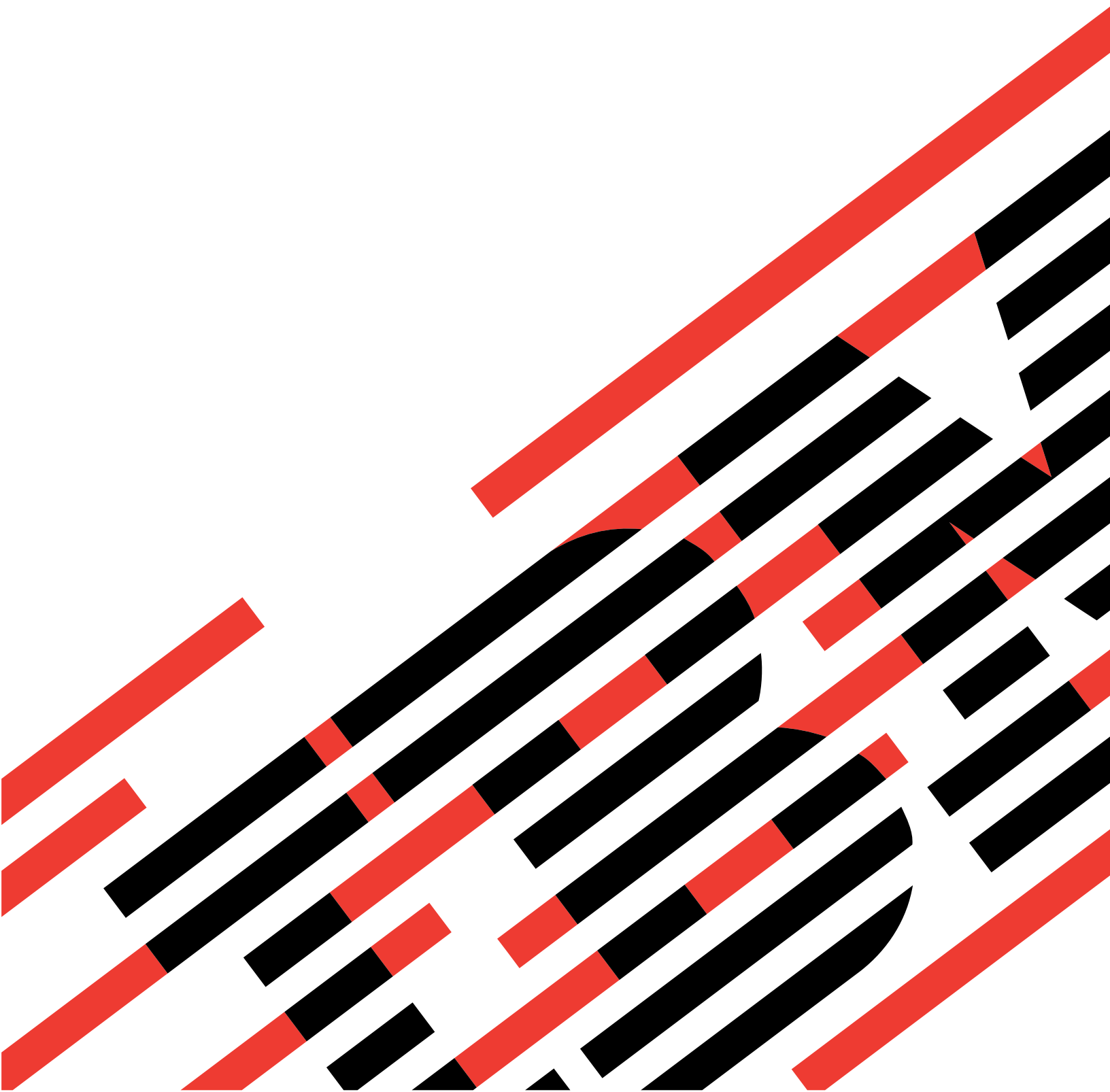


IBM

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Printing





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Printing

Contents

Printing	1
Plan for printing	1
Print protocols	2
Scenarios: Select a print protocol	3
Scenario: SNMP printer configuration	4
Scenario: PJI printer configuration	5
Scenario: IPP printing configuration	6
Scenario: IPDS with PSF/400 printer configuration	7
Scenario: LPR/LPD printing configuration	7
Configure printing	8
Example: IPP Printer Device Description	9
Manage printing	10
Related information for printing	10

Printing

IBM(R) iSeries(TM) servers have powerful printing functions and services. You can present information using overlays, bar codes, graphics, images, and more. iSeries servers support a variety of printing solutions from high performance multi-function printing environments to printing in a distributed network environment.

Choosing and implementing a printing solution requires you to be familiar with both your organization's requirements and resources, and the capabilities provided by the iSeries systems. The following information illustrates some of the common iSeries printing methods, and helps you plan for and configure these environments.

Plan for printing

Use this information to select the printing method that best meets your needs. This topic presents an overview of several common printing protocols and their hardware requirements.

Scenarios: Select a print protocol

See examples of printing solutions that illustrate the advantages and requirements of common printing methods, and provides example configurations. This topic covers SNMP, PDL, IPP, IPDS (PSF/400), and LPR/LPD printing.

Configure printing

Refer to this procedure for instructions on setting up communication between the iSeries server and the printers.

Manage your print environment

Find help and resources for administering and working with your printing environment after successful configuration.

Related information

Get detailed information about iSeries printing from the manuals, Redbooks and web sites listed here.

To access this information in PDF format, see [Print this](#). For an overview of changes and additions to iSeries printing this release, see [What's new in V5R2](#).

Plan for printing

The iSeries servers offer a wide range of printing solutions, ranging from high-function IPDS printers supporting bar-codes and complex document formatting on high performance printers, to simple document printing using a directly attached printer. Clearly understanding your organizations requirements, the type of printed output you need, and knowing the capabilities of the hardware you currently have or intend to purchase, are all critical components of configuring an iSeries printing solution. After you've determined your requirements, you should decide whether you will use IPDS or Host Print Transform to convert and send print data. Generally, IPDS (usually used with PSF/400) offers higher performance and additional functions, but at a higher price. Refer to the following resources for more information about determining what type of printing solution will best meet your business needs.

Print protocols.

This topic describes some of the common options for iSeries printing, and compares their features and requirements.

Printing Solutions for iSeries

Use this IBM web site to help identify which printing solution best meets your needs.

IBM printer selector .

This web-based tool from ibm.com can help you select the best printing hardware for your requirements.

IBM AS/400 Printing V .

The Printing V Redbook describes the iSeries printing capabilities, and recommends configurations.

Support for Various ASCII Printers .

One of the most common causes of problems in a printing environment is hardware compatibility. Refer to this IBM Knowledge Base article to find out which printers will support the print protocols you require.

Print protocols

The iSeries server offers several different print protocols to meet a variety of configuration and performance requirements. The following information introduces the capabilities and requirements of some of the common printing options.

SNMP

Simple Network Management Protocol (SNMP) printing provides excellent support for resource sharing and problem handling by using two separate TCP/IP ports for communication, one to send print data, and another to track job status. This allows SNMP printing solutions to display error messages or status while a job is printing. SNMP also uses IBM Shared Connections to ensure that sockets are released after every copy of a printed document. This allows the iSeries to efficiently share a printer with other users. Additionally, since SNMP supports both Post Script and PJP print data, it offers excellent hardware and application compatibility.

SNMP printing requires the printer and print server or network adapter to support the Host Resource Management Information Base (Host Resource MIB), and for full functionality, the Printer Resource Management Information Base (Printer Resource MIB). Not all printing hardware will support SNMP, so you should carefully check for compatibility before implementing this solution. OS/400 V4R5 or higher supports the SNMP print driver.

PJP

Printer Job Language (PJP) printing solutions also provide problem handling and status information during the print process by using bi-directional communication between the printer and print server over a single TCP/IP port. PJP printing will allow you to share a printer between the iSeries and other network users, but since the iSeries keeps communicating with the printer until the iSeries output queue is empty, resource sharing is more limited than with other either SNMP or LPR/LPD.

PJP printing through an iSeries server requires that the printer and printer adapter or network adapter support Printer Control Language level 5e. Also, the cabling, printer and network adapter or print server must be capable and configured for bi-directional communication. OS/400 version V4R1 (V3R7 with PTFs) or higher support PJP printing.

IPP

IPP printing allows you to send and manage print information from a variety of remote sites by sending print information over the Internet or Intranet. IPP is a versatile printing method, and should be supported by a variety of printers and network adapters. This protocol provides the advantages of printing with LPR/LPD, but is significantly easier to manage and troubleshoot because print status information is available during the printing process. IPP also provides excellent security by allowing SSL encryption.

IPP printing solutions communicate using TCP/IP ports, and require an HTTP server, Java, and Digital Certificate Manager (if SSL is used). Not all devices support IPP, so verify hardware compatibility before implementing an IPP-based printing solution.

LPR/LPD

LPR/LPD printing sends print information from a remote output queue to remote servers or printers. This printing method is supported by most hardware, but provides less error handling support than other options. It also provides the least amount of print function, and does not support page range selection or job accounting.

This printing method This protocol requires that you configure remote output queues for the remote printers. Most printers and adapters will support this protocol.

IPDS (PSF 400)

IPDS with PSF/400 offers industry-leading printing performance and functions, and can take advantage of the iSeries Advanced Function Presentation print resources. While PSF/400 solutions offer excellent performance, they are also more expensive than other iSeries printing options.

Scenarios: Select a print protocol

There are many options available when selecting a print protocol. The one you should choose will depend on your business requirements, the current hardware and skills available, and the resources your organization is willing to commit. Also, since different protocols support different functions, and require different hardware and network architecture, it's important to carefully consider what your current hardware will support, and what specific functions you require in a printing solution.

The following scenarios provide a brief business case illustrating the advantages of four common printing methods, state the requirements for using each protocol, and then link to configuration examples and procedures.

Scenario: Simple Network Management (SNMP) printer configuration

Share printing resources over a LAN with iSeries applications and user workstations. SNMP provides good support for printing functions like page ranges and allows for basic problem handling and resource sharing functions.

Scenario: Printer Job Language (PJL) printer configuration

Share printing resources over a LAN with iSeries applications and user workstations. PJL uses Printer Control Language commands to format printed output, which supports a broad range of printing functions. PJL print protocols also support some problem handling and resource sharing features.

Scenario: IPP printer configuration

Print over the Internet using the iSeries as an IPP server for remote printing, and to share printing resources on your corporate Intranet.

Scenario: IPDS with PSF/400 printer configuration

Provide detailed error recovery and resource sharing along with industry-leading support for print functions using IPDS printers with PSF/400 software from IBM.

Scenario: Line Printer Request/Line Printer Daemon (LPR/LPD) printing

Either start LPD on the iSeries server to handle print requests from attached clients, or use LPR (Remote Writer) to send print jobs from a remote output queue to another printer or print server on your network. This protocol has extensive hardware support, but provides only minimal support for error handling and resource sharing features.

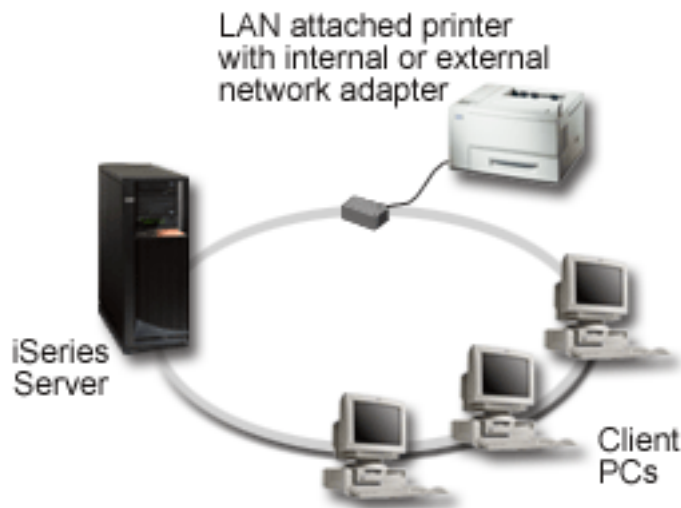
Scenario: SNMP printer configuration

Situation

As an administrator for your company's network, you need to provide print services to several dozen client PCs by allowing them to share a common printer attached to the office LAN. Since this printer will have many users, you require a solution with reliable sharing capabilities and error handling. With these needs in mind, you've purchased printing hardware that supports SNMP printing.

Details

To provide printing resources to your client PCs over a LAN you will use your iSeries as a print server that manages print jobs and sends them to an SNMP-compatible printer attached to the LAN via a network adapter. Communication between the iSeries and the printer will be managed with the SNMP protocol. SNMP printing uses two distinct TCP/IP ports for communication, one port for sending the print job, and another for tracking status and errors.



- SNMP requires that the print server (or network adapter), and printer each support the Host Resource Management Information Base (Host Resource MIB), and recommends support for Printer Management Information Base (Printer MIB). This SNMP requirement is documented in RFC 1514 (Host Resource MIB) and RFC 1759 (Printer MIB).
 - OS/400 V4R5 and above support SNMP printing.
 - To find out if your printer and network adapter support the Host Resource and Printer MIBs, refer the manufacturer's documentation. The IBM Knowledge Base document 17690939 "Support for Various ASCII Printers" also maintains a list of protocols supported by common printers.
- The printer is attached to the first parallel port of the multi-port network adapter, and is the only SNMP-enabled device attached.
- SNMP allows for simple security by defining communities of either public or private access to a given resource. The public community name must have read authority.

Configuration steps

1. Define the printer's device description in OS/400 using the CRTDEVPRT command. For detailed instructions on how to complete this description, including recommended values for several printer

types and an example device description, refer to the IBM Knowledge Base document 19932815 "Configuring a *LAN 3812 SNMP Device Description"

2. Configure the printer and print server (or network adapter). Refer to the manufacturer's documentation for more information. Also, the IBM Knowledge Base document 19935220 "Configuration Settings and Error Messages for *LAN 3812 SNMP Device Descriptions" lists suggested settings.
3. If necessary, configure your libraries, queues and spooling in OS/400. For more information refer to Work Management.

Scenario: PJP printer configuration

Situation

As an administrator for your company's network, you need to provide print services to several dozen client PCs by allowing them to share a common printer attached to the office LAN. You need a solution that provides some job accounting information to allow for error handling, and would like to use your current hardware that supports Printer Job Language (PJP).

Details

To provide printing resources to your client PCs over a LAN you will use a network adapter and a LAN attached printer. Communication between the iSeries and the printer will be managed using PJP. This provides applications with a significant level of control for how print output should be formatted, even allowing for distinctions in paper handling like sorting and stapling. Communication between the print server and the printer is bi-directional, meaning that information about errors that occur during printing will be available.



- PJP requires that the print server (or network adapter), and printer each support PCL level 5e.
 - OS/400 V4R1 and above support PCL level 5e. Release V3R7 requires PTFs for this support.
 - To find out if your printer and network adapter support PCL level 5e, refer to the manufacturer's documentation. The IBM Knowledge Base document 17690939 "Support for Various ASCII Printers" also maintains a list of protocols supported by common printers.
- The network adapter must provide bi-directional communication with the printer.
- If the network adapter is external, its connection with the printer must use IEEE 1284 bi-directional printer cable.

Configuration steps

1. Define the printer's device description in OS/400 using the CRTDEVPRT command. For detailed instructions on how to complete this description, including recommended values for several printer types and an example device description, refer to the IBM Knowledge Base document 8695149 "Configuring a *LAN 3812 PJI Device Description"
2. Configure the printer and print server (or network adapter). Refer to the manufacturer's documentation for more information. Also, the IBM Knowledge Base document 14461435 "Configuration Settings and Error Messages for *LAN 3812 PJI Device Descriptions" lists suggested settings.
3. If necessary, configure your libraries, queues and spooling in OS/400. For more information refer to Work Management.

Scenario: IPP printing configuration

Situation

You need to provide printing services across several existing LANs, which consist of both PCs and several servers, and must include your sales staff at several remote offices across the country. Because your printing solution ties in existing hardware from several LANs, you require a printing solution that will be compatible with a wide variety of printers and network adapters. Moreover, you will have to configure printers and work with print jobs and errors at several remote sites. Also, since some of the communication involves confidential information, you require a printing solution that provides secure communication. With these needs in mind, you decide that printing over your corporate Intranet will be the most versatile option, so you need to configure your network to support IPP printing.

Details

IPP printing requires an IPP server handling requests from a variety of IPP client devices. Since this communication uses HTTP, print requests can travel over your company's Intranet or over the Internet. IPP uses SSL to encrypt communication and provide secure connections. IPP server is available in OS/400 V5R1. The IPP driver requires V5R2. Also, IPP requires an HTTP server, Java, and DCM (for SSL encryption).



Configuration steps

1. Setup the IPP printer device description on the iSeries. Refer to Example: IPP device description for recommended settings.
2. Configure the IPP printers and network adapters.
3. Configure the IPP server by entering the printer URL in a web browser. For example: `http://prt01:2010`. (Appending `:2010` specifies a secure connection, otherwise use `2001`.)

Scenario: IPDS with PSF/400 printer configuration

Situation

Your company requires a print solution that handles complex forms that include bar-codes and other graphics for printing shipping and receiving requests in your warehouse. Since the success and normal operation of your business depends on the ability to print reliably and to generate forms rapidly, you decide to invest in a high-end printing solution.

Details

PSF/400 with IPDS printers provides industry leading support and performance for complex and demanding printing environments. PSF/400 is included in OS/400, but must be activated before it is used. Fees are based on the performance requirements for your printing solution.

Configuration steps

For information about purchasing and configuring PSF/400, refer to PSF/400 home page.

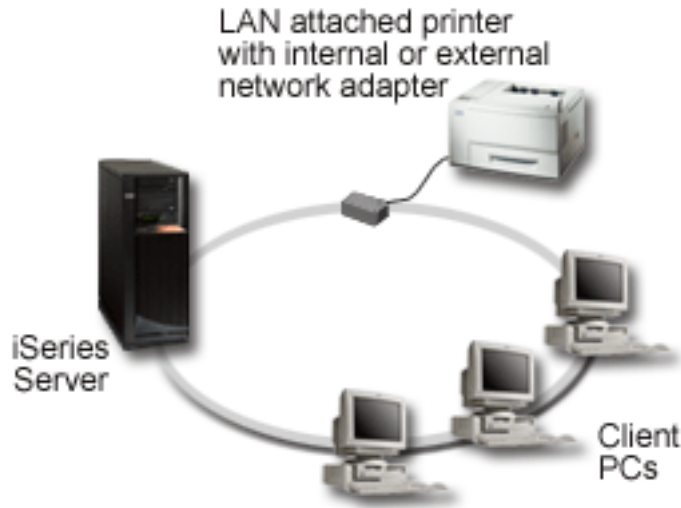
Scenario: LPR/LPD printing configuration

Situation

You need a simple way to print iSeries reports and status information, and since you will only be printing occasionally, you would like to use an older printer that is already in use and attached to the corporate LAN, and a protocol that supports some resource sharing. You don't need the function supported with Host print transform or IPDS, and since your printing needs are minimal, you don't need the job accounting and tracking information provided by other protocols. With these needs in mind, you decide that LPR/LPD printing will meet your needs, without requiring you to purchase new hardware or implement a new printing solution.

Details

You can setup a remote output queue to automate Line Printer Requests (LPR/Remote Writer) on the iSeries server. This sends printer output to another printer or print server that is using a Line Printer Daemon (LPD).



Although the hardware support for printing through a remote output queue using LPR/LPD is extensive, not all printers will support it. You should verify that the printer you would like to use supports this printing method. The IBM Knowledge Base document 17690939 "Support for Various ASCII Printers" maintains a list of protocols supported by common printers.

Configuration steps

1. Start LPD on the print server, PC, or iSeries that you are printing to. If you are printing to another iSeries, you can start LPD with iSeries Navigator:
 - a. Click **Network > Servers > TCP/IP**
 - b. Right click on **LPD** from the list of servers, and select **Start**.
2. Setup a remote output queue for the iSeries server. Refer to the IBM knowledge base article Remote Output Queues (RMTOUTQ) for instructions and additional information.
3. Vary on the printer.
 - a. Enter WRKCFGSTS *DEV command. The Work with Configuration Status screen will display a list of devices.
 - b. Enter a 1 next to the printer printer device description to vary on the printer.
4. Enter STRREMWTR to Start the Remote Writer.

Configure printing

Configuring iSeries printing requires that all the hardware components, network configuration settings, and software involved in the connection to work together effectively. You can avoid many potential problems with this process by verifying that your printer is fully compatible with the printing protocol that you are using. The IBM support document 17690939 Support for Various ASCII Printers maintains a list of known protocols supported by some common printers. For detailed information about how to configure printers and related devices, refer to the Printer Device Programming .

Configuring Line Printer Request/Line Printer Daemon (LPR/LPD) printing

1. Start LPD on the print server, PC, or iSeries that you are printing to. If you are printing to another iSeries, you can start LPD with iSeries Navigator:
 - a. Click **Network > Servers > TCP/IP**
 - b. Right click on **LPD** from the list of servers, and select **Start**.

2. Setup a remote output queue for the iSeries server. Refer to the IBM knowledge base article Remote Output Queues (RMTOUTQ) for instructions and additional information.
3. Vary on the printer.
 - a. Enter WRKCFGSTS *DEV command. The Work with Configuration Status screen will display a list of devices.
 - b. Enter a 1 next to the printer printer device description to vary on the printer.
4. Enter STRREMWTR to Start the Remote Writer.

Configuring PJL, SNMP, or IPP printers

1. Setup and configure the printer and the network adapter or print server. Refer to the following IBM Knowledge base documents for recommended hardware settings:
 - SNMP printer settings
 - PJL printer settings
 - For IPP printer settings, refer to the printer documentation.
2. Create a device description in OS/400 using the CRTDEVPRT command. Refer to the following IBM knowledge base articles for recommended settings and examples:
 - SNMP printer device description
 - PJL printer device description
 - IPP printer device description
3. Vary the printer on.
 - a. Enter WRKCFGSTS *DEV command. The Work with Configuration Status screen will display a list of devices.
 - b. Enter a 1 next to the printer printer device description to vary on the printer.
4. Enter STRPRTWTR to start the Print Writer.

Configuring IPDS (PSF 400) printing

For information about purchasing and configuring PSF/400, refer to PSF/400 home page.

Example: IPP Printer Device Description

For an IPP printer, enter the following information for the device description:

Field	Suggested value
ion: "0">	
Device description	PRT01
Device class	*LAN
Device Type	3812
Device model	1
LAN attachment	*IP
Port number	631
Online at IPL	*YES
Font: Identifier	11

Printer error message	*INFO, or *INQ — Selecting *INQ will force a response to error messages.
Host print transform	*YES
Remote location: Name or address:	Enter the IP address, system name, or URL of the printer. For example: http://prt01
Validation list	Optional. If specified, users must be validated before the printer will accept communication.
System driver program	*IBMIPPDRV

Manage printing

Administering your company's printing solution after the initial setup and configuration involves troubleshooting any printer problems, dealing with changing user and application requirements, and handling any upgrades or performance considerations as your system grows. The following resources can help you manage your printing environment.

Working with printer output

Learn how to track and work with spooled files and print jobs on your iSeries system.

Printer Device Programming

Manage printers and related devices and get detailed configuration information.

For help troubleshooting printing problems, refer to IBM Printing Systems Support , and the IBM Knowledge Base

Related information for printing

Listed below are the iSeries manuals and IBM Redbooks^(TM) (in PDF format), Web sites, and Information Center topics that relate to the printing topic. You can view or print any of the PDFs.

Manuals

- AFP Utilities for iSeries User's Guide
- InfoPrint Server: Introduction and Planning Guide
- InfoPrint Server: User's Guide
- iSeries Guide to Advanced Function Presentation and Print Services Facility
- Printer Device Programming

Also see the Redbook IBM AS/400 Printing V .

Web sites

- Printing Solutions for iSeries
- PSF/400 home page
- IBM Printing Systems Support
- IBM Knowledge Base

Other information

- Working with printer output
- Work Management

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

1. Right-click the PDF in your browser (right-click the link above).
2. Click **Save Target As...**
3. Navigate to the directory in which you would like to save the PDF.
4. Click **Save**.

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