel connection to a single printer.

Other customers who may wish to use the Enterprise Printing Option are:

- Customers who are interested in native PostScript and PCL printing as opposed to using data stream conversion software packages.
- Customers who have an established AFP/IPDS environment and are planning to migrate to a client server. These customers may need production printing capabilities both during and after the transition.
- Companies that are interested in printing network-based applications in the off-peak printing time available on the mainframe-attached AFP production printer.
- Customers who must support both AFP mainframe environments and newly developed network-based applications that require high-volume transaction printing.

For more information on the Enterprise Printing Option, refer to Chapter 5 "Incorporating Xerox value-added features".

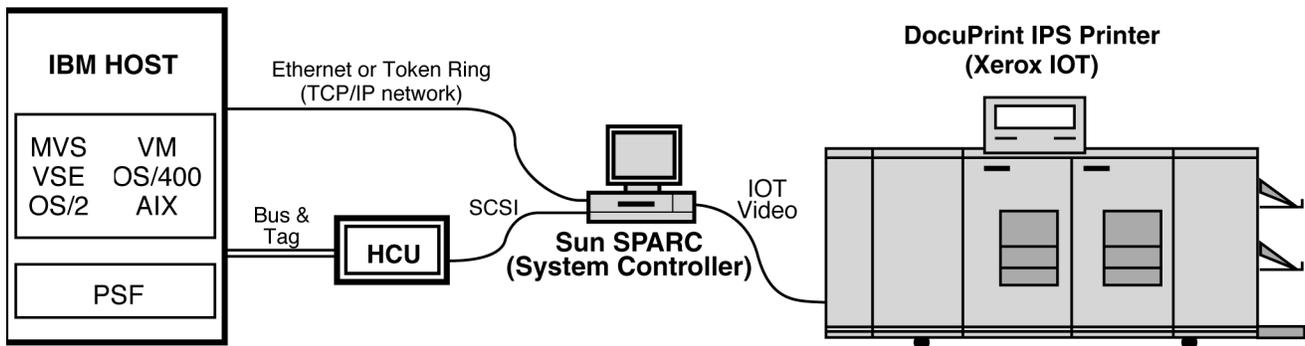
DocuPrint IPS architecture

DocuPrint IPS printers function in all IBM environments running the current level of PSF software. Figure 3-1 shows the overall IPS series architecture. Each element is defined below:

- The IBM host is connected to the Sun SPARCstation using either of these connections:
 - Token Ring or Ethernet, which connect the host directly to the SPARCstation through a TCP/IP connection.
 - Bus & Tag, which connects to the HCU. The output of the HCU is transferred to the Sun SPARCstation through a SCSI cable.

Daisy-chaining to other devices is also supported except on the RS/6000.
- The Xerox software, which resides on the SPARCstation, creates the rendered bit stream for transmission to the Xerox IOT.

Figure 3-1. DocuPrint IPS printer components

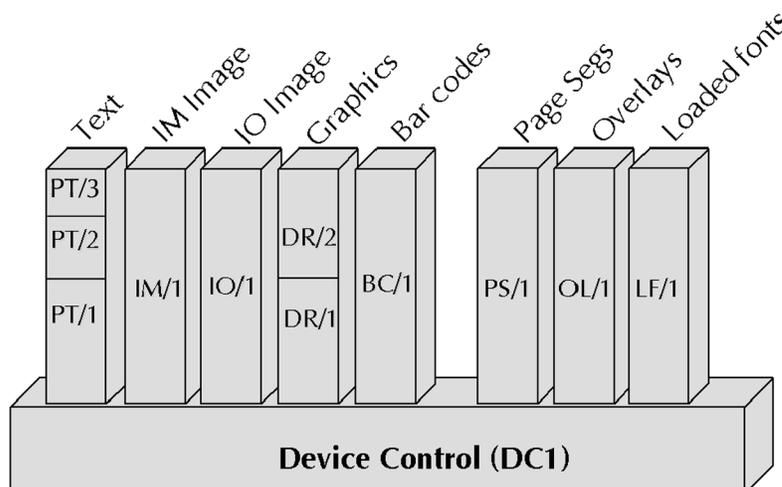


IPDS command sets and data towers

A command set is a collection of architecture constructs and associated values. Command sets can be defined across or within subsets. The DocuPrint IPS printers are compliant with the IPDS command sets and data towers.

These command sets have corresponding towers. Figure 3-2 shows the data and resource towers and their associated command sets.

Figure 3-2. **Towers and command sets**



During initialization, the IPDS command sets are communicated to PSF by the Acknowledge Reply to the 'Obtain Printer Characteristics' command. The IPS responds to PSF with the data tower and resource tower command sets. These command sets are part of the Device Control function set (DC1), which is composed of commands and an acknowledge protocol. The commands set up the logical page environment and communicate device controls. The acknowledge protocol transmits printer characteristics, status, resource information, and error information to PSF.

Data towers

The following sections define the command sets for the data towers.

Text function set – PTOCA (PT1, PT2, and PT3)

The text command set is composed of the IPDS command for presenting text information in a page, a page segment, or an overlay. The lowest level of this support is known as PT1. The next level, PT2, allows the use of Overstrike, Underscore, and Temporary Baseline Move (for superscript and subscript). Then comes PT3 which includes an additional extended text color selection method.

IM Image function set (IM/1)

The IM-image command set contains the commands for presenting image raster data on a logical page, a page segment, or an overlay.

IO Image function set – IOCA (IO/1)

The IO-image command set also contains the commands for presenting image raster data on a logical page, a page segment, or an overlay.

The Write Image 2 command within the IO/1 command set carries data defined by the IOCA FS10 subset. Refer to Image Object Content Architecture Reference for a description of IOCA FS10.

Graphic function set – GOCA (GR/1)

The graphics command set contains the IPDS commands and data controls for presenting graphics pictures on a page, page segment, or an overlay.

The Write Graphics command within the GR/1 command set carries data defined by the GOCA DR/2VO subset. Refer to Graphics Object Content Architecture Reference for information about GOCA DR/2VO.

Bar Code function set – BCOCA (BC/1)

The bar code command set contains the command and controls for presenting bar code information on a page, page segment, or an overlay. The IPDS printer uses these commands to print bar code symbols from user-created data.

The Write Bar Code command within BC/1 command set carries data defined by the BCOCA BCD/1 subset. Refer to Bar Code Object Content Architecture Reference for a description of BCOCA bar code symbol data and the BCD/1 subset.

Resource towers

The following sections define the command sets for the resource towers.

Page Segment function set (PS/1)

The page segment command set allows frequently accessed user data to be stored by name within the printer. Page segments are merged with the pages during printing.

Overlay function set (OL/1)

The overlay command set allows frequently accessed user data to be stored within the printer. An overlay is defined within a logical page presentation space. Overlay logical pages are either merged with a page's logical page on the medium presentation space (page overlay), or merged directly onto the medium presentation space (medium overlay).

Loaded Font function set (LF/1)

The loaded font command set is used for graphic character placement in logical pages and describes the commands used to download and manage font information at the printer.

An LF/1-type coded font consists of a fully described font plus font indexes, or several fully-described font sections plus font indexes for each section.

Product capabilities

This section describes the capabilities of the DocuPrint IPS printers.

User interface

Each DocuPrint IPS printer provides a graphical user interface (GUI) which you use to place the IOT online, configure the printer and peripherals, and start or stop print jobs. In addition, the IPS System Message CONSOLE window warns you of any problems with the system (Sun SPARCstation).

The IPS GUI allows you to access various DocuPrint IPS printer features, such as:

- select finishing options
- output tray configuration options
- set front and back margins
- select the originating paper tray or group of trays
- print sample print engine test patterns
- define the system configuration
 - channel address and mode
 - color extraction (DocuPrint 4850/4890/92C IPS only)
 - enable or disable the modem in the HCU (optional)
 - MICR mode printing (DocuPrint 96 MICR, 4635 MICR, and 180 MICR IPS only)
 - printer resolution (240, 300 or 600 dpi)
 - optional processing parameters.

For complete information on the IPS GUI and its functions, refer to the user documentation distributed with your DocuPrint IPS printer.

Printer emulation

The IPS system emulates an IBM Group 3 page printer (for example, the 3825 or 3827 printer) with the Advanced Function Image and Graphics (AFIG) option, a separate feature from IBM that directly processes IOCA FS10 images and GOCA DR/2V0 vector graphics. Xerox distributes the DocuPrint IPS printers with support for the IOCA and GOCA data towers as a standard feature; you need not purchase these options separately.

During initialization, the DocuPrint IPS printers communicate information to PSF in response to IPDS commands. The Xerox-specific printer features are enabled by sending the appropriate information from the printer to PSF in response to the 'Sense Type and Model' and 'Obtain Printer Characteristics' IPDS commands. The following sections provide further explanation of these commands.

Sense Type and Model (STM) command

When an STM command is issued by the host, the DocuPrint IPS printer responds that it is a Group 3 page printer. It also sends information to PSF about the printer, for example what printer model it is (4050 for the DocuPrint 4050 IPS, 4090 for the DocuPrint 4090 IPS, etc.). The command streams that follow after this information may also inform PSF of any required device controls or other information.

Obtain Printer Characteristics (OPC) command

The 'Obtain Printer Characteristics' command allows PSF to query the printer about the additional features and functions which it supports. For example, a printer may pass information back to PSF stating that it supports a specific level of GOCA, certain device controls, can print color, has a specific resolution, or other information. Both the IBM Group 3 and DocuPrint IPS printers return this same type of information to PSF. However, the information provided by the DocuPrint IPS printers describes more features based on the additional features offered by these printers.

Remote printing solutions

You can connect DocuPrint IPS printers to an IBM host in many ways. The simplest solution is Direct Bus & Tag or TCP/IP (Token Ring or Ethernet). Other possible connections, such as SNA/SDLC and LAN (other than TCP/IP Token Ring or Ethernet), require a Bridge to Bus & Tag. Some of the possible solutions are:

- BARR/AFP
- BARR/RJE
- PSF/2
- InfoPrint Manager/PSF for AIX

Note: InfoPrint Manager functions equivalent to PSF for AIX as it is its replacement product. Although PSF for AIX is no longer marketed by IBM, many customers may still use it.

This table shows the various remote connections and their capabilities:

Table 3-1. **Remote solution summary**

Solution	Spooling	Operator control	Resource storage	Transforms	Printer types
Channel Extender	No	Local to Host only	No (network bandwidth)	No	All
BARR	No	Local and Host	No (network bandwidth)	No	All
PSF/2 Direct	No	Local to Host only	No	Yes	IPDS, PCL, and PPDS
PSF/2 DPF ¹	Yes (first page out)	Local only	Yes	Yes	IPDS, PCL, and PPDS
InfoPrint Manager/PSF for AIX Direct	No	Local to Host only	No	Yes	IPDS, PCL, and PPDS
InfoPrint Manager/PSF for AIX using MVS download facility ²	Yes (first page out)	Local to Host only	Yes	Yes	IPDS, PCL, and PPDS

1. Distributed Print Function is available at PSF/2 Release 1.1 and higher.
2. You must have MVS TCP/IP Version 3 Release 1 running on your system to use this facility.

Connectivity solutions

This section/table provides the valid connectivity solutions for the stand-alone and dual mode configurations of the DocuPrint IPS printer series.



Note: Please note these connectivity limitations:

- In IPS mode, only one connection is active at any given time.
- In Dual Mode configuration, while in IPS mode, PostScript and PCL jobs may be spooled in the background.
- In Dual Mode configuration, switching between modes requires a soft reboot.
- Fiber Distributed Data Interface (FDDI) connections are not supported on DocuPrint IPS systems. □

Table 3-2. **Connectivity solutions**

System configuration	System connectivity combinations				
IPS	Bus & Tag				
		Token Ring			
			Ethernet 10Mb		
				Ethernet 100Mb	
	Bus & Tag	Token Ring			
	Bus & Tag		Ethernet 10Mb		
	Bus & Tag			Ethernet 100Mb	
		Token Ring	Ethernet 10Mb		
		Token Ring		Ethernet 100Mb	
	Bus & Tag	Token Ring	Ethernet 10Mb		
	Bus & Tag	Token Ring		Ethernet 100Mb	

Table 3-2. **Connectivity solutions** (continued)

System configuration	System connectivity combinations				
Dual Mode IPS/NPS	Bus & Tag (IPS)	Token Ring (NPS)			
	Bus & Tag (IPS)		Ethernet 10Mb (NPS)		
	Bus & Tag (IPS)			Ethernet 100Mb (NPS)	
	Bus & Tag (IPS)				FDDI (NPS)
		Token Ring (IPS/NPS)			
			Ethernet 10Mb (IPS/NPS)		
				Ethernet 100Mb (IPS/NPS)	
	Bus & Tag (IPS)	Token Ring (IPS/NPS)			
	Bus & Tag (IPS)		Ethernet 10Mb (IPS/NPS)		
	Bus & Tag (IPS)			Ethernet 100Mb (IPS/NPS)	
		Token Ring (NPS)	Ethernet 10Mb (IPS)		
		Token Ring (NPS)		Ethernet 100Mb (IPS)	
		Token Ring (IPS)	Ethernet 10Mb (NPS)		
		Token Ring (IPS)		Ethernet 100Mb (NPS)	
	Bus & Tag (IPS)	Token Ring (NPS)	Ethernet 10Mb (IPS)		
	Bus & Tag (IPS)	Token Ring (NPS)		Ethernet 100Mb (IPS)	
	Bus & Tag (IPS)	Token Ring (IPS)	Ethernet 10Mb (NPS)		
	Bus & Tag (IPS)	Token Ring (IPS)		Ethernet 100Mb (NPS)	

4. IPS application migration

Now that you know more about AFP and how the DocuPrint IPS printers work, you can start printing your AFP applications to DocuPrint IPS printers. This chapter explains the steps required to modify an existing AFP application for printing to a Xerox DocuPrint IPS printer.

Where do application resources reside?

Resources reside in one or more libraries on the host system. For example, on a mainframe, you may store the page segments in a page segment library, the overlays in an overlay library, and so on. On an AS/400 or RS/6000, however, you may have one library that contains all resource files.

If you are running on a mainframe platform, Xerox recommends that you store your font resources in two separate libraries: one for 240 pel resolution fonts and one for 300 pel resolution fonts. This storage method should prevent overwriting fonts that have the same names but different resolutions.

If you are running on a platform that allows different file naming extensions, such as the RS/6000, you may store both 240 pel and 300 pel fonts in the same library. However, you should make sure that the different resolutions have different file extensions. For example, you might name font GT10 at 240 pel resolution IBMGT10.240; at 300 pel resolution, you might name this font IBMGT10.300.

To obtain optimal printer output quality, Xerox recommends that you use 300 dpi or pel resources. Note, however, that this recommendation does not apply to the DocuPrint 180 IPS because it uses the 600 by 2400 dpi enhanced resolution.

IBM recommends that customers use outline fonts. Outline fonts are independent of printer resolution.

Resource creation packages and programs

You can use any of several resource creation packages and programs to create new AFP resources or convert your existing AFP resources for use by DocuPrint IPS printers. This section lists some of the packages and programs offered by IBM, Elixir, ISIS, and PReS. For a brief listing of more products, refer to Appendix B, "Resource creation and conversion programs".

IBM

As part of the AFP architecture, IBM provides several products which you can use to create resources. Some of these products are explained in this section.

Font Library Services Facility (FLSF)

This product allows you to define, rename, or delete fonts, code pages, and character sets. You can also add or remove characters from a font or copy characters between fonts.



Note: This product is no longer supported by IBM. 

IBM AFP Font Collection

The IBM font collection offers over 1000 fonts in various formats that can be used on all AFP printers. Type Transformer can be used to convert any Adobe Type 1 font into raster or outline AFP font. FontLab can be used to design or modify fonts.

Overlay Generation Language (OGL)

This product allows you to create the overlays (electronic forms) used in your applications. It defines the constant text, lines, boxes, and shading elements that make up the electronic form. You can also include page segments in the overlay.

Graphical Data Display Manager (GDDM)

This product is a collection of programs used to edit graphics and images, create composite documents, and convert files to different formats.

Page Printer Formatting Aid (PPFA)

PPFA is a batch utility that generates the page definitions and form definitions used in your AFP applications. You can use this program to specify how the printer controls will process the physical sheet of paper and how the data should appear on the logical page. You can also specify colorization commands for text or overlays within the PageDef.

IBM AFP Windows Printer Driver

The IBM Windows Printer Driver allows you to convert a form created in any Windows application into a compiled OGL. This product also allows you to create page segments. The IBM AFP Windows Printer Driver also supports the basic AFP colors.

Elixir

Elixir provides a suite of products to convert your existing AFP resources for use on DocuPrint IPS printers. Each of these products is explained in the following sections. You can purchase most of these applications through Xerox.

Elixir Desktop and Converters for AFP

The Elixir Desktop and Converters for AFP provide an integrated set of tools for conversion and file management activities:

- The Elixir Converters for AFP program makes it easy for you to load your existing AFP resources into Elixir's WYSIWYG (What You See Is What You Get) editing tools. Elixir then converts the resources to the appropriate Elixir generic interchange file formats while still preserving the unique AFP attributes. From there, you can convert the resource to any number of formats, depending on your needs. You can also add color to the resources.
- The Elixir Desktop for AFP is an integrated, icon-based, operating environment for customers who use Elixir's AFP software. It features point and click operation of any Elixir application, linking DOS applications to icons to simplify the loading process. You can also access the Elixir AFP conversion software and utilities through the Converter icon.

Each of the following applications works in conjunction with this product to create a total document creation solution.

ElixirFont for AFP

ElixirFont for AFP is a WYSIWYG tool used to create and edit fonts. It works in conjunction with the Elixir Desktop and Converters for AFP to give you full control over AFP font components, such as coded fonts, character sets, and code pages. Using this product, you can perform precise pel editing, resize fonts, and control all font metrics of character sets and code pages.

ElixirForm for AFP

ElixirForm for AFP is a WYSIWYG tool used to create and revise monochrome or full color forms for printing on DocuPrint IPS and other printers. It allows you to personalize your existing AFP by adding color to any element of the form. You can also import AFP-format fonts and images to include in the form.

ElixirImage for AFP

ElixirImage for AFP is a WYSIWYG tool that gives you the power to create and maintain images on your personal computer. After you import page segment, IOCA, TIFF, or PCX images into the Elixir Desktop and Converters for AFP and convert them to the Elixir interchange format, you can use ElixirImage for AFP to edit all or part of the image. This product also includes drawing tools specific to the AFP environment to help with your editing.

Elixir AppBuilder for AFP

Once you've created or modified your resources, you can combine them into a document using the Elixir AppBuilder for AFP. This program allows you to create and edit AFP PageDefs and FormDefs on-screen instead of through a character-based editing tool. Using this program, you can set up complex field and record processing jobs by dragging fields and records into position on forms. You can import most existing PPFA-formatted PageDefs and FormDefs for editing. When the document is finished, you can output it to PPFA source or compiled PPFA format.

ISIS

ISIS provides two different product families to create, edit, and print AFP resources and documents:

- The ISIS OverView product family, which runs on a PC and connects to the mainframe via 3270 emulation session or the ISIS APPC module
- The Papyrus Document System which runs on multiple platforms and builds on the AFP architecture.

OverView AFP Designer

A program developed for AFP only, the OverView AFP Designer offers integrated development of an AFP application with multiple forms and PageDef data layout. This program is fully compatible with IBM OGL and PPFA and allows you to display and design using the actual print line-data file visible. The applications can then be printed through AFP on MVS, VSE, VM, AIX, OS/400, OS/2, and Windows platforms.

OverView Font & Image Editor

This program is a PC-based graphical editor for AFP fonts that supports the editing and generation of AFP fonts and page segment objects. It supports bounded box and unbounded box fonts in 240 dpi and enables the editing of characters, code pages, and coded fonts. It also includes double-byte character sets and 300 dpi support. The Image Editor includes a TIFF conversion utility.

OverView AFPDS Compiler

This feature is like having your own mainframe on your desktop. It completely emulates the functionality of the IBM OGL/370 and PPFA/370 products while enabling 300 dpi and color support for overlays. This product runs on OS/2, Windows NT, and Windows95 systems.

OverView Digitizer Pad Support

This program is an optional software feature that provides an interface for industry standard CAD drawing pads. It operates in parallel with the mouse, providing accurate position information from the existing form. As you digitize the form, the system creates OGL source code which can be printed without requiring a conversion.

OverView PageEXEC

PageEXEC is a stand-alone or PSF/2-integrated program component that executes the IBM PageDef description and converts a line data file to an AFPDS document file. It provides complete PSF functionality in an OS/2 environment, and also provides functionality of PSF/MVS and PSF/6000 transparently on the OS/2 platform. This product is also compatible with IBM's AFP Conversion and Indexing Facility (ACIF), allowing you to generate the TLE index of a document.

Papyrus Designer

This product allows you to develop document applications using visual and graphical techniques. Papyrus Designer runs on your PC, allowing you to create forms, bar code applications, images, overlays, and page layouts. It incorporates the functionality of OverView AFP Designer for forms and PageDef design and the development component for multi-page statements.

Papyrus DocEXEC

DocEXEC formats the high quality, data-driven, multi-page documents you created using Papyrus Designer. The source code created is upwardly compatible to PageDefs. It allows for field placement, variable data merge, color support, dynamic chart generation, as well as other useful features. This product runs on MVS/ESA, AIX, OS/2, and Windows 3/95/NT systems. You may print documents to AFP, Xerox Metacode, and PCL 4/5 printers.

Papyrus Host/Server/Client

You can also use the Papyrus Host/Server/Client components to manage, view, and print distributed document applications. You can also use these products to convert Windows documents to AFP.

PReS

PReS (Printer Resource Software) is a software product designed to make the formatting and printing of variable data a simple task. PReS is a family of products which supports a range of electronic printers from desktop PCL and Web Press/InkJet printers through to high-speed channel-attached devices from various manufacturers.

PReS runs on widely used personal computer platforms, including Microsoft Windows (Versions 3.1.x, NT, Windows 95, and Windows 2000.) Unlike the other packages in this section, PReS does not normally create resources such as page segments, overlays, etc. for use with PSF, but generates and then uses these resources via its own Print Control software. However, PReS can also be used to generate AFP data for subsequent printing by PSF.

PReS consists of the following utilities:

TRF Editor

This utility is used to edit and maintain standard letter text. For example, it provides “boiler plate” texts to be selected and merged with the variable data at the time of printing.

Script Editor

The Script Editor defines a series of steps and procedures in a user-friendly language, using a range of instructions specifically designed for speedy print data editing, manipulation, formatting, and control options. The script is compiled for the appropriate printer and this enables scripts to be tested on desktop PCL printers before going into production on IPDS printers.

Print Control

PReS Print Control provides job and printer control during the production printing process. It includes many features designed to give the operator the simplest techniques for directing the mode and activity of the printer. Prompts may be fed to PReS Print Control from the Script, for example, to indicate which stock to load. Stops, starts, restarts, and file positioning are easily controlled.

Other utilities to complement PReS:

TransFont

This utility allows printer fonts to be created for the target printer from TrueType, PostScript, and Raster outlines. It also allows for these fonts to be edited and manipulated. Fonts may also be migrated from one printing environment to another with character re-mapping, re-scaling, and different resolution options.

TransForm

This utility accepts input in the form of PCX, TIFF, and other printer graphic formats such as Xerox IMG and IPG files. It also accepts data from word-processing and DTP programs for conversion to graphic files for the target printer. The images can be rotated, resolution changed, and re-scaled.

Fonts

This section describes the actions you may need to perform to make your fonts available for use with the DocuPrint IPS printers. Review each section to determine if it applies to your site.

Printer-resident fonts versus downloading fonts

PSF can access fonts two ways:

- referencing them from the host system
- referencing them from the printer.

Any user with the proper security access rights can access fonts that reside on the host. In contrast, all users can access fonts stored on the printer, regardless of security rights. The DocuPrint IPS printers support single-byte outline and double-byte outline fonts, but do not support resident raster fonts.

IBM AFP font collection

IBM delivers a standard set of 240 and 300 pel fonts with their printers. If your current printer only supports 240 pel, you may not have installed the 300 pel fonts. You may choose to purchase the IBM Font Collection which contains over 1,000 fonts in various formats and resolutions.

Xerox recommends that you upgrade to the 300 pel font libraries since these fonts provide better print quality on most DocuPrint IPS printers. If you have a DocuPrint 180 IPS, however, you may continue to use the 240 dpi fonts since both the 240 and 300 dpi fonts print with a high print quality due to the enhanced resolution marking engine.

The following sections provide information on the various types of fonts provided by IBM.

Sonoran fonts

Sonoran fonts are proportional fonts, available in Serif, Sans Serif, and Petite formats. They are available in both 240 and 300 pel resolutions.

Sonoran fonts are the only AFP typographic font available for the original version of PSF. If you are a long-time AFP customer, you will most likely have purchased these fonts. If you plan to continue using Sonoran fonts for printing to DocuPrint IPS printers, make sure that you use the 300 pel version for the best resolution quality.

The use of Core interchange fonts is recommended over using Sonoran fonts.

Compatibility fonts

The Compatibility fonts provide compatibility with IBM 3800 Model 1 printer technology and impact printer technology. These fonts are available in both unbounded and bounded box format and are generally used for applications printed to 3800 printers.

If you plan to convert your continuous form documents to cut sheet format, make sure that you use the 300 pel version for the best resolution quality.

Core interchange fonts

IBM distributes an additional set of fonts, known as core interchange fonts, which consist of Courier, Helvetica, and Times New Roman. These fonts are based on the Adobe Type Manager (ATM) Type 1 format. If you no longer wish to use Sonoran or Compatibility fonts, you should replace them with the core interchange fonts.

Core interchange fonts are available in both 240 and 300 pel resolution. If you plan to use these fonts for printing to DocuPrint IPS printers, make sure that you use the 300 pel version for the best resolution quality. If you plan to use a DocuPrint 180 IPS, this recommendation does not apply.

Data 1 fonts

The Data 1 fonts are fixed pitch fonts at 12.3 cpi used with early AFP applications. These were the recommended fonts for use when converting line printer stock tab applications to 8.5 by 11 inch paper. Data 1 fonts are distributed in 240 pel resolution.

IBM now distributes PSF with the Gothic font, GT13. This font replaces the existing Data 1 fonts. You may change your application to reference this font, or to reference the 300 pel version of the D224 Data 1 font.

It is recommended the customer use Core interchange fonts over Sonoran fonts in order to achieve compatibility with other print environments where Adobe fonts are used (i.e. Windows, Macintosh environments).

Outline fonts

Outline fonts contain the instructions on how to draw the font rather than the raster image. Because of this, outline fonts are printer resolution independent. They can be purchased in the IBM AFP Font collection.

The DocuPrint IPS printers support both single- and double-byte outline fonts.

240 versus 300 pel libraries

Because both types of font resolution files may use the same file names, Xerox recommends that you store your 240 pel and 300 pel fonts in two separate libraries. We also recommend that you place the following fonts in a separate library:

- any fonts that you have created or modified
- fonts you purchased from a third party
- special fonts, such as the Xerox E13B MICR fonts, that you received from Xerox.

Placing these fonts in a separate library will prevent any of your existing fonts from being overwritten if they have the same name as these fonts.

Custom fonts

If you require special character sets or need to add new characters to an existing character set, you may choose to create custom fonts for your site. When using these fonts to print applications on DocuPrint IPS printers, you may need to:

- identify your custom fonts by comparing a listing of fonts on your system to the listing of fonts distributed by PSF. You may also wish to compare the resource libraries that contain the 240 pel and 300 pel character sets to determine if any custom fonts reside in these libraries.
- create and implement a 300 pel version of the font.



Note: Note that, if you are converting from an IBM 3800 printer, you may need to convert your unbounded box custom fonts to bounded box fonts. 

Font conversion

You may need to convert some or all of your fonts for use with the DocuPrint IPS printers. Follow these steps to convert your existing fonts:

- Step 1.** Identify the fonts that require conversion.
- Step 2.** Use a font conversion tool or a resource conversion service to create the 300 pel fonts. Examples are:
- APSRCF30, a PSF utility for 240 to 300 pel conversion
 - font editors, such as Elixir or ISIS programs
 - font services, such as Statice Fonts or COPI
 - Xerox Font Center
 - FontLab font designer.
- Step 3.** Implement the new character set(s) into the 300 pel libraries and test them.

As the coexistence of 240 pel and 300 pel printers grows, this will become less and less of an issue.



Note: Note that this procedure does not apply to the DocuPrint 180 IPS because of its enhanced resolution marking engine. 

Page segments

The print quality of the page segments you currently use with AFP may depend on how they were created originally. For example, you may have created a page segment at 240 pel resolution but, when it is converted to 300 dpi, it may not look like it did originally. However, a different page segment created at 240 pel resolution may look the same when converted and printed.

To determine if you need to convert your page segments, print a test document to the DocuPrint IPS printer. Look at the document to decide if the print quality is as clear as you'd like it to be. If so, you may continue using the page segment without making any changes. However, if the print quality is not satisfactory, you should recreate it at 300 dpi.

The DocuPrint IPS printers support printing up to 32,511 page segments per print job.

Overlays

You may print your existing overlays to DocuPrint IPS printers without conversion with two exceptions:

- for overlays that include inline images, you must convert those images to 300 dpi before printing; otherwise, the print quality will not be consistent.
- for overlays that include the PATTERN command, the command may reference either an image within an overlay or a special symbol not available in distributed fonts. You may need to recreate the image or special font to have an identical appearance on a 300 dpi printer. You may use a font or image editing tool to recreate the document at 300 dpi.

IBM has distributed a PTF for OGL (UW78384) that allows you to specify a 300 dpi font library when creating an overlay. This change causes OGL to create overlays with a PGD value of 1440 dpi (if you specify a 300 dpi font library). As a result, when you include a 300 dpi page segment in that overlay, the page segment will print in color. Note, however, that the IM images created by OGL shading commands remain at 240 dpi.

The DocuPrint IPS printers support printing up to 32,511 overlays per print job.

Images

When you print AFP documents that contain 240 pel images to DocuPrint IPS printers set to run in 300 dpi mode, PSF converts the IM images to IOCA image format. Using the Resolution option on the DocuPrint IPS user interface, you can specify that the document print at 240 or 300 dpi (or 600 dpi on DocuPrint 92C, 96, 180, 4635 IPS systems).

The print quality of any images you currently use with AFP may depend on how they were created originally. For example, you may have created an image at 240 pel resolution but, when converted to 300 dpi, it may not look like it did originally. However, a different image created at 240 pel resolution may look the same when converted and printed.

The DocuPrint IPS printers use an algorithm to convert 240 pel images to 300 dpi. To determine if this internal conversion will produce the quality of output you require, print a test document to the DocuPrint IPS printer. Look at the document to decide if the print quality is as clear as you'd like it to be. If so, you may continue using the image without making any changes. However, if the print quality is not satisfactory, you should either regenerate or rescan the image at 300 dpi.

Color IM-type images

If you are running PSF/MVS, you can print IM images in color to a DocuPrint IPS printer as described in Table 4-1. If the IM resolution and the printer resolution do not match, conversion by PSF strips the color bit from the data stream.

Table 4-1. **Color IM image cross-reference chart**

PGD units ¹	IM image resolution/units	IPS printer resolution	Prints in color if specified? ²
240	240	240	Yes
240	240	300	No
240	300	300	No
300	300	300	Yes
1440	300	300	Yes
240	240	600 ³	No
300	300	600	Yes
1440	300	600	Yes

1. "PGD units" is the page dimension structured field that indicates the unit of measure for the page.
2. This column applies only to the PSF/MVS platform. Other PSF platforms have not been tested.
3. 600 dpi resolution applies only to the DocuPrint 96/4635/180 IPS, MIICR versions of these printers, and the 92C IPS.



Note: Note that support for printing these images was added to the PSF/MVS environment by IBM's PTF UW26975 (APAR OW18369). □

PSF may convert the image to IOCA at the IPDS level to cause resolution correction/scaling based on these factors:

- If the image resolution and printer resolution are not equal, PSF creates an IOCA image at the IPDS level that uses the scale-to-fit mapping to print the image. This method preserves the intended aspect ratio and dimension.
- If the image resolution is not a factor of the PGD units, PSF creates an IOCA image at the IPDS level that uses the position-and-trim mapping. This method accommodates for any rounding error.

For more information on adding color to page segments and IM images, refer to Chapter 5 “Incorporating Xerox value-added features”.

Pixel doubling

If you print applications that include images consisting of single-pel lines, the DocuPrint 4050 IPS or DocuPrint 4090 IPS printers automatically convert those single-pel lines to double-pel lines. This process, known as pixel doubling, accommodates the imaging technology of these printers and ensures optimum output quality of the document.

Mixed plex jobs

DocuPrint IPS 7.1 supports Mixed Plex jobs. That is, the IPS system controller can receive jobs from a host computer that contain simplex, duplex, or a mixture of both simplex and duplex pages within a job.

Mixed Plex enables the IPS system to switch plex modes (simplex to duplex and vice versa) within a job. In the AFP environment changing plex modes in the middle of a document is allowed and common.

Jobs that contain both simplex and duplex pages shall be printed without an IOT cycle-down. However, when switching from duplex to simplex within a job the printer may dead cycle to clear the paper path of all duplex sheets before feeding the first simplex sheet.

Users can avoid dead cycles when switching from duplex to simplex by performing “simulated simplex.” This is achieved by setting a Maximum Simplex value with the IPS GUI to maximize throughput.

Maximizing throughput

If you print applications that mix simplex and duplex pages (single and double-sided pages), you maximize throughput and minimize your per copy charges by configuring your system using the IPS graphical user interface.

- Using the Configuration menu select the Maximum Simplex option.
- Set the Maximum Simplex value to 0.

The IPS system will start the first job in the plex mode of the first sheet received.

- If the initial mode is duplex, and a subsequent sheet is received in simplex, blank back sheets are printed until the maximum simplex value is reached. If the maximum simplex value has been set to zero, the printer shifts to simplex mode immediately. Shifting to simplex causes the printer to clear the paper path of all duplex sheets prior to printing the first simplex sheet.
- If the initial mode is simplex and a subsequent sheet is received in duplex, the printer will immediately start to print in duplex. (The maximum simplex value has no relevance in this case.)

Input tray attribute considerations

If you have programmed applications to use stock from specific input trays using FORMDEFs, you should pay close attention to the attributes given to the printer input trays. Media (tray) attributes can be set to simplex or duplex. These attributes are set on the Input Configuration panel. Each individual tray is set to contain media defined as simplex or duplex. (See the Guide to Configuring and Managing the System for your printer for specific directions on setting input configurations.)

A tray loaded with media defined as simplex will cause the printer to print all sheets from that tray in simplex. A tray loaded with media defined as duplex will cause the system to print all pages fed from that tray as requested by the job, switching between simplex or duplex seamlessly. (The printer may or may not require dead cycles, or clearing of the paper path.) Therefore, if a tray loaded with special stock must print in simplex, it will print correctly from a tray which has either a simplex or duplex attribute. However, if a tray loaded with special stock prints in duplex, the tray must have the duplex attribute for the application to print correctly. You may find the best procedure to follow is to give all input trays the duplex attribute.

Continuous form to cut sheet conversion

If you try to print the same application on both an IBM 3800 printer (continuous form) and a DocuPrint IPS printer (cut sheet), your output may appear in the wrong orientation or extend off the edge of the page. These problems occur because the page origin on the IBM 3800 printer is different from all other IPDS printers, including the DocuPrint IPS printers:

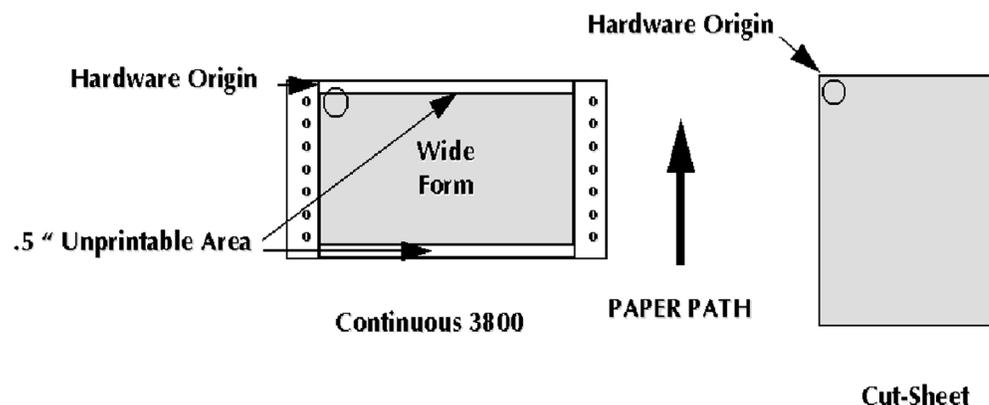
- for DocuPrint IPS printers and all other cut sheet printers (both IBM and Xerox), the origin is at the top left corner of a portrait page
- for IBM 3800 printers, the origin is at the top left corner of the leading edge.

As a result, you may need to modify your existing AFP resources to account for this difference, whether you are changing from a 3800 to another IBM continuous feed printer, such as the 3900 or 3835, or to any IBM or Xerox cut sheet printer.

The required changes are based on the current page rotation and presentation specified in the FormDef or PageDef for documents printed on continuous form printers. For example, if you have documents that use 11 by 17 inch paper, you may need to change the rotation in order to print the application correctly.

Another option is to use the 90° rotation feature on the DocuPrint IPS printers. This allows the print operator to rotate the print 90° and allows it to print correctly, without having to make any application changes.

This figure illustrates the difference between the two page origins:



Converting 3800 applications

Continuous forms are fed into a 3800 printer either of two ways: wide feed (long edge first) or narrow feed (short edge first). While the DocuPrint IPS printers feed the paper long edge first (wide feed), the orientation is based on a narrow feed. Therefore, if you are migrating an application originally created for the IBM 3800 that uses narrow forms, you should not have to make any changes to your AFP resources because the 3800 hardware origin will match the DocuPrint IPS origin.

However, if you are migrating applications originally created for the IBM 3800 that use wide forms, you must modify the AFP resources to use the new hardware origin:

- for DCF output, you can specify a logical device type appropriate for cut sheet printers; for example, you might specify 3820 or PG3A.
- for line-mode applications, you must use a PageDef formatted for cut sheet printers.

For example, when creating a PageDef for an IBM 3800 printer with wide forms, landscape data is formatted using the DIRECTION ACROSS operand in the PAGEDEF or PAGEFORMAT command, while portrait data uses DIRECTION DOWN. However, when creating a PageDef for any other printer, including the DocuPrint IPS printers, landscape data is formatted using DIRECTION DOWN or UP, while portrait data uses DIRECTION ACROSS.

DIRECTION UP is recommended for compatibility between cut sheet and continuous form printers.

In lieu of modifying the applications, you can print the job using the 90° rotation feature on the printer.

Converting other IBM continuous form applications

Other IBM continuous form printers, such as the 3900 or 3835, are more compatible with cut sheet printers than the 3800. The 3900 and 3835 automatically adjust their hardware origin to match the portrait origin of cut sheet printers, regardless of whether wide or narrow forms are loaded. In other words, the hardware origin is always the top left corner of a portrait page, just as it is for cut sheet printers. As a result, no changes are required when migrating applications originally created for these continuous form printers to a cut sheet printer such as the DocuPrint IPS.



Caution: If you use either EZ-Letter or ASAP to create your applications and you are a licensed user, you must perform either of these actions:

- download the most current software release from their web page (www.accessaba.com)
- FTP the most current software release from their FTP site ([ftp.accessaba.com](ftp://ftp.accessaba.com)). 

For EZ-Letter, the most current release is 3.7. For ASAP, the most current release is 1.4.

Using 3800-compatible form definitions

If you wish to print AFP resources that were originally created for a 3800 printer on a printer such as the 3900 or 3835, PSF uses the PRESENT and DIRECTION operands of the FORMDEF command to adjust the hardware origin to match that of the 3800 application. This adjustment allows you to print 3800 applications on the 3900 or 3825 printers without modification.

If you use these 3800-compatible FormDefs in applications you plan to print on DocuPrint IPS printers, you should perform either of these procedures:

- Convert your 3800 application to a cut sheet application as described in “Converting 3800 applications” earlier in this section. This is the preferred solution.
- If you choose not to convert your 3800 application, you can force PSF to process the PRESENT and DIRECTION operands in the FormDef. Because PSF normally does not send these values to a cut sheet printer, such as the DocuPrint IPS printers, you must include N_UP 1 in your FormDefs to force this processing. This command causes PSF to pass the PRESENT and DIRECTION operands to any cut sheet printer.

5. Incorporating Xerox value-added features

The DocuPrint IPS series allows you to take advantage of many Xerox value-added features. These features include highlight color, paper handling and paper tray selection, enhanced resource resolution, and guaranteed MICR printing.

This chapter provides instructions for incorporating the Xerox value-added features into your existing documents.

Adding color

AFP supports almost all of the functionality of a Xerox high-end printer, including highlight color. You may add color to lines of data, fields within lines of data, overlays, and page segments within your document using any variety of programs.

Adding color to your documents can dramatically change its effect on customers. The DocuPrint 4850, 4890, and 92C IPS printers print black plus one of ten solid highlight colors: cyan, magenta, cardinal, violet, brown, ruby, royal, green, blue, and red. They can also print a variety of shades or tints of any of these color.

This section describes the steps required for adding color to your document, either for the text, page segments, or overlays.

Color mapping

Before printing your AFP document, you specify which color to use as the highlight color using the Extraction Color menu option on the IPS user interface. For example, if you wish to print your document using blue as the primary highlight color, you would select Blue on the Extraction Color menu. Then, when the document is printed, highlight color references will print in blue; any other colors referenced in the data stream will print as a shade of blue.

Color mapping is also important when using an ink color that is not defined by IBM (for example, cardinal), or when using an IBM color call for which Xerox does not have an ink (for example, yellow).

Note, however, that the color housing you have installed in the printer will determine which color palette actually is used. The color extraction tables will be based on this color. For example, if you specify blue as your Extraction Color but have installed the red color housing in the printer, all references to blue in the data stream will print as solid red. Other colors will print as shades of red.

Variable and constant data

This section explains how to add color to variable and constant data using either PPFA or ElixirForm for AFP (version 3.11c).

Using PPFA

To add color to any constant or variable text in your application, modify the PageDef for the application as follows:

- To colorize a field of print data in a PageDef, add the COLOR parameter to the FIELD statement. For example:

```
FIELD START 1 LENGTH 32 POSITION 255 175 COLOR
RED
```

- To colorize a line or series of lines of text in a PageDef, add the COLOR parameter to the PRINTLINE statement. For example:

```
PRINTLINE REPEAT 3 CHANNEL 1 POSITION 0 0 COLOR
RED
```

You can also add color to text in a DCF/Script document by adding the .DF (define font) keyword to the document. For example:

```
.DF GT10 TYPE('SONORAN' 10) COLOR RED
```



Note: If you add the COLOR command to the .DF keyword, you must also update your Logical Device Table and Physical Device Table to support color. □

Using Elixir Desktop for AFP

To add color to an existing line of black text, follow this procedure:

- Step 1.** With the left mouse button, select the “up arrow” key in the tool box.
- Step 2.** Move the mouse to the first character you wish to colorize and click the right mouse button.
- Step 3.** Click on the ink box with the left mouse button. The system displays the eight color selections at the bottom of the screen.
- Step 4.** Select the color you wish to use with the left mouse button.

The line of text changes from black to the selected color.

To add color text on a new form, select the “Add Text” icon then select the color you wish to use. When you begin typing, the text will appear in the selected color.

Conditional processing

Conditional processing allows an action to be taken dependent on a field in the input data. You can use conditional processing to determine whether certain elements on a page will print in color.

For example, you can:

- specify that the first page of a statement be printed with a color logo and the remaining pages be printed without the logo
- specify that certain fields be printed in color on some copies and printed in black on other copies of documents
- print customer statements with a color overlay and logo, but print the internal copy in black on plain white paper
- print the due date and amount due in red if the bill is past due.

To specify conditional processing in your AFP document, specify the **CONDITION** command in either the copy group or page format, depending on what element(s) you wish to change.

Example:

You use two different page formats with your documents:

- PF1, which includes your company logo in color
- PF2, which includes your company logo black and white.

When you print statements to send to customers, you may select PF1 to print the logo in color and enhance the look of the document. However, when printing internal documents, you may wish to lower printing costs, and thus select PF2 to print the black and white logo.

For this example, your PageDef may look something like this:

```
PAGEDEF LTRLOGO
.
PAGEFORMAT PF1 WIDTH 11 IN HEIGHT 8.5;
  PRINTLINE REPEAT 25 CHANNEL 2;
.
OVERLAY LOGOC SIZE 2 3 OFFSET .25 1;
CONTROL REPLACE;
FONT FONT1 A0557C;
SEGMENT LOGO ROSLGOC;
.
CONDITION cond1
  START 2 LENGTH 1
  WHEN EQ 'B'
  BEFORE SUBPAGE
  NULL PAGEFORMAT PF2;
.
PAGEFORMAT PF2 WIDTH 11 IN HEIGHT 8.5;
  PRINTLINE REPEAT 25 CHANNEL 3;
.
OVERLAY LOGOB SIZE 2 3 OFFSET .25 1;
CONTROL REPLACE;
FONT FONT1 A0557C;
SEGMENT LOGO ROSLGOB;
.
CONDITION cond2
  START 2 LENGTH 1
  WHEN EQ 'C'
  BEFORE SUBPAGE
  NULL PAGEFORMAT PF1;
```

When condition B exists, the system uses the PAGEFORMAT PF2.
When condition C exists, the system uses the PAGEFORMAT PF1.

For a complete description of conditional processing, refer to IBM's *PPFA/370 User's Guide and Reference* (S544-3700).

Overlays

IBM's Overlay Generation Language (OGL) compiler version 1.1 supports color for fonts, rules, patterns, and other commands. You can also generate color overlays using utility programs or third-party packages. These colorized overlays can then be printed on DocuPrint IPS printers.

The DocuPrint IPS printer can also accept the IOCA color spaces in the extended controls, referred to as the "4E" color triplets. The new color triplets include Highlight Color, Standard OCA Color, RGB, CYMK and CIE-LAB.

Highlight Color allows the processing of a shaded area, which specifies a percentage of a Highlight Color and a percentage of black.

Standard OCA Color allows for the specification of a standard color space.

RGB, CYMK and CIE-LAB (three new color spaces) are now accepted, but are converted to a 50% Highlight Color. Future enhancements will resolve these color spaces by determining the luminance of the given color and substituting a Highlight Color space with the closest luminance.

Utilities

You can add color to certain overlays by running utilities provided by either IBM or Xerox. For example, you may use the IBM supplied PL/1 program provided with DCF (DCFPPVOL).

Third-party packages

Several third-party packages exist that allow you to add color to overlays. Some of these are:

- IBM AFP Driver
- Elixir
- ISIS.

Using Elixir Desktop for AFP

When you use Elixir to convert an image to an overlay, make sure that you have selected either GOCA or IM as the image type and the "embed page segments" option. By embedding the page segments in the overlay, you reduce the number of files that need to be managed, and you can change the color directly within the form. Also, you only need to upload the .OVE and any referenced fonts to the host for printing.

Because the DocuPrint IPS printers support file compression for IM objects, Xerox recommends that you use IM objects instead of GOCA objects when creating embedded page segments. If you choose IM objects as the embedded page segment, the output of the .OVE file is significantly smaller.

As an alternative, you may choose to reference an external page segment instead of embedding the page segments. You may then use the GOCAPSEG DOS utility (from Elixir) to change the image into a color page segment in GOCA format.

Page segments and images

Page segments and images only print in color if there is no conversion by PSF from 240 pels to 300 dpi. If a conversion is required, PSF converts the page segment or IM image to an IOCA image. This conversion strips the color bit from the data stream.

Note these factors when printing IM images in color:

- The PGD (unit of measure) structured field may be added to the page or the overlay that contains the page segment or inline image. The PGD within the resource that includes the image is the relevant structured field. In the case of an overlay, if the PGD is set correctly for the overlay, the IM image will print in color even though the page containing the overlay does not match.
- Changing the PGD unit of measure value manually will affect text placement and image handling. Therefore, you should use caution if you wish to change this value.

One way to avoid this problem is to isolate the image into a separate overlay that does not contain text. You can then change the PGD unit of measure for this overlay without affecting any other text or images on the page.

- Changing the IID value manually will affect the size of the printed image. If you change the value from 240 to 300, the image will print 4/5ths its original size.

For these reasons, the last combination in table 4-1 (shown on page 4-10) is the best. Applications that generate AFP at 300 dpi tend to use 1440 as the PGD unit of measure.

For example, when Using Elixir Desktop for AFP, an overlay generated at 300 dpi generates 1440 PGD. As a result, you do not need to make any manual hex edits to the structured fields.

Also, after you apply PTF UN78384, OGL will generate a PGD unit of measure at 1440 dpi when used with a 300 dpi font library. This change causes any 300 dpi page segments included in an overlay to print in color.

If you wish to change your applications at the hex level manually, the relevant structured fields are:

- **PGD1 x'D3A6AF'**
page units per unit base (XpgUnits and YpgUnits)
- **IID x'D3A67B'**
image points per unit base (XUnits and YUnits)

and the relevant values are:

- for 240 dpi: x'0960'
- for 300 dpi: x'0BB8'
- for 1440 dpi: x'3840'.

Using Elixir Desktop for AFP

If you have converted a black and white page segment to Elixir format, you can copy that image into a form. To change the color, select the image, then select a color with the left mouse button.

Lines and borders

OGL v1.1 supports color using the DRAWRULE, DRAWMASK and DRAWBOX commands.

Example:

```
DRAWRULE...COLOR BLUE
```

You can use either OGL, DCF/Script or ElixirForm for AFP to colorize lines and borders in your document. This section explains the procedures for both products.

Using DCF/Script

To colorize lines or borders in a DCF/Script document, add the .DR (define rule) keyword to the document. For example, to create a red line that is .6 millimeters (mm) long, add this command:

```
.DR HEAD1 WEIGHT .6MM COLOR RED
```



Note: If you add the COLOR command to the .DR keyword, you must also update your Logical Device Table and Physical Device Table to support color. □

Using Elixir Desktop for AFP

To colorize existing black lines and borders, follow this procedure:

- Step 1.** With the left mouse button, select the “up arrow” key in the tool box.
- Step 2.** Move the mouse to the object you wish to colorize and select it using the right mouse button.
- Step 3.** To change the border of the object, select the pencil icon.
The system displays the eight color selections at the bottom of the screen.
- Step 4.** Select the color you wish to use with the left mouse button.
The line changes from black to the selected color.

To draw a new color graphic object in your form, select all of the ink and shaded patterns before you draw the object. Select the “draw box” icon, then draw the object.

Shading and shaded form boxes

OGL v1.1 supports color using the DRAWBOX, PATTERN and DRAWRULE commands. This also includes the background color of a DRAWBOX if the colors used are defined with OCA Model (Blue, Red, Magenta, Green, Cyan, Yellow, Black, and Brown).

Example:

```
DEFINE RED1 COLOR OCA RED;  
PLACE PATTERN...COLOR RED1
```

You can also add color by using third-party tools. Some of the tools you can use are:

- IBM AFP Windows Print Driver (with some Windows applications)
- Elixir's Desktop and Converters for AFP
- ISIS's Overview AFP Designer

Using Elixir Desktop for AFP

To change the shading pattern or fill color of existing black boxes and circles, follow this procedure:

- Step 1.** With the left mouse button, select the "up arrow" key in the tool box.
- Step 2.** Move the mouse to the object you wish to colorize and select it using the right mouse button.
- Step 3.** To change the fill color of the object, select the ink fill icon.
The system displays the eight color selections at the bottom of the screen.
- Step 4.** Select the color you wish to use with the right mouse button. Note that you can change the shaded patterns by clicking on the shaded pattern box and selecting one of the 64 OGL screen patterns or OGL standard patterns.

The object changes from black to the selected color.

To draw a new color-filled graphic object in your form, select all of the ink and shaded patterns before you draw the object. Select the "draw box" icon, then draw the object.

Stitching

The DocuPrint IPS stitcher function integrates into AFP using either of these methods:

- the MarkForm facility stitches documents at the job boundary (including banner pages)
- the output stacker jogging facility stitches documents when a new copy group or subgroup is encountered.

Use these options in conjunction with the output tray options on the IPS GUI.

The stitching options are supported for the DocuPrint 4050, 4090, 4850, and 4890 IPS printers.

MarkForm facility

The MarkForm facility was originally implemented for continuous feed printers to put a black mark on the edge of the separator pages. Operators could then easily spot the marks in a stack of paper, making it easier to separate jobs. Cut sheet printers jog the output between reports, thus eliminating the need for the black edge marks.

You specify a MarkForm in the PSF printer attributes for the printer definition. The command can then be modified just as you would any other printer attribute, for example, by using operator commands:

- in an MVS/JES2 environment, use the MODIFY command to change the MarkForm option by specifying the JES2 command \$TPRTn, MARK=Y, where n is the printer number
- for a PSF/2 system, specify the MarkForm option in the printer settings dialog box.

You may wish to change the defaults for the printer so it uses the correct MarkForm setting when you IPL or reboot the system.

Offset stacking facility

Offset stacking allows you to separate a report into “documents.” The printer jogs the output bin as each portion of a report is printed. This command can be used for both cut sheet and continuous feed printers.

You specify offset stacking in either the FORMDEF command or the COPYGROUP subcommand of a FORMDEF:

- specify JOG YES to stack pages in the specified copy group offset from the previous copy group
- specify JOG NO to stack pages in this copy group in line with the previous copy group.

Resource interpolation

Another advantage in using the DocuPrint IPS printers is that you can print your documents originally created for 240 ppi resolution at 300 dpi. In addition, the document will be scaled to print at 600 by 600 dpi by the DocuPrint 92C and 4635 IPS and to 600 by 2400 dpi for the DocuPrint 180 IPS.

You can achieve this higher-resolution quality without changing your existing AFP application. Because the DocuPrint IPS printers recognize AFP resources, the fonts used in the application are converted automatically from 240 dpi to either 300 dpi or 600 dpi, as necessary. Graphics are also scaled to the appropriate resolution when the print job is submitted.

This table shows the resolutions available and the scaling operations performed by the IPS software for the DocuPrint IPS printers.

Table 5-1. **Printer resolutions and scaling**

DocuPrint IPS printer	Resolution (selected in IPS user interface)	IPS software scaling operation	Printed output resolution (dpi)
92C	240	None ¹	600 by 600
	300	None ¹	
	600	None ¹	
180	240	None ³	600 by 2400
	300	None ²	
	600 ²	None ²	
4050	240	240 to 300	300 by 300
	300	None	
4090	240	240 to 300	300 by 300
	300	None	
4635	240	240 to 600	600 by 600
	300	None ⁴	
	600 ¹	None	
96, 4635, and 180 MICR	240 ⁵	240 to 600	600 by 600
	300	None ³	
	600 ¹	None	
4850	240	240 to 300	300 by 300
	300	None	
4890	240	240 to 300	300 by 300
	300	None	300 by 300
	600	None	600 by 600

1. The DocuPrint 92C IPS converts 240 dpi and 300 dpi data to 600 dpi at the controller.
2. The DocuPrint 180/180MICR IPS, DocuPrint 96/96MICR and DocuPrint 4635 IPS accept only full-page IOCA images at 600 dpi. They do not accept any other type of resource at 600 dpi.
3. The DocuPrint 180 IPS interpolates 240 dpi, 300 dpi, and 600 dpi to 600 by 2400 dpi resolution at the printer's imaging system.
4. The DocuPrint 4635 and 96 IPS interpolates 300 dpi resources to 600 by 600 dpi resolution at the printer's imaging system.
5. Applies only to resources other than fonts. To preserve the integrity of Xerox-supplied 300 dpi E13B and CMC-7 MICR fonts, the fonts on the DocuPrint 96, 4635, and 180 MICR IPS printers must be 300 dpi.

Disable hardware scaling and alternate shading

Two new resolution options have been added to the IPS software:

- Disable Hardware Scaling
- Alternate Shading.

Disable hardware scaling

Disable Hardware Scaling is a new option for printers (IOTs) capable of accepting 240, 300, or 600 dpi. This includes the 92C IPS with the XRC1 board option and 180 IPS with the 240 spi kit. Disable Hardware Scaling is an option on the Resolution panel of the printers listed above.

If the Disable Hardware Scaling option is not selected (default), 240 and 300 dpi jobs are imaged at 240 or 300 dpi by the IPS Printer Controller and scaled to 600 dpi by the IOT.

If Disable Hardware Scaling is selected, 240 and 300 dpi jobs are imaged (and thus scaled) by the IPS Printer Controller.

Hardware scaling is faster (although the performance gain will not be noticeable on all jobs) but software scaling can produce better results for those applications that use resolution-independent resources such as outline fonts, GOCA, and percent shading.

Alternate shading

Alternate shading is a new option for printers (IOTs) capable of accepting 600 dpi. This includes the 92C IPS with the XRC1 board, the 92C without the XRC1 board option, the 96 IPS, 180 IPS, and 4635 IPS. Alternate Shading is an option on the Resolution panel of the printers listed above.

For the IPS 5.4 software release, shading patterns were developed specifically for 600 dpi printing. These shading patterns are tuned to produce better quality at 600 dpi. By default, the IPS Printer Controller uses the 600 dpi shading patterns when configured to the IOT.

When the Alternate Shading option is selected, the IPS Printer Controller uses an alternate set of shading patterns, originally developed for 300 dpi printing.

MICR applications

You may print documents that include MICR fonts on the DocuPrint 96, 4635, and 180 MICR IPS printers. Xerox provides the IPS MICR font kit which includes the E13B and the CMC-7 MICR fonts, MICR diagnostic forms and installation instructions. These fonts are loaded into your 300 dpi font library and used for all MICR applications printed on the DocuPrint 96, 4635, and 180 MICR IPS printers.



While other printers may also print MICR applications, they do not guarantee their printing and product quality. Xerox stands behind the performance of Xerox MICR laser printers and the Xerox benchmark MICR inks. We will assist our customer in investigating and resolving bank-reported MICR performance or reject rate problems. If we are unable to resolve the issues, we will reimburse the customer for fees they are required to pay to their bank for excessive rejects of checks printed after Xerox was notified of the problem, and where it is verified by Xerox that Xerox MICR materials or printer-related check defects are the cause of the imposition of the fees.

Use of a non-Xerox E13B and CMC-7 MICR font is not supported and will invalidate the Xerox Check Performance Guarantee. Any Xerox cost incurred in this regard may be billed to the customer.

MICR printing on the DocuPrint 96, 4635, and 180 MICR IPS printers

You can print your existing MICR applications that were originally created for an IBM 3828 MICR printer on the DocuPrint 96, 4635, and 180 MICR IPS printers. This printer accesses the Xerox AFP MICR fonts to print the MICR characters required for the document. All other font resources for MICR applications printing must be supplied at 300 dpi resolution.

Xerox E13B and CMC-7 MICR fonts

Xerox provides its own version of AFP MICR fonts for use with the DocuPrint 96, 4635, and 180 MICR IPS printers. This version is fully compatible with the IBM version of the AFP MICR fonts. The T1001032 code page include these fonts:

- X0AE13 (E13B font)
- X0AT13 (E13B test font)
- X0LE13 (Landscape E13B)
- X0LT13 (Landscape test font).

The T1001033 code page includes this font: X0ACMC (CMC-7 font).



Note: Note that the landscape versions of the E13B font are for the 3828 printer only. These fonts are included for compatibility. Also note that the CMC-7 font contains both portrait and landscape orientations. 

The Xerox AFP MICR fonts include all E13B and CMC-7 characters. In addition, the E13B fonts include these characters:

- Xerox symbol
- dollar sign
- version identifier
- 1-, 2-, 4-, 8-, 16-, 32-, 38-, and 64-pel spaces.

For information on installing the Xerox AFP MICR fonts on your DocuPrint IPS printer, refer to *Installing Xerox AFP MICR Fonts (720P24482)* and *MICR Fundamentals Guide (720P14081)*.

To implement the Xerox AFP MICR fonts in your existing IBM MICR application, perform the steps from the following appropriate section.

Existing IBM MICR implementation

- Step 1.** Install the Xerox MICR fonts on the host AFP system.
- Step 2.** Ensure that all other fonts used for MICR applications have been converted to 300 dpi and loaded into the 300 dpi font library.
- Step 3.** Substitute the Xerox 300 dpi AFP MICR fonts for the line-named IBM originals.
- Step 4.** Add the new library to the IPS font library concatenation.
- Step 5.** Because the names of the Xerox AFP MICR fonts are the same as the IBM AFP MICR fonts, be careful not to overwrite the original IBM fonts. You may need to reference them at a later date.

New MICR implementation

- Step 1.** Install the Xerox MICR fonts on the host AFP system.
- Step 2.** Use the X0AE13, X0AT13, and/or X0ACMC fonts in your applications.

- Step 3.** Refer to the code page/character set descriptions in the IBM manuals and Xerox supplements.
- Step 4.** Ensure that the MICR strings are contiguous. For example, if you have a string of MICR font text and you insert a non-MICR font in the middle of that string, the MICR font spacing will not be accurate when printed.

Custom MICR font application

- Step 1.** Install Xerox MICR fonts on the host AFP system.
- Step 2.** Substitute the Xerox MICR fonts for your existing custom MICR fonts.
- Step 3.** Modify the code page, if necessary.
- Step 4.** Use the unchanged Xerox MICR character set to ensure integrity of the Xerox Check Performance Guarantee.

Existing Xerox MICR font application

- Step 1.** Install Xerox MICR fonts on the host AFP system.
- Step 2.** Remove the '!' spacing from text strings. This character was required for correct spacing in previous MICR technology. However, the new set of MICR fonts uses relative metric technology that inserts blank pel spacing automatically after every two characters.
- Step 3.** Code a PageDef to select the E13B and/or CMC-7 font for MICR strings.

MICR application resources

In order to print your MICR documents on a DocuPrint IPS printer, you must have all of the resources used in the application resident on your host system. You must also have the Xerox AFP MICR fonts installed on your system.

Security features

PSF has a security feature that allows you to download MICR fonts to a MICR printer only. The DocuPrint 96, 4635, and 180 MICR IPS printers also support this feature.

The DocuPrint 96, 4635, and 180 MICR IPS printers do not support these features of the Xerox 4635MX Laser Printing System:

- Security and audit features
- Bar code reader option.

The Sample button on the Printer Control Console allows you to print a sample to the sample tray. If you wish to disable this feature contact your Xerox service representative.

Input and output tray processing

The DocuPrint IPS printers support many of the input and output tray options available with PSF. This section explains how to activate these features.

Input tray grouping

Using the IPS GUI, you can group certain input trays into tray groups to enable continuous paper feed or to map AFP bin numbers to specific DocuPrint IPS input trays. A “tray group” is a cluster of trays that share the same paper size.

If you need to print a large document and do not want printing to stop when the input tray runs out of paper, you can specify an input tray group within the application. Then, when the first input tray runs out of paper, the printer switches automatically to the next input tray in the tray group. As a result, printing is not delayed while waiting for operator intervention.

Changing input trays within a job

You can change the input tray from which paper is pulled within a document. This feature allows you to change paper sizes or paper stocks without having to change the paper in the input tray manually. The change occurs at the copy group level within the FormDef.

To change the input tray, for each different input tray you wish to use, you must specify a different COPYGROUP that defines that paper size in the IMM structured field. You must also include the specified BIN within each copy group in the FormDef. For example:

```
COPYGROUP CG1BIN2 DUPLEX NORMAL OVERLAY FORM1 4 4
BIN 2 DIRECTION DOWN CONSTANT FRONT;

COPYGROUP CG1BIN3 DUPLEX NORMAL OVERLAY FORM1 4 4
BIN 3 DIRECTION DOWN CONSTANT FRONT;
```



Note: Note that if you choose to incorporate this feature, the printer may cycle down to accommodate the change of paper sizes. Also, if you use the MVS operating system and:

- you wish to pull from bins 3 and 4, you may need to apply a PTF to PSF (reference APAR OY57164)
- you wish to pull from bins 5 or higher, you may need to apply a PTF to PSF (reference APAR OW08127). □

Changing input trays for copy subgroups

You may need to print multi-part applications, such as invoices, that use a different color stock for each page of the document. For example, you may wish to print copy 1 on blue paper and copy 2 on green paper.

To activate this feature, you must specify a different SUBGROUP within the COPYGROUP for each different input tray you wish to use. You must also indicate the specified BIN number on the SUBGROUP subcommand in the copy group. For example:

FORMDEF MULTI;	Name of the multi-part formdef
COPYGROUP MULTI;	Specifies a multi-part copygroup
SUBGROUP COPIES 1	Print 1 copy and pull from
BIN 1;	input tray 1 (blue paper)
SUBGROUP COPIES 1	Print 1 copy and pull from
BIN 2;	input tray 2 (green paper)
SUBGROUP COPIES 1	Print 1 copy and pull from
BIN 3;	input tray 3 (pink paper)
SUBGROUP COPIES 1	Print 1 copy and pull from
BIN 4;	input tray 4 (yellow paper)

The DocuPrint IPS printer selects the specified color stock from the appropriate input tray for each copy of the invoice based on the value entered in the copy subgroup.

You can use this feature only if you are running one of the following:

- PSF/MVS version 2.2 or higher
- PSF/400
- InfoPrint Manager/PSF for AIX.

Output tray grouping

Using the IPS GUI, you can group certain output bins into output groups to enable continuous output into bins or to map AFP tray numbers to specific DocuPrint IPS output bins.

When you are printing multiple documents and do not want printing to stop when the output bin is full, you can specify an output group within the application. Then, when the first output bin reaches its maximum capacity, the printer switches automatically to the next output bin in the output group. As a result, printing is not delayed while waiting for operator intervention.

Media destination (output bin) selection

This feature allows you to select a specific output bin for an individual job instead of waiting for the current bin to be filled before switching to the next available output bin. You can specify a value from 1 to 65535 as the output bin number.



Note: Allow Host Control on the GUI to enable the media destination selection:

- For PSF/MVS, specify the output bin number for the OUTBIN keyword in your JCL OUTPUT statement.
- For PSF/VM, set the OUTBIN options keyword on your PSF command line or PSF OPTIONS file to the correct bin number.
- For PSF/VSE, set the OUTBIN JCL keyword on your * \$\$ LST statement to the correct bin number.
- For InfoPrint Manager/PSF for AIX (v2.1 and higher), set the output bin number either for each printer in the printer profile or for each job using a print submission parameter. □

Feeding and finishing

The Document Feeding and Finishing Architecture (DFA) feature enables the DocuPrint IPS printers to support specific options for third-party feeding and finishing devices, including:

- the ability to map the Roll-Feed and downstream finishing devices to AFP input trays and output bins selected from an AFP medium map or host JCL.
- the ability to map Finishing Function 1 (FF1) and FF2 to a Medium Modification ID in the Select Medium Modification (SMM) command. When IPS finds a match between a modification ID in the SMM command and the number mapped to a finishing function, it will apply that finishing function to the current sheet until the next SMM command is encountered. Two vendors who supply finishing devices are Baldwin-Davlin and Roll Systems; both use the FF1 signal to control document stitching.
- support for end-of-set and end-of-job DFA signals.
- recovery from a set boundary following finishing device jams, etc.
- the ability to define DFA set and job boundaries from an AFP application as specified by the JOG OFFSET and MarkForm commands (similar to current stitching support).
- setting global DFA processing parameters such as maximum and minimum set size and segment ordering.
- the creation of named input and output DFA profiles, which allow you to associate a set of DFA attributes or parameters with specific DFA devices.

DFA is supported on the DocuPrint 180 IPS, 4635 IPS, 96 MICR IPS, 4635 MICR IPS, 180 MICR, and 4890 IPS. Currently, DFA is not supported for the DocuPrint 4050 IPS, 4090 IPS, and 4850 IPS. This table provides additional notes for the DocuPrint IPS printers that support DFA functionality:

Table 5-2. **DFA support for DocuPrint IPS**

DocuPrint IPS	Additional notes
180 and 180 MICR	<p>If a Roll Systems roll-to-cut sheet feeder is attached, no input enablement kit is required. However, you can attach the feeder to the back of the feeder/stacker modules. This replaces the feeder in that module. The stacker is still functional.</p> <p>If a bypass transport is attached, you can have a maximum of three feeder/stacker modules only.</p> <p>Set Recovery and Sheet Recovery are supported.</p>
4635 and 4635 MICR	<p>If a roll-to-cut sheet feeder is attached, you must also have an Input Enablement Kit. Also, you can have maximum of three feeder/stacker modules only.</p> <p>If a bypass transport is attached, you can have a maximum of three feeder/stacker modules only.</p> <p>Set Recovery and Sheet Recovery are supported.</p>
4890	<p>If a roll-to-cut sheet feeder is attached, paper tray 2 is used. Also, an Input Enablement Kit is not required.</p> <p>Set Recovery and Sheet Recovery are not supported.</p>



Note: Note that the following functions are not supported by any DocuPrint IPS printers:

- automatic restart of the printer after clearing a “full” condition of the finishing device
- the LCDS (Xerox data stream) equivalent of Segment Management. 

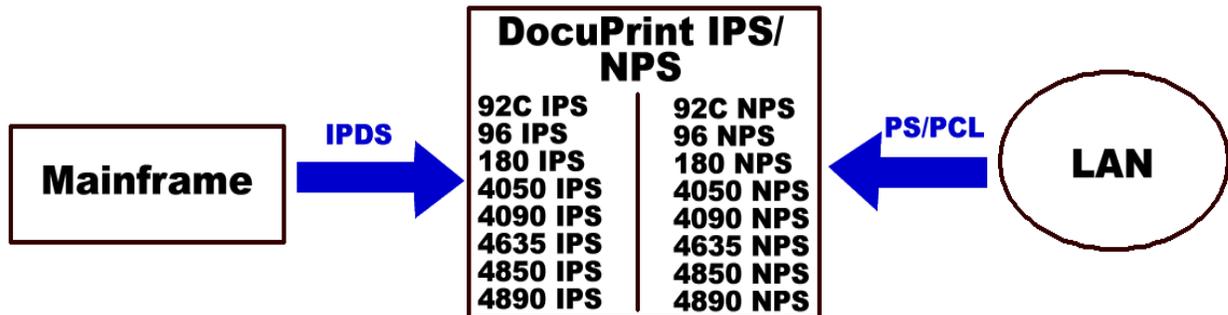
Contact your Xerox Account Representative to determine which third-party feeding and finishing devices are supported for your DocuPrint IPS printing system.

Enterprise Printing Option\Switching modes

The Xerox Enterprise Printing Option is a dual mode system that supports both the AFP and PostScript/PCL environments. This option provides all of the capabilities of the Xerox Network Printer Series (NPS) family and the DocuPrint IPS series. It allows you to control the priority of print jobs from mainframe hosts and network clients, thus enabling you to print legacy applications.

For example, if you have a high volume of internal documents to print from the mainframe and have many network clients that produce a high volume of printed output, you may print these applications to one printer at two different times of the day. You can print from the network clients during business hours, when the majority of your employees are at work. Then, you can schedule your AFP documents to print from the mainframe after regular business hours. The result? You make better use of your printers by keeping them active during all hours of the day.

This figure shows how you can incorporate the Enterprise Printing Option into your work environment:



These printers work in a network environment and support these output data streams:

- PostScript Level 2
- PCL 5e
- ASCII
- TIFF (CCITT Group 4) wrapped in PostScript.

For more information on the Enterprise Printing Option and the DocuPrint NPS printers, refer to the DocuPrint NPS user documentation.

Switching between print modes

While using the IPS print mode, the DocuPrint IPS/NPS printer can spool NPS data streams in the background using the TCP/IP communications protocol. To print these documents from the print spool, you must switch to NPS print mode. Note, however, that while in NPS print mode, the printer cannot receive IPDS (IPS data streams) in the background.

You can switch easily from one print mode to the other (for example, from IPS to NPS or from NPS to IPS). For instructions on switching between print modes, refer to the printer documentation.

6. Commonly asked questions

This chapter provides answers to questions frequently asked about the DocuPrint IPS printers by Xerox customers.

How do the DocuPrint IPS printers compare to the XPAF solution?

The Xerox Printer Access Facility (XPAF) is a host-based software program that prints AFP data streams (AFPDS), as well as SYSOUT, line-mode, DJDE, XES, page-formatted, PCL, and pass-through data streams on Xerox production, distributed, and mid-range printers. Thus, XPAF and DocuPrint IPS printers can coexist in the same environment, which provides you with more flexibility when implementing Xerox printing systems solutions.

How do I power on the DocuPrint IPS printer components?

The correct power-on sequence for the DocuPrint IPS printers is to power on the IOT, then the HCU, then the Sun SPARCstation. This power-on sequence ensures that all features of the printer will be accessible when you begin printing.

The trays on my DocuPrint 4635 IPS are not always accessible. Why?

Before you power on the Sun SPARCstation, you must make sure that all trays on the DocuPrint 4635 IPS printer are in a “ready” state (for example, loaded with paper). Otherwise, the trays will not be accessible by the system.

I need to print PostScript, PCL, and IPDS data streams. Does Xerox have a solution for this?

The DocuPrint IPS/NPS Enterprise Printing Option is a dual mode system that supports both the AFP and PostScript environments. This option allows you to schedule print jobs for your printers based on need. For example, you can print your office documents from PC workstations during the day and your high-volume production jobs after hours.

What is the Diagnostic Lockout feature on the DocuPrint 180 IPS?

The Diagnostic Lockout feature allows your Xerox Service Representative to access the programs required for running diagnostics on your DocuPrint 180 IPS printer. As part of the Full Service Maintenance Agreement (FSMA), Xerox provides these levels of diagnostics:

- Basic, which provides minimal diagnostic support
- ValueAdded, which includes Basic diagnostics and provides expanded diagnostic capabilities.

In addition, Time and Material (non-FSMA) customers may purchase an annual Right To Use for Basic Diagnostics.

To activate the Diagnostic Lockout feature, the service engineer enters an authorization code in the Administration/Authorization option on the IPS GUI. This code, when combined with a valid host serial number and IOT serial number (provided internally by the system), activates an encryption system that unlocks the system diagnostics.

While the system is in diagnostic mode, users cannot issue operator commands or other system processing commands, nor can they access any other GUI panel or window. This restriction prevents the user or service engineer from being injured while working on the system.

When the diagnostics have been completed, the system reverts to the locked diagnostic mode, and the printer may be used for normal printing.

What is Sixth Sense Technology?

Sixth Sense Technology is a user-friendly suite of tools that allow service personnel to connect with a customer system and evaluate its performance while the system is being used. The Customer Service Engineer (CSE) can troubleshoot problems remotely, transfer, apply, and remove patches remotely, and, if an on-site call is required, arrive with the solution to fix the problem.

Customer benefits of using this technology include:

- Diagnostic help and identification of required parts before the service visit
- Planned visits based on known problems and/or replacement of wear-out items
- Customer self-maintenance to provide faxed replacement change to trained operators.

Using Sixth Sense Technology, CSEs can access your system's diagnostic data remotely using a regular telephone line almost as if they were at the Printer Controller (SPARCstation).

For security reasons, the customer maintains control of the modem connection, and may leave the modem disconnected. Also, the customer provides a password for access to Sixth Sense Technology via the modem.

A. DocuPrint IPS printer capabilities

This appendix provides a table showing the IPS print controller platforms supported for the various versions of IPS software. It also provides tables that summarize the Xerox value-added features available on the DocuPrint IPS printers.

DocuPrint IPS printer specifications

Table A-1. DocuPrint IPS printer specifications - general

	Max. print speed (ipm)	Highlight color support	Resolution (dpi)	Max. print volume (per month)	Supported paper sizes
96 96 MICR	96	No	600 x 600	3,000,000	Inches: 7.4 x 10 to 14 x 17 MM: 259 x 254 to 356 x 432, including A4, A3, JB4
180 180 MICR	180	No	600 x 2400	6,000,000	Inches: 7 x 10 to 14 x 17 MM: 203 x 254 to 356 x 432, including A4, A3, JB4
4050	50	No	300 x 300	750,000	Inches: 8 x 10 to 8.5 x 14 MM: 203 x 254 to 216 x 356, including A4
4090	92	No	300 x 300	2,000,000	Inches: 8 x 10 to 8.5 x 14 MM: 203 x 254 to 216 x 356, including A4
4635 4635 MICR	135 154 (7x10)	No	600 x 600	4,000,000	Inches: 7 x 10 to 14 x 17 MM: 178 x 254 to 356 x 432, including A4, A3, JB4
4850	50	Yes	300 x 300	750,000	Inches: 8 x 10 to 8.5 x 14 MM: 203 x 254 to 216 x 356, including A4

Table A-1.DocuPrint IPS printer specifications - general
(continued)

	Max. print speed (ipm)	Highlight color support	Resolution (dpi)	Max. print volume (per month)	Supported paper sizes
4890	92	Yes	300 x 300	1,300,000	Inches: 8 x 10 to 8.5 x 14 MM: 203 x 254 to 216 x 356, including A4
92C	92	Yes	600 x 600	1,300,000	Inches: 8 x 10 to 8.5 x 14 MM: 203 x 254 to 216 x 356, including A4

DocuPrint IPS printer specifications - input trays and feeding options

Table A-2.DocuPrint IPS printer specifications - input trays and feeding options

	Number of input trays	Input tray capacity (20 lb/80 gm paper)	Third-party feeding
96 96 MICR	1 (Main)	1,100	Roll feed is available through tray 3
	2 (Aux)	600	
	3 (HCF ¹)	2,600	
	4 (HCF1) - optional	2,600	
180 180 MICR	1 (Main)	1,100	Roll feed is available through tray 3
	2 (Aux)	600	
	3 (HCF)	2,600	
	4 (HCF1)	2,600	
	5 (HCF1) - optional	2,600	
	6 (HCF1) - optional	2,600	
4050	1 (Main)	1,000	None
	2 (Aux.)	500	
	3 (HCF) - optional	1,000	
	4 (HCF1) - optional	1,000	
4090	1 (Main)	1,000	None
	2 (Aux.)	500	
	3 (HCF1) - optional	1,000	
	4 (HCF1) - optional	1,000	

Table A-2.DocuPrint IPS printer specifications - input trays and feeding options (continued)

	Number of input trays	Input tray capacity (20 lb/80 gm paper)	Third-party feeding
4635 4635 MICR	1 (Main)	1,100	Requires Input Enablement Kit
	2 (Aux.)	600	
	3 (HCF1)	2,600	
	4 (HCF1)	2,600	
	5 (HCF1) - optional	2,600	
	6 (HCF1) - optional	2,600	
4850	1 (Main)	1,000	None
	2 (Aux.)	500	
	3 (HCF1) - optional	1,000	
	4 (HCF1) - optional	1,000	
4890/92C	1 (Main)	1,000	None
	2 (Aux.)	500	
	3 (HCF1) - optional	1,000	
	4 (HCF1) - optional	1,000	

1. HCF=High Capacity Feeder

DocuPrint IPS printer specifications - output trays and finishing options

Table A-3.DocuPrint IPS printer specifications - output trays and finishing options

	Number of output bins	Output tray capacity (20 lb/80 gm paper)	Optional stitcher/stacker	Third-party finishing
96 96 MICR	Sample Tray	100	No	Requires programmable bypass transport
	Purge Tray	100		
	1 (HCS ¹)	2,500		
	2 (HCS1) - optional	2,500		
180 180 MICR	Sample Tray	100	No	Requires programmable bypass transport
	Purge Tray	100		
	1 (HCS)	2,500		
	2 (HCS1)	2,500		
	3 (HCS1) - optional	2,500		
4 (HCS1) - optional	2,500			

Table A-3. DocuPrint IPS printer specifications - output trays and finishing options (continued)

	Number of output bins	Output tray capacity (20 lb/80 gm paper)	Optional stitcher/stacker	Third-party finishing
4050	Dual Bin Stacker 1	750	Yes	Not supported
	Dual Bin Stacker 2 or Stitcher/Stacker	750 2,000 (unstitched) 50 (per stitched set)		
4090	Dual Bin Stacker 1	750	Yes	Not supported
	Dual Bin Stacker 2 or Stitcher/Stacker	750 2,000 (unstitched) 50 (per stitched set)		
4635 4635 MICR	Sample Tray	100	No	Requires programmable bypass transport
	Purge Tray	100		
	1 (HCS1)	2,500		
	2 (HCS1)	2,500		
	3 (HCS1) - optional	2,500		
4 (HCS1) - optional	2,500			
4850	Dual Bin Stacker 1	750	Yes	Not supported
	Dual Bin Stacker 2 or Stitcher/Stacker	750 2,000 (unstitched) 50 (per stitched set)		
4890/92C	Dual Bin Stacker 1	750	Yes	Requires bypass transport
	Dual Bin Stacker 2 or Stitcher/Stacker	750 2,000 (unstitched) 50 (per stitched set)		

1. HCS = High Capacity Stacker

B. Resource creation and conversion programs

This table lists several of the resource creation and conversion programs available to users.

Software	Vendor	Used for	Input	Output	Xerox equivalent	OS supported
Overlay Generation Language (OGL)	IBM	Overlay generation	OGL source code	Overlays	HFDL	MVS, VM, VSE, AIX
Page Printer Formatting Aid (PPFA)	IBM	Resource generation and formatting	PPFA source code	FormDefs and DefPages	JSL	MVS, VM, VSE, AIX
Print Management Facility (PMF) ¹	IBM	Resource generation		FormDefs, PageDefs, and fonts		MVS, VM
IBM Font Collection Type Transformer FontLab	IBM	Font collection, creation, and editing	Fonts	Fonts	FontEditor	MVS, VM
Graphical Data Display Manager (GDDM)	IBM	Page segment generation		Page segments		MVS, VM
Document Composition Facility (DCF)	IBM	Document composition and indexing		AFPDS		MVS, VM, VSE
Elixir Desktop for AFP	Elixir	Resource conversion and generation		Fonts, overlays, page segments, FormDefs, PageDefs		DOS Windows
OverView Product Family	ISIS	Document composition Resource conversion and generation	Fonts, images, AFPDS, line data	Fonts, overlays, page segments, FormDefs, PageDefs		Windows 3.1/95/NT, OS/2

Software	Vendor	Used for	Input	Output	Xerox equivalent	OS supported
Advanced Function Presentation Utilities (AFPU/400)	IBM	Resource generation		Overlays, PFDs (similar to PageDefs), fonts, page segments		OS/400
DisplayWrite 370 (DW/370)	IBM	Document generation		Line data		MVS, VM, VSE
AFP Conversion & Indexing Facility (ACIF)	IBM	Data stream conversion and indexing	Line data	AFPDS		MVS, AIX
Font Scaling Utility	IBM	Font scaling	Fonts	Fonts		MVS, VM, VSE
Print Services Manager (PSM)	IBM	LAN print manager				AIX
PSF/Direct	IBM	Bypass spool		IPDS		OS/2
AFP Workbench ²	IBM	Viewing	AFPDS, FAX, scanned data	WYSIWYG		AIX, DOS Windows
AFP Toolbox	IBM	Application development		Structured fields in data		MVS
AFP Windows Print Driver	IBM	OGL PAGESEG and document creation	Forms from any Windows application	Object OGL or PAGESEG AFPDS	HFDL	Windows (3.1, 95, and NT)
AFP OnDemand	IBM	Document archival and retrieval	AFPDS, line data, PS/PDF, ASCII, CCITT G3/4, TIFF, JPEG			AIX
PReS	PrintSoft of Australia	Mail merge	Text and graphics, variable data	Xerox Metacode, IPDS, PCL, PostScript		DOS Windows (95 and NT)
CrocoDoc	Elixir	Document composition	Variable data, overlays, fonts, logos, images	AFPDS, Xerox Metacode, PCL, PostScript, XGF, PDF		Windows NT
PSF/MVS	IBM	Print Services Facility	AFPDS, line data	IPDS		MVS
PSF/VM	IBM	Print Services Facility	AFPDS, line data	IPDS		VM

Software	Vendor	Used for	Input	Output	Xerox equivalent	OS supported
PSF/VSE	IBM	Print Services Facility	AFPDS, line data	IPDS		VSE
PSF/400	IBM	Print Services Facility	AFPDS, IPDS, line data, SCS	IPDS		OS/400
AFP PrintSuite For PSF/400	IBM	Advanced Print Utility PPFA AFP Toolbox SAP R/3 AFP Print	SCS	IPDS		AS/400
InfoPrint Manager PSF for AIX ³	IBM	Print Services Facility	AFPDS, line data, PostScript, PCL, ASCII	IPDS, PCL, PPDS		AIX
PSF/2 ⁴	IBM	Print Services Facility	AFPDS, PostScript, ASCII	IPDS, PCL, PPDS		OS/2
EZ-Letter	Group 1 Software	Document generation		AFPDS		
DOC1	Group 1 Software	Document composition		AFPDS, Metacode, PCL		
DocuFlex	Image Sciences, Inc.	Document composition Document conversion Resource creation Document archival and retrieval	Line data, AFPDS, Metacode	AFPDS, Metacode, PCL		
Papyrus Document System	ISIS	Document composition	Line data, AFPDS	AFPDS, IPDS, Metacode, PCL		MVS, AIX, OS/2, Windows 3.1/95/NT

1. IBM stopped supporting this product as of December 31, 1995. They recommend that customers use PPFA as a replacement.
2. Native mode documents only.
3. PSF for AIX is no longer marketed by IBM. InfoPrint Manager is the replacement product.
4. Does not support page definitions.

C. DocuPrint IPS limitations

While the DocuPrint IPS printers allow you to perform many print functions, there are some features that they do not support. This section lists some of those limitations.

AFP features currently not supported

The DocuPrint IPS printers do not support the CONTAINER OBJECT command.

Other considerations

Color limitations

Xerox highlight color printers, the DocuPrint 4850, 4890, and 92CIPS printers, support all 10 highlight colors distributed by Xerox. Note, however, that since you can install only one highlight color unit at a time, you can print only black plus a variety of shades of that highlight color. You cannot print all 10 colors on one page.

Also, these printers do not support custom colors. For example, if your company logo uses a specific Pantone blue and you have the blue housing installed in the printer, the logo will not print with the specified Pantone blue color; it will print using the standard blue toner.

N-UP Processing

N-UP jobs are processed in segments based on the number of images per page, which varies based upon the N-UP settings of each job. Because of this multiple page processing, the “Pages Outstanding” counter on the status menu will increment in segments and not on a sheet-by-sheet basis, as in single page jobs.

This behavior is working as designed for the N-UP job type.

Printing preprinted forms loaded face down

Unlike the IBM 3828 printer, the DocuPrint 96 MICR, 4635 MICR, and 180 MICR IPS currently does not support printing of pre-printed or pre-numbered forms that are loaded face down in reverse order (in other words, page 1 is on top but is face down).

Shading

When you print a document that contains shaded IM images at 240 dpi to a printer with 300 dpi resolution, PSF converts the image object from an IM image to an IOCA image. As a result, the shading may appear differently. You should either recreate or rescan the image at 300 dpi to get the correct shading values.

If your document contains shaded objects created via an overlay creation tool, you may have to adjust the level of shading via that tool.

Printing documents created in WordPerfect

PSF does not allow you to print documents directly from WordPerfect. However, you may convert the source WordPerfect document to AFP format. Some conversion tools are:

- AFP driver (from WordPerfect)
- Graphics Commander (by Image Sciences, Inc.)
- Print Commander (by Image Sciences, Inc.)
- AFP Windows Print Driver (IBM).

Jam recovery for ordered/tab stock

Ordered stocks are sheets of paper stacked in the input paper tray in an ordered manner. Two typical uses of ordered stocks are:

- colored paper (ordered by color, such as red, green, blue, red, green, blue, and so on)
- tab stocks (ordered by printed tab positions on the sheets of paper, such as first tab, second tab, third tab, first tab, second tab, third tab, and so on).

A typical advantage with ordered stocks is jam recovery. For example, when a jam occurs, the DocuPrint 180 IPS, DocuPrint 4635 IPS, and DocuPrint 96 MICR, 4635 MICR, and 180 MICR IPS would need to purge sheets up to the sheet before the jam occurred. Using the colored paper example, if the jam occurs on the green sheet (at this point the IOT already has blue, red, green, blue, red and green in its paper path), the DocuPrint 180 IPS, DocuPrint 4635 IPS, and DocuPrint 96 MICR, 4635 MICR, and 180 MICR IPS would need to purge the blue and red sheets so that it could feed the green sheet when all jams have been cleared. This type of jam recovery is currently not supported on the DocuPrint IPS printers.

Hints and Tips

This section includes several hints and tips that may help you use your DocuPrint IPS systems.

- On a DocuPrint 180 IPS, DocuPrint 4635 IPS, or DocuPrint 96 MICR, 4635 MICR, and 180 MICR IPS printer, when you print a job that has 600 pel full-page IOCA images only, you must turn off the banner page. Note also that this type of job may not print at rated speed due the large amount of processing power required for 600 pel resolution images.
- If you use the IPS GUI to change any of the options listed below, you must reboot the entire system after you save the change. Otherwise, the DocuPrint IPS printer will not recognize the change.
 - printer resolution (for example, from 240 to 300)
 - channel settings (channel address and channel mode)
 - MICR mode
 - slumber mode.

D.

AFP print flows

This appendix shows the AFP print flows for the different environments supported by PSF. These print flows apply to both PSF and the DocuPrint IPS printers.

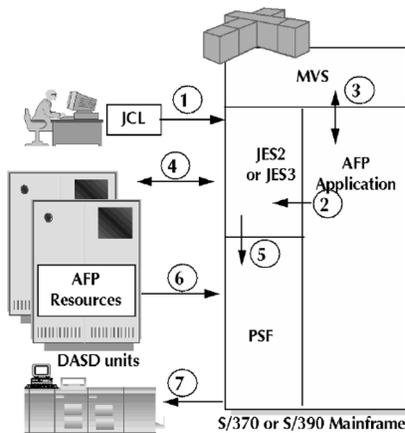
Mainframe data flows

In the mainframe environment, you may install PSF in three operating system environments: MVS, VM, and VSE. These operating systems may run on either a System/370 or System/390 mainframe. The following sections describe the AFP print flows for each environment.

MVS print flow

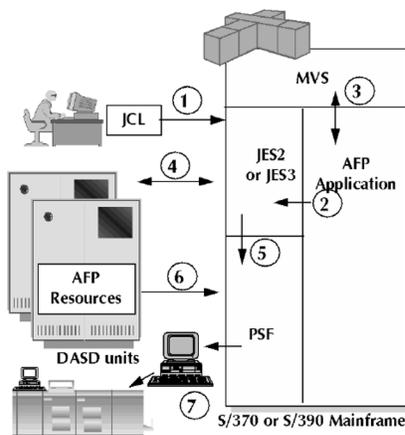
1. JCL is submitted to JES.
2. JES receives the job, then prepares and schedules the job for processing.
3. JES passes control to the operating system for job execution.
4. Output is spooled to a JES pool file.
5. PSF acquires the job from the JES queue.
6. PSF identifies and retrieves any necessary AFP resources stored on DASD. PSF then composes the data stream to IPDS.
7. PSF directs the output to the printer. The IPDS printer then prints the data.

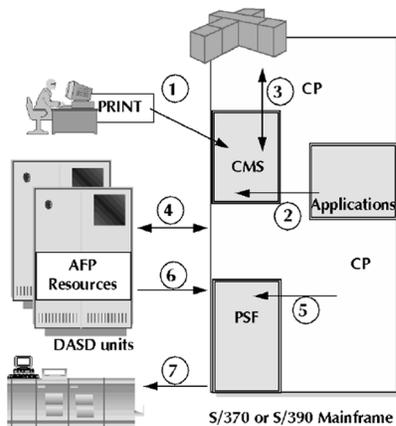
When PSF is finished, the job is purged from the JES queue.



MVS print flow for a remote printer via PSF/2

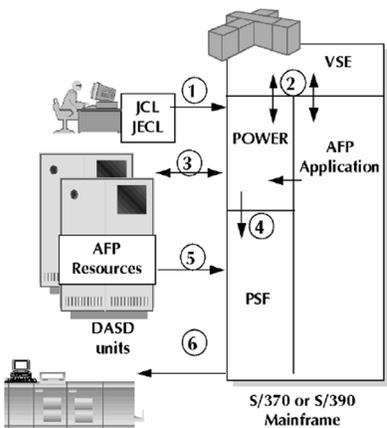
1. JCL is submitted to JES.
2. JES receives the job, then prepares and schedules the job for processing.
3. JES passes control to the operating system for job execution.
4. Output is spooled to a JES pool file.
5. PSF acquires the job from the JES queue.
6. PSF identifies and retrieves any necessary AFP resources stored on DASD. PSF then composes the data stream to IPDS.
7. PSF directs the output to PSF/2 via VTAM. With PSF DIRECT, the document is routed directly to the printer and not spooled on PSF/2.





VM print flow

1. CMS print command is issued.
2. CMS writes to a virtual printer.
3. CP intercepts the command and data.
4. CP spools the data to DASD.
5. When the specified printer is available according to job control parameters, CP schedules the job to PSF.
6. PSF identifies and retrieves any necessary AFP resources stored on DASD.
7. PSF composes the data stream into IPDS and directs the output to a printer.

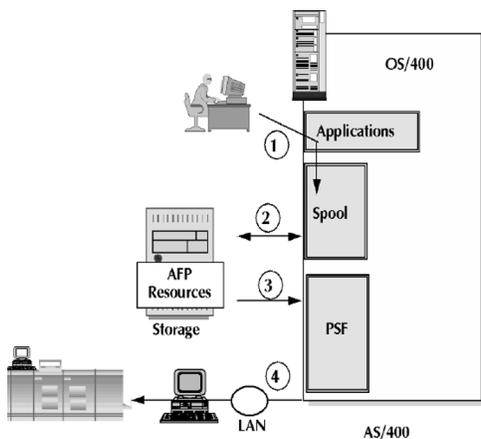


VSE print flow

1. The job is submitted to POWER.
2. POWER schedules the job for execution.
3. When the job is finished, POWER spools the output.
4. When a printer is available and the print criteria are met, POWER submits the data to PSF.
5. PSF identifies and retrieves any necessary AFP resources stored on DASD.
6. PSF directs the output to a printer. After PSF is finished, the job is purged from POWER.

AS/400 data flow

PSF/400 accepts MO:DCA-P data streams, as well as SCS data streams with DDS, IPDS, and line data.



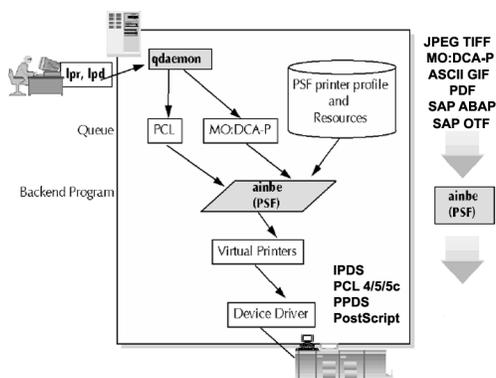
OS/400 print flow

1. An application creates the print output.
2. OS/400 spools the output to DASD.
3. When the specified printer is available according to the job parameters, PSF identifies and retrieves any necessary AFP resources stored on DASD.
4. PSF composes the data stream into IPDS and directs the output to the printer.

RS/6000 data flow

The RS/6000 connection accepts ASCII, ditroff, MO:DCA-P, PCL 5e, EUC (Extended UNIX commands), DBASCII (double-byte ASCII), 1403 line-mode (EBCDIC) data, PostScript level 2 and 3, SAP ABAP line data, and SAP OTF data streams. In turn, it outputs IPDS, PostScript (from AIX or BSD attached printers), PPDS, and PCL 4/5c data streams.

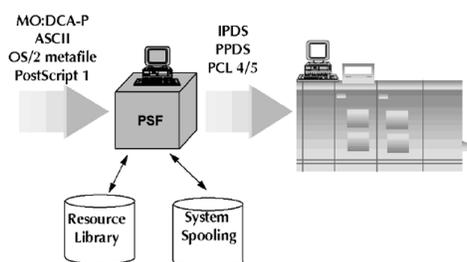
To create resources in the RS/6000 environment, you may use the PPFA/6000 program. The RS/6000 connection supports both AFP and non-AFP printers, and enables printer sharing between System/390 and AIX systems.



AIX print flow

1. An application creates the print output.
2. An lpr or lpd command is issued to transfer the output into the qdaemon.
3. The qdaemon determines what the input data stream to PSF is. If required, the qdaemon transforms the data stream to the necessary format.
4. When the specified printer is available according to job control parameters, the qdaemon schedules the job to PSF. This PSF task is identified as "ainbe" on the RS/6000.
5. PSF identifies and retrieves any necessary AFP resources stored on DASD.
6. PSF (ainbe) composes the data stream into IPDS and directs the output to a virtual printer, which in turn writes the data to a device driver on the IPDS printer.

PS/data flow



The PS/2 connection accepts ASCII, MO:DCA-P, OS/2 metafile, and PostScript 1 data streams. In turn, it outputs IPDS, PPDS, and PCL 4/5 data streams.

1. An application creates the print output.
2. The print job is submitted for printing.
3. When the specified printer is available according to the job parameters, PSF/2 identifies and retrieves any necessary AFP resources from the resource libraries.
4. PSF composes the data stream into IPDS and directs the output to the printer.

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