IntelliBar® AS Net Printer

Setup Guide for

IBM AS/400-iSeries Networks

1 Introduction

This section describes IPDS supported features, networking features and intended application of the IntelliBar AS Net printer.

1.1 INTELLIBAR AS NET PRINTER SUMMARY

IntelliBar AS Net printers are specifically designed to support IBM's AS/400, iSeries and mainframe AFP/IPDS printing services over TCP/IP networks for IPDS bar code label printing. IntelliBar AS Net printers feature an integrated Ethernet 10BaseT print server and an IPDS interpreter with an IBM 4028 laser printer emulation. The print server and interpreter consist of individual PCBs mounted on the main controller. The main controller consists of an HP PLC5 interpreter with an HP LJIII emulation and the printer engine controller.

In active IPDS operation, the IntelliBar AS Net print server receives IPDS communications from the host and passes the data to a buffer in the IPDS interpreter. The interpreter then processes and transforms the IPDS data into HP PCL protocol. The PCL data stream is then passed to main printer controller for raster image processing and printing.

When in non-IPDS operation, the IntelliBar AS Net can receive PCL5 commands and ASCII data via the network. The non-IPDS data is passed through the IPDS interpreter to the main controller. The IPDS interpreter in this mode performs no operations.

The dual emulations and multiprotocol network support featured in all IntelliBar AS Net printers allow multiple host computers to share an IntelliBar AS Net printer in mixed IBM/ASCII networks. Almost any host can share an IntelliBar AS Net printer on virtually any network.

1.1.1 IntelliBar AS Net printers Features and Benefits

IntelliBar AS Net printers offer IPDS LAN bar code label printing with web browser-based management in one integrated solution. There are no external hardware devices or additional power supplies required to integrate an IntelliBar AS Net printer into an AS/400 or iSeries TCP/IP network.

IntelliBar AS Net printers support most network protocols, network operating systems in any Ethernet network environment and can be used over the Internet.

IntelliBar AS Net printers feature multiprotocol network support for all of the popular ASCII network protocols including TCP/IP, IPX/SPX, Direct Mode IPX, DLC/LLC, NetBEUI, Apple TCP/IP, Novell Netware ® NEST ® protocol stack for full Novell Directory Services (NDS) support, Direct Mode IP (Windows (TM) 95/98 TCP/IP Peer-to-Peer), DLC/LLC protocols, SMTP, and POP3/SNMP for use with Unix, Linux, Microsoft Windows.

Advanced network capabilities such as multiple services per port, programmable setup/reset strings, IP security, and character substitution allow IntelliBar AS Net printers to handle virtually any network printing situation.

IntelliBar AS Net printers offer a variety of ways to manage the print server, including Windows and DOS-based utilities, web browser, HP Web Jetadmin, and Telnet remote console. IntelliBar AS Net printers feature an embedded web server that offers a comprehensive network and IPDS management facility that can be accessed using any Internet browser without the need for special software on the PC or application/file server.

IntelliBar AS Net printers have the highest overall printing throughput capabilities in the industry with the ability to print 300 x300 dpi at speeds up to12 inches per second thereby offering unsurpassed high speed, high resolution AFP/IPDS label printing performance.

1.1.2 Supported IPDS Functions

IntelliBar AS Net printers support all eight IPDS command sets (towers):

- **Device control**. Commands used to set up the page, communicate device controls, and manage host/printer communicatons.

- **Text.** Commands used to present text in formation on a page, page segment, or overlay.

- **IM-Image.** Function set containing the IPDS commands required to output uncompressed raster data on a page, page segment, or overlay.

- **IO-Image.** Commands used to output compressed raster data on a page, page segment, or overlay. Supported functions include decompression (group-3, group-4, and IBM-MMR) and scaling.

- **Graphics.** Commands used to present vector graphics on a page, page segment, or overlay. These include line drawings, arcs, shaded areas, etc.

- **Bar Code.** Commands and data controls used to present bar codes.

- **Page Segment & Overlay.** Commands used to store and present page segments that contain text, graphics, image, and barcode elements and commands used to store and present overlays that contain text, graphics, image, and barcode elements.

- **Loaded Font.** Commands used to download and control host resident fonts.

1.1.3 Supported IPDS Fonts

The following fonts are supported in IPDS in all four degrees of rotation (0°, 90°, 180°, 270°).

IntelliBar AS Net Printer Supported IPDS Fonts				
FGID	**Font Style**	**CPI**	**Pt.**	**Sample**
3	OCR-B	10		ABCDEFG abcdefg 0123456789
11	Courier 10	10		ABCDEFG abcdefg 0123456789
12	Prestige Pica	10		ABCDEFG abcdefg 0123456789
18	Courier 10 Italic	10		*ABCDEFG abcdefg 0123456789*
19	OCR-A	10		ABCDEFG abcdefg 0123456789
46	Courier 10 Bold	10		**ABCDEFG abcdefg 0123456789**
85	Courier 12	12		ABCDEFG abcdefg
86	Prestige Elite 12	12		ABCDEFG abcdefg
87	Letter Gothic 12	12		ABCDEFG abcdefg
92	Courier 12 Italic	12		ABCDEFG abcdefg
111	Prestige Elite 12 Bold	12		**ABCDEFG abcdefg**
112	Prestige Elite 12 Italic	12		*ABCDEFG abcdefg*
159	Boldface	PS		**ABCDEFG abcdefg 0123456789**
203	Gothic Text 13.3	13.3		ABCDEFG abcdefg 0123456789
221	Prestige 15	15		ABCDEFG abcdefg 0123456789
223	Courier 15	15		ABCDEFG abcdefg 0123456789
254	Courier 17.1	17.1		ABCDEFG abcdefg 0123456789
256	Prestige 17.1	17.1		ABCDEFG abcdefg 0123456789
281	Letter Gothic 20	20		ABCDEFG abcdefg 0123456789
283	Gothic Text 20	20		ABCDEFG abcdefg 0123456789
290	Gothic Text 26.7	26.7		ABCDE abcde 0123456789
304	Gothic Text (scaleable)		Scalable	ABCDEFG abcdefg
305	OCR-A (scaleable)		Scalable	ABCDEFG abcdefg 0123456789
306	OCR-B		Scalable	ABCDEFG abcdefg 0123456789
318	Prestige Bold		Scalable	**ABCDEFG abcdefg**

319	Prestige Italic		Scalable	*ABCDEFG abcdefg*
400	Letter Gothic		Scalable	ABCDEFG abcdefg
404	Letter Gothic Bold		Scalable	**ABCDEFG abcdefg**
416	Courier		Scalable	ABCDEFG abcdefg
420	Courier Bold		Scalable	**ABCDEFG abcdefg**
424	Courier Italic		Scalable	*ABCDEFG abcdefg*
428	Courier Italic Bold		Scalable	***ABCDEFG abcdefg***
432	Prestige		Scalable	ABCDEFG abcdefg
751	Times Roman 8pt		8	ABCDEFG abcdefg 0123456789
760	Times Roman 6pt		6	ABCDEFG abcdefg 0123456789
762	Times Roman 14pt		14	ABCDEFG abcdefg 0123456789
1051	Times Roman 10pt		10	ABCDEFG abcdefg 0123456789
1351	Times Roman 12pt		12	ABCDEFG abcdefg 0123456789
1803	Times Roman 18pt		18	ABCDE abcdeg 0123456789
2103	Times Roman 24pt		24	ABCD abcd 01234
2304	Helvetica		Scalable	ABCDEFG abcdefg 0123456789
2305	Helvetica Bold		Scalable	**ABCDEFG abcdefg 0123456789**
2306	Helvetica Italic		Scalable	*ABCDEFG abcdefg 0123456789*
2307	Helvetica Bold Italic		Scalable	***ABCDEFG abcdefg 0123456789***
5687, 2308	Times New Roman		Scalable	ABCDEFG abcdefg 0123456789
5707, 2309	Times Roman Bold		Scalable	**ABCDEFG abcdefg 0123456789**
5815, 2310	Times Roman Italic		Scalable	*ABCDEFG abcdefg 0123456789*
5835, 2311	Times Roman Bold Italic		Scalable	***ABCDEFG abcdefg 0123456789***
20224	Boldface		Scalable	**ABCDEFG abcdefg 0123456789**

1.1.4 Supported IPDS Barcodes

IntelliBar AS Net printers support following list of IPDS bar codes in all four orientations (0, 90, 180, 270).

IntelliBar AS Net Supported IPDS Bar Codes
Codabar 2-of-7
Code 3-of-9
USS Code-128
EAN (2-digit supplement)
EAN (5-digit supplement)
EAN-13
EAN-8
Industrial 2-of-5
Interleaved 2-of-5
Matrix 2-of-5
MSI
POSTNET
UPC (2-digit supplement)
UPC (5-digit supplement)
UPC-A
UPC-E

1.2 NETWORK INSTALLATION

IntelliBar AS Net printers are intended for Ethernet 10BaseT and 100BaseT networks using CAT 5 unshielded twisted pair cable.

1.3 NETWORK CONFIGURATION AND MANAGEMENT

IntelliBar AS Net printers can be conveniently configured by the following methods:

1.3.1. XAdmin32 print server configuration utility (Recommended).

1.3.2 Browser network configuration utility that includes IPDS configuration (Recommended).

1.3.3 Hewlett Packard Web JetAdmin print server configuration utility.

1.3.4 Telnet Command Console.

2 Communications Ports And Diagnostic Interfaces

This section describes the communications ports and user diagnostic interfaces for the IntelliBar AS Net printer. The printer configuration and diagnostic functions are accessed through the front control panel. Operation of these functions is covered in the main IntelliBar Users Guide. Communications ports, Ethernet and IPDS status indicators and diagnostic DIP switches are located on the rear panel of the printer. This Section discusses the rear panel functions.

2.1 COMMUNICATIONS PORTS

IntelliBar AS Net printers feature three host communications ports for network, parallel and serial communications.

IntelliBar AS Net Communications Port Functions

Port	Primary Function
Ethernet 10BaseT	LAN Printing (IPDS + PCL + ASCII)
Centronics Parallel	PC-share and down load IPDS firmware
RS-232 Serial	PC-share / LAN share

2.1.1 **Ethernet Communications Port**. An RJ45 socket is provided for 10/100BaseT network connection.

2.1.2 **Parallel Communications Port.** A standard 36-pin Centronics port is provided for parallel communication from a PC or host terminal (ex., IBM 5250).

2.1.3 **Serial Communications Port**. An RS-232 DB nine-pin port is provided for serial communications from a PC or a host terminal.

2.2 LED STATUS INDICATORS

2.2.1 Print Server Status Indicators.

Five vertically arrayed network LED status indicators (in ascending order Red, Green, Yellow, Green, Yellow that respectively represent TEST/ERROR, LINK, XMIT, POL, RCV) are located directly below the RJ45 Ethernet socket.

2.2.1.1 The red TEST/ERROR LED indicates the functionality of the IntelliBar print server. The TEST/ERROR LED will light up during power on self-test when the printer is powered on. If the TEST/ERROR LED stays constantly lit or blinks for more than once per second, an error or fault condition is indicated.

2.2.1.2 The lower green LINK LED indicates network activity. The LINK LED activity is dependent on whether or not a valid network connection is established. The LINK LED blinks when there is an active network connection.   If the LINK LED does not light or blink, then there is no valid network connection.

2.2.1.3 The lower yellow XMIT LED indicates 10BaseT network connection status. The XMIT LED will light and stay on if there is a good 10BaseT Ethernet connection and will blink when network traffic is being transmitted.

2.2.1.4 The upper green POL LED indicates the network socket polarity. The POL LED will come on based on what the print server detects on the network. The POL LED activity is dependent on whether or not a valid network connection is established. The POL LED blinks when there is an active network connection.   If the POL LED does not light or blink, then there is no valid network connection.

2.2.1.5 The upper yellow RCV LED indicates 10BaseT network connection status. The RCV LED will light and stay on if there is a good 10BaseT Ethernet connection and will blink when network traffic is being transmitted or received.

2.2.2 IPDS Status Indicators.

A combination green/red IPDS LED status indicator located directly above the DIP switches indicates the status of IPDS printing, diagnostic mode status and the status of firmware installations.

- The green IPDS LED will light and stay on when the IPDS interpreter is active (Port 5001 is open - the IPDS service resides on PORT 5001 of the IntelliBar AS Net print server). While in this mode the IntelliBar AS Net printer will execute all IPDS commands and reply to all AFP queries. The printer will remain in IPDS mode until the host terminates the session and closes the port. When the port is closed the green IPDS LED will go out. Once port 5100 is closed other clients can request printing services. Locking port 5100 while in active IPDS mode ensures that a running print job is not interrupted by a print job request from another client.

- The green IPDS LED will light and stay on when the IPDS interpreter is in the diagnostic mode awaiting diagnostic configuration or execution.

- The green IPDS LED will flash when executing a diagnostic function.

- The red IPDS LED will light briefly upon power up to indicate a self-test is being performed. If the red IPDS LED lights and stays on, a fault condition is indicated.

- Both the green and red IPDS LEDs will alternately flash when a firmware update is being downloaded to the IPDS interpreter.

- Both the green and red IPDS LEDs will alternately flash when ASCII data is printing. The IntelliBar AS Net printer is fully compatible with all ASCII printing environments.

2.2.3 Label Gap Sensor Indicator.

A single red label gap (the gap is the space between die cut labels) sensor LED status indicator is located behind the controller mounting bracket to the right of the DIP switches. The gap sensor LED indicates the status of the label gap sensor. If the label gap sensor is properly adjusted, the label gap sensor LED will flash when a label gap passes through the gap sensor array. If the sensor is not adjusted properly the label gap sensor cannot sense the gap and the LED will either not light (the sensor is under adjusted) or will stay on constantly (the sensor is over adjusted).

2.3 DIAGNOSTIC DIP SWITCHES

IntelliBar AS Net printers feature a bank of four DIP switches located directly above the RJ45 Ethernet socket. The switches are mounted in a vertical array and are numbered 1 through 4 in ascending order. When a DIP switch is toggled to the left, it is in the OFF position and when toggled to the right, it is in the ON position.

The switches are used to configure the printer for the following diagnostic functions to:
- print a self test label that shows the printer IPDS and network settings
- set the printer to output EBCDIC hex dump
- reset the printer to IPDS and print server factory default settings
- enable IPDS printing on the parallel port

See Section 5.1.3 for DIP switch setting details.

Note: The IntelliBar AS Net IPDS configuration can also be set via a browser or via data stream commands. See Section 5 for details.

Dip Switch Layout
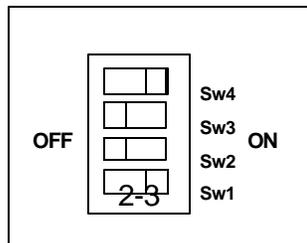
3 Printer Set Up and Network Configuration

This section provides step-by-step instructions for setting up an IntelliBar AS Net printer for OS/400 TCP/IP networks.

3.1 PRINTER SETUP

Verify the printer setup and confirm its operational status.

3.1.1   Load labels and ribbon into the printer. Verify that the media follows the correct path through the print station and that the print head adjustments are set correctly for the type of label being used (see the IntelliBar Users Guide for details).

3.1.2   Verify that the appropriate parameters for printer operation are entered in the printer control panel.

3.1.3   Print a test page from the printer control panel (see the IntelliBar User's Guide for details) to confirm that the printer is operating correctly.

3.1.4   Print configuration self-tests to confirm that the IPDS interpreter and print server are communicating correctly with the main controller (See Section 5.1.2 for instructions how to print a self-test using the DIP switches on the rear of the printer). Save the self-test print out, since you will need to know the print server IP and MAC addresses when configuring the server IP address for your network.

> NOTE: In the following example of a self-test print out, the IP address is the factory default address: 192.0.0.192.
>
> The 'Ethernet:' address printed on the self-test print out is the same as the MAC address.

IntelliBar AS Net Print Server Configuration Self-Test Printout

```
%!PS-Adobe
/Courier findfont 12 scalefont setfont
36 700 moveto
[
% --------------- Print Server Status ---------------
( XCD XJetIV-PLUS                          EN_SNAP  Unknown
( FW Ver. XJ8-3.78 (2000.07.18)
( Boot Ver. 6.5                            AppleTalk Name:
( Ethernet: 00-40-17-06-90-D8             XCD_0690D8_P1_AT
( Node name:                               AppleTalk Zone:
( XCD_0690D8
( .
( Active services:                         NetBIOS Computer Name:
( IPDS                                     XCD_0690D8
( BINARY_P1                                NetBIOS Domain:
( TEXT_P1                                  WORKGROUP
( POSTSCRIPT_P1                            Primary WINS server
( PCL_P1                                   0.0.0.0
( XCD_0690D8_P1_AT                         Secondary WINS server
( .                                        0.0.0.0
( TCP/IP       Enabled
( Netware      Enabled                     NETWORK STATISTICS
( AppleTalk    Enabled                     Packets Received
( POP3         Enabled                     Bytes Received
( DLC          Enabled                     Bad Packets Received
( NetBIOS/IP   Enabled                     Receiver error mask
( NetBEUI      Enabled                     Receiver overruns
( LAT          Enabled                     Packets Transmitted
( Banyan       Disabled                    Bytes Transmitted
( .                                        Packet Collisions
( IP address    192.0.0.192                Transmit packet fail
( Subnet mask   0.0.0.0                    Transmit error mask
( IP Gateway    0.0.0.0
(  (set manually)
( Boot method   AUTO
( Boot tries    3
( .
( Netware Status:  No servers
(    enabled
( .
( .
[ .
( Netware Retries:            0
( Frame type  Network     Count
( EN_II    Unknown          4
( EN_802.2 Unknown         30
( EN_802.3 Unknown          2
% ---------------------------------------------------
]
( show currentpoint 14 sub exch pop 36 exch moveto ) forall
showpage
%%EOF
```

3.2 NETWORK SETUP

3.2.1 Printer to Network Physical Connection.

Connect the printer RJ45 port to a network hub, switch or router using CAT 5 unshielded twisted pair cable.

3.2.1.1 Assign Printer IP Address

Install the printer on the AS/400 or iSeries host network by setting the IP address, subnet mask and gateway. Assign an IP address to the IntelliBar AS Net printer using one of the following network configuration utilities: XAdmin32 (Recommended), HP Web Jetadmin or Telnet.

> Note: Consult your system manager before assigning IP addresses to the print server in order to avoid IP address duplications. Your network administrator will need to issue a unique static IP address for the printer. Make sure that the printer IP address is on the same TCP/IP network and sub-net as the host computer.
>
> You will need to know the IntelliBar AS Net print server IP address in order to access the print server with XAdmin32. Refer to the print server test page you printed in Section 3.1.4 above.
>
> All IntelliBar AS Net print servers are shipped with the factory default IP address of 192.0.0.192. XAdmin32 recognizes the factory default address as an unconfigured print server.
>
> In order to configure using a web browser, the IntelliBar print server IP address must first be configured for your network using XAdmin32.

3.2.1.2 Configure the IntelliBar print server using XAdmin32 (Recommended Configuration Utility).

XAdmin32 is a 32-bit Windows graphical interface utility for configuration and management of the IntelliBar AS Net print server. XAdmin32 works on Windows 95/98, NT, 2000 or XP using the TCP/IP or IPX/SPX protocols.

3.2.1.2.1 Install XAdmin32 on a PC Workstation.

Find the copy of Xadmin32 on the CD ROM supplied with your printer or download a free copy from http://www.intellitech-intl.com and install it on a PC workstation that is on the same network as the printer. Follow the XAdmin32 setup instructions on the screen to complete the installation.

A. **Launch XAdmin32.** In the windows program menu double click on the XAdmin32 icon to launch the program. When launched, XAdmin32 automatically searches the network for configured and unconfigured IntelliBar AS Net print servers on the network using the default TCP/IP and IPX/ SPX filters.

B. **XAdmin32 network search return of configured print servers.** If there are configured IntelliBar AS Net print servers located on the network and if they have the same primary IP address as the network, they will appear in a list the search return window. To modify configured devices, see Step J. below. In the following XAdmin32 main view, the TWC_8A9D54 device is already configured on the network and has the IP addresses of 192.168.1.8.

XAdmin32 Network Search Return Window
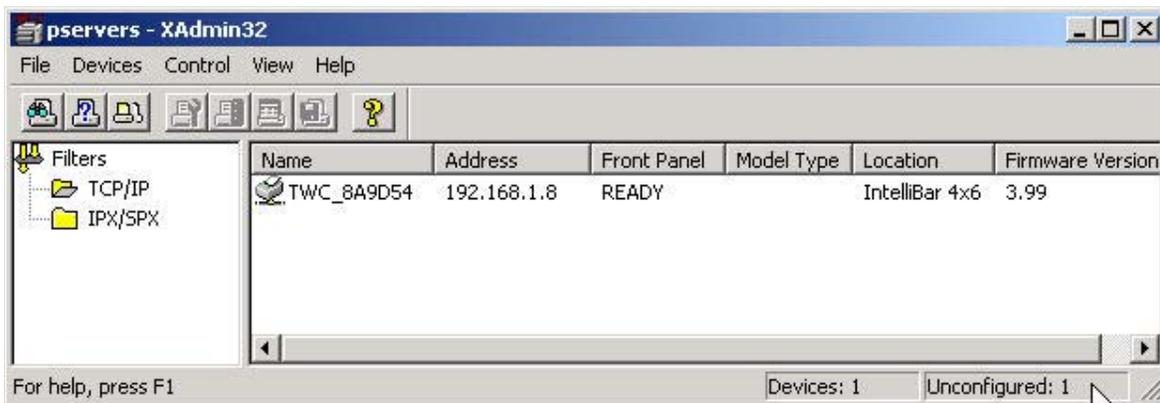
C. **XAdmin32 network search return of unconfigured print servers.** If there are unconfigured IntelliBar AS Net print servers located on the network, the number of unconfigured devices will be listed in lower right hand window of the XAdmin32 main window (unconfigured devices will not appear in the main search return window list). In the previous view one (1) unconfigured print server has been discovered.

D. **Access unconfigured print servers.** To access unconfigured print servers, click on the 'Devices' tab. The 'Setup Unconfigured Devices' selection will be enabled if unconfigured print servers were discovered on the network. To configure unconfigured print servers, go to Step E. below. The following figure shows the Setup Unconfigured Devices menu.

XAdmin32 Setup Unconfigured Devices Menu
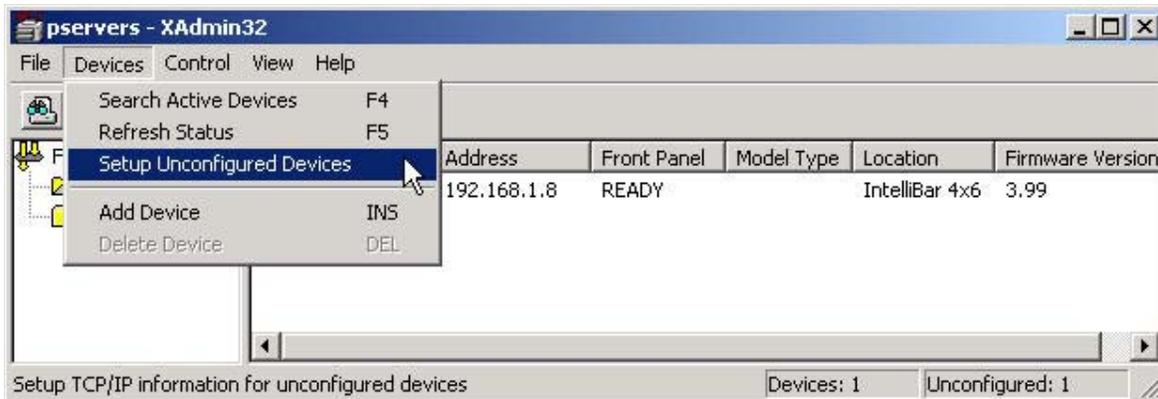
Note: If there are no unconfigured print servers on the network, the 'Setup Unconfigured Devices' selection will not be enabled.

If the IntelliBar AS Net print server has been configured but is set for an IP address other than that of your network, XAdmin32 will not recognize the print server as either a configured or unconfigured device. In order for XAdmin32 to recognize the print server, the server must be reset to factory defaults as an unconfigured device.

To reset the IntelliBar print server to factory default settings using the DIP switches on the rear of the printer, see Section 5.1.2. After resetting a print server, print a configuration self-test using the DIP switches on the rear of the printer by following the instructions in Section 5.1.2.

The factory default settings for IntelliBar print servers are:
IP Address   192.0.0.192
Subnet   0.0.0.0
Gateway   0.0.0.0

E. **Select a new print server to configure.** To configure new print servers click the 'Setup Unconfigured Devices' button in the tool bar (the third button from the left) or select the 'Setup Unconfigured Devices' choice in the 'Devices' tab drop down menu. The 'Configure New Print Servers' window will open that shows the MAC addresses of unconfigured devices on the network. Compare the 'Ethernet:' address on the self-test page you printed in Section 3.1.4 to the MAC Address list in the window (the 'Ethernet:' address on the self-test print out is the device's MAC address).

XAdmin32 Configure New Print Servers Window

F. **Configure new print server IP address.** Match the address in the list to your test page address. Double click on the desired address or click once on the address and then click on the configure button. The 'Configure TCP/IP Address' window will open.

XAdmin32 Configure TCP/IP Address Window
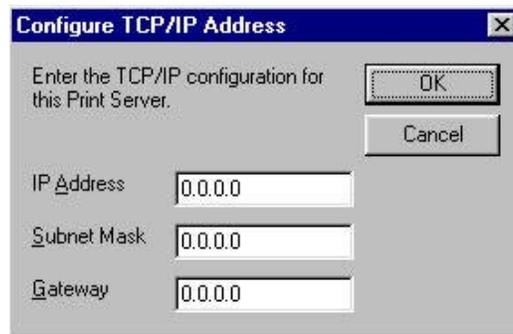
G. Configure the IP, Subnet and Gateway addresses as desired and click 'OK'. In the following example the print server has been configured with the IP address of 192.168.1.38 along with Subnet Mask and Gateway addresses.

XAdmin32 Completed TCP/IP Configuration
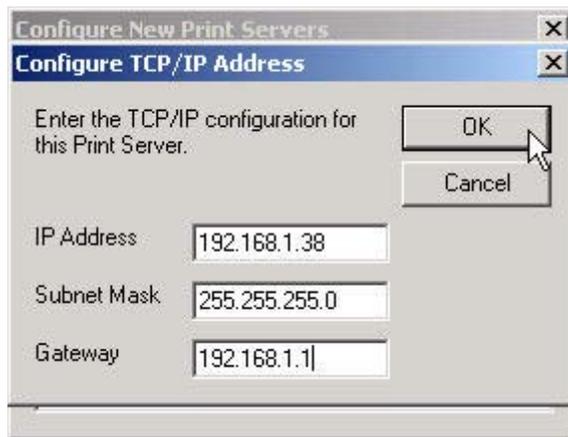
H. **Confirm new IP address.** After clicking 'OK" XAdmin32 conducts another network search and returns a list of print servers discovered on the network. The IntelliBar AS Net print server should appear in the search return window (the default device name will be 'XCD_*xxxxxx*,' where '*xxxxxx*' are the last six digits of the Ethernet (MAC) address).

XAdmin32 Search Window Return with 192.168.1.38
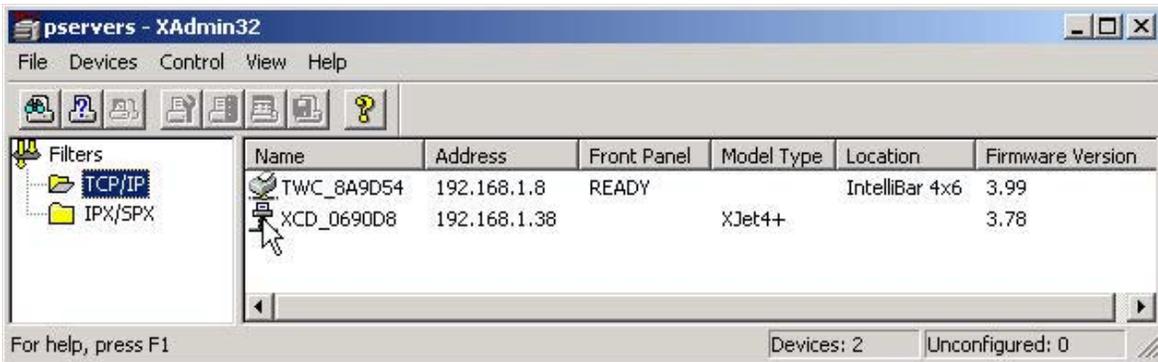
I.   If the newly configured print server does not appear in the search return window, click on the 'Devices' tab and select 'Search Active Devices.' The IP address you just entered will appear in the search return window.

XAdmin32 Search Active Devices
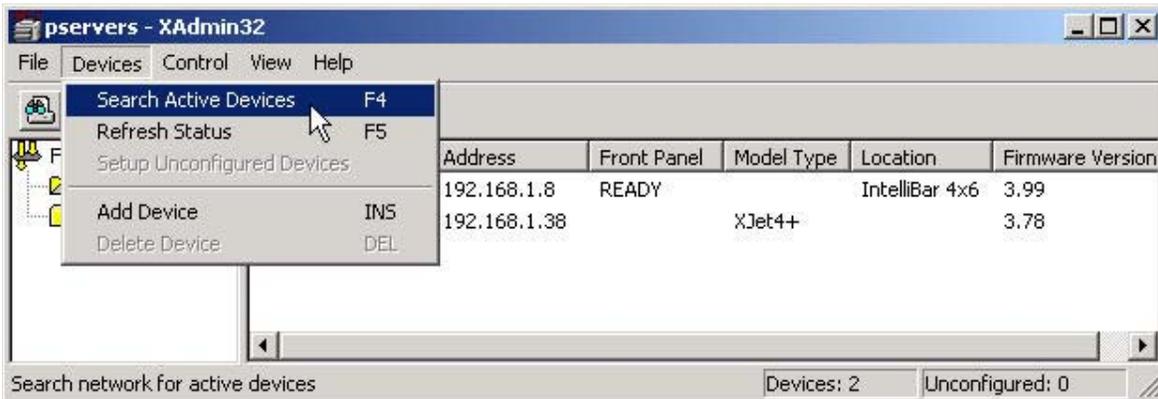
J.   Double click on the IntelliBar AS Net print server to be configured. A menu window will open. Select the 'Configure Device' option.

XAdmin32 Select Device to Configure
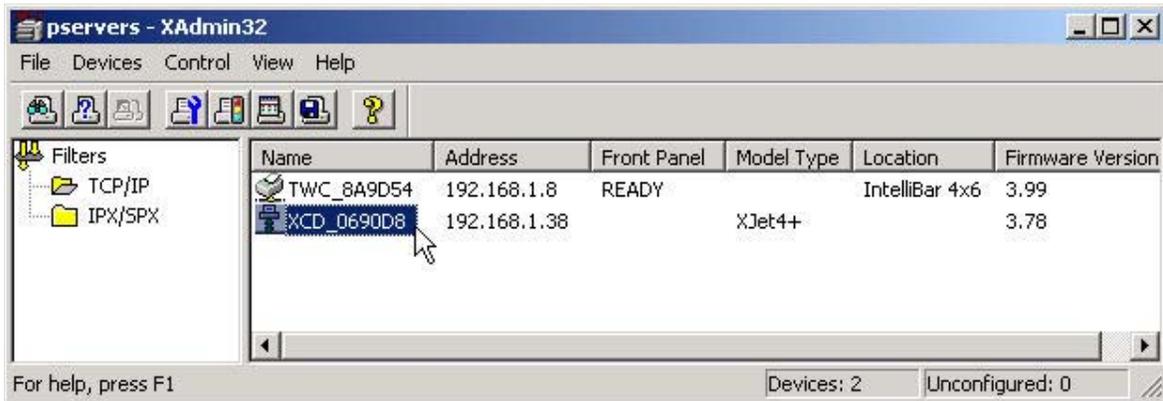
K. The 'Password' window will open and you will be prompted to enter a password. Type the password 'access' in the window ('access' is the default password and it is not case sensitive) and click 'OK.'

XAdmin32 Password Window

L. The XAdmin32 general services configuration window will become accessible. You are now able to select the service that you wish to configure by clicking on the respective tab.

XAdmin32 General Services Configuration Window
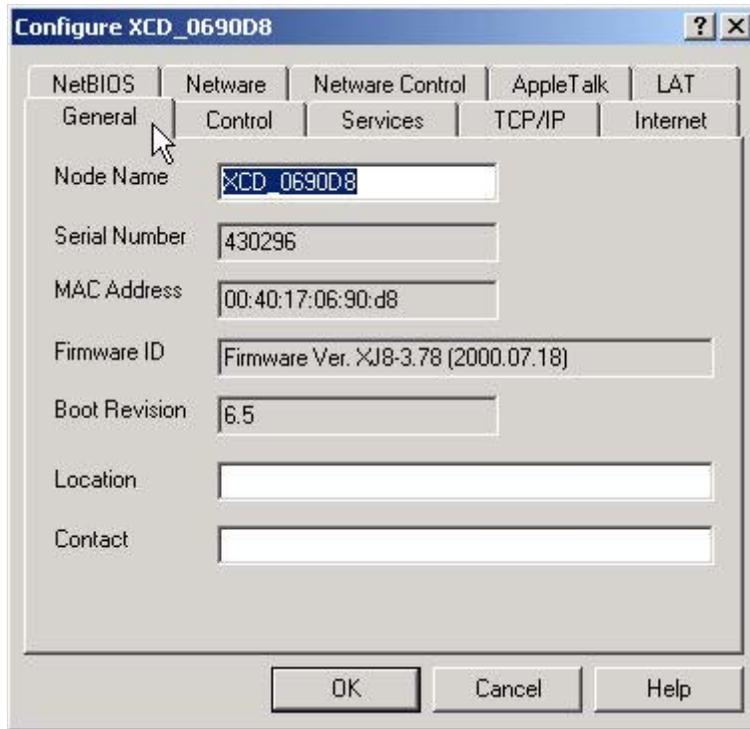
At this time select the TCP/IP tab and configure the IP addresses as required.

Note: IntelliTech recommends that the 'IP Config' (address boot) setting = 'Static,' that the 'Timeout' setting = '0,' and that the 'Keepalive Timer' = 1.

Setting the IP address boot to 'Static' ensures that the print server retains a permanent IP address. This is important in order to maintain print queue settings in systems that dynamically assign IP addresses. Setting the Timeout to '0' will ensure that the IntelliBar printer remains in constant contact with the host. Setting the Keepalive Timer to '1' will provide frequent confirmation to the host that the print server is still active on the network.

To set IP Config and Timeout, click on the TCP/IP tab of the configure window, click on the 'Static' button under the IP Address section and enter '0' in the 'Timeout' section window.

The Keep Alive Timer is set through the print server's embedded web server that is accessed via a web browser. (See Section 3.2.1.3). The Keep Alive Timer is located in the TCP/IP settings. Enter '1' in the Keep Alive Timer window.

XAdmin32 TCP/IP Services Configuration Screen
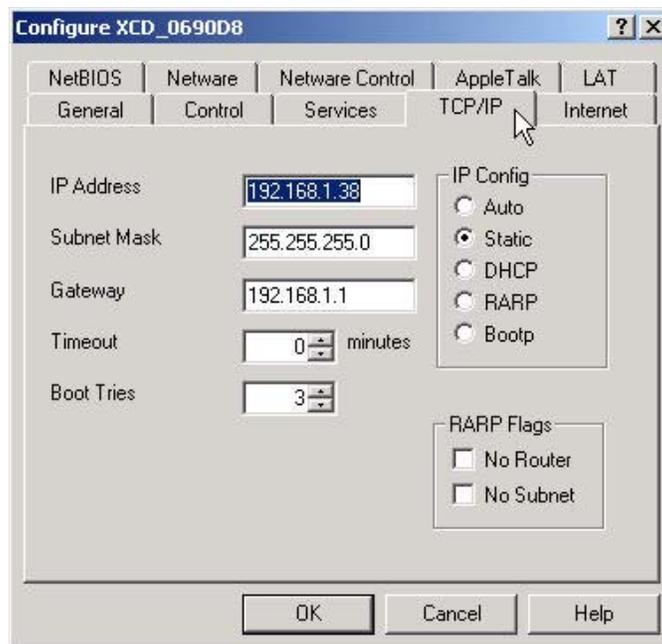
Note: The IntelliBar Net printer's raw port is 9100. This port name
must be specified when creating the out queue on the host computer.

3.2.1.3 Configure the IntelliBar print server using a web browser.

The IntelliBar AS Net print server features an embedded web server that provides the capability
to set network and IPDS configurations with a standard web browser such as Netscape Naviga-
tor or Microsoft Internet Explorer. In order to access the IntelliBar web server, verify that a web
browser is installed on your computer and that you have configured an IP address in both the
computer and the print server. TCP/IP must be configured to communicate over the local area
network and must be on the same subnet.

A. To access the embedded IntelliBar web server, start your web browser, enter the IP ad-
dress of the print server as the destination web site and push enter. The main page of the
web server will appear.

IntelliBar AS Net Main Browser Page
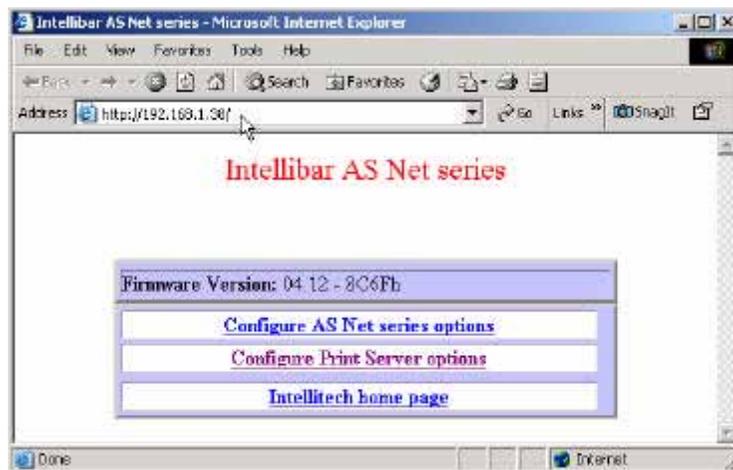
B. Select 'Configure Print Server options. The 'Network Card Access Password' window
will open. Enter the password 'access' ('access' is the default password) and click the
'Submit' button.

IntelliBar Browser Password Window

C. The Network Configuration page will open. Select the protocol or other item that you wish to configure. You will then be connected to the appropriate web page for configuration of that item. You may use the normal browser buttons to move forward and backward through the web pages. When you have completed the configuration exit the browser. Your settings will have already been entered in the print server. At this time click on the TCP/IP Link.

IntelliBar Browser Network Services Configuration Page
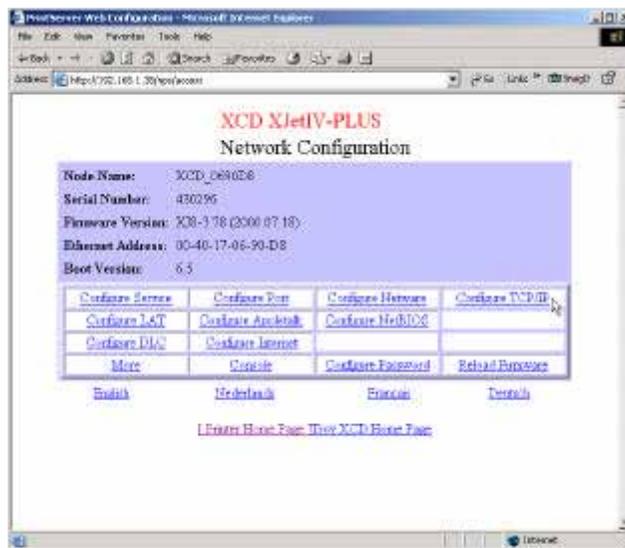
Note: IntelliTech recommends that the 'IP Config' (address boot) setting = 'Static,' that the 'Timeout' setting = '0,' and that the 'Keepalive Timer' = 1.

Setting the IP address boot to 'Static' ensures that the print server retains a permanent IP address. This is important in order to maintain print queue settings in systems that dynamically assign IP addresses.

Setting the Timeout to '0' will ensure that the IntelliBar printer remains in constant contact with the host.

Setting the Keepalive Timer to '1' will provide frequent confirmation to the host that the print server is still active on the network.

To set the IP address boot, Timeout and Keep Alive Timer, click on the TCP/IP tab in network configuration page.

IntelliBar Browser TCP/IP Configuration Page

3.2.1.4   Configure the IntelliBar print server using HP Web Jetadmin.

The IntelliBar AS Net print server works transparently with the HP Web JetAdmin utility. HP Web JetAdmin configures the IntelliBar AS Net print server with a standard web browser such as Netscape Navigator or Microsoft Internet Explorer. Before using HP Web JetAdmin, verify that a web browser is installed on your computer and that there is a configured an IP address in both the computer and the print server. TCP/IP must be configured to communicate over the local area network.

A.   Download a free copy of HP Web Jetadmin from the HP website,

www.hp.com/go/webjetadmin.   Select, download and install the appropriate version of Web Jetadmin for your workstation operating system following the instructions provided by the download installer.

B. After you have completed the installation, you may use a web browser to access the print server.

C. Start the browser and connect to the Web JetAdmin home page.

D. Click on the 'Find Device' tab and then click on 'Find All Devices' to get a list of all Web JetAdmin compatible print servers (or you may limit your search by using the 'Advanced Search' method). The IntelliBar print server will appear in the list of configured print servers if IPX is running on the computer or the print server is configured with a valid IP address.

E. Click on the desired print server name, and the Properties page will be displayed for that print server.

F. If the IntelliBar AS Net print server address does not appear in the list, then select 'Device' from the menu bar and click on 'New.'

G. Select the IntelliBar AS Net print server from the list of unconfigured devices and then press 'Modify' button (or select Device and then Modify from the menu bar) to change the print server configuration.

H. Click on the 'Config' tab to configure the print server.

I. Enter the requested information, including the IP address, subnet mask, and gateway.

J. Click 'Close' to return to the list of configured print servers.

3.2.1.5   Configuring the IntelliBar print server using Telnet.

IntelliBar AS Net print servers may be configured by using the Telnet console available on most operating systems. See Appendix B for a listing of IntelliBar Telnet commands.

4 AS/400, iSeries Host Set Up

This section explains the system requirements and host set up instructions for AFP/IPDS TCP/IP printing to an IntelliBar printer.

4.1   HOST SETUP OVERVIEW

The AS/400 or iSeries host setup process consists of the following steps:

Verify that valid TCP/IP settings have been configured on both the host computer and the IntelliBar AS Net print server.

If the host and the printer are not on the same LAN segment, verify that a route has been defined in the TCP/IP route list. If a route does not exist, use the ADDTCPRTE command to add one.

    A. Verify that TCP/IP has been started using the STRTCP command.

    B. Verify that the IntelliBar AS Net printer can be pinged successfully from the <u>host</u> computer (not from a workstation).

    C. Verify that PSF/400 is installed on your host.

    D. Verify that the latest OS/400 PTFs for your OS version are installed.

    E. Configure the OS/400 commands. Depending on the version and release of the OS/400, configure the descriptions according to the instructions in one of the following Sections:

Section 4.4	Configuring 0S/400 V3R1
Section 4.5	Configuring OS/400 V3R2
Section 4.6	Configuring OS/400 V3R6
Section 4.7	Configuring OS/400 V3R7, V4R3 and V4R4
Section 4.8	Configuring OS/400 V4R5, V5R1 and V5R2

    F. Create a printer device description by configuring the CRTDEVPRT command (Create Device Description (Printer)).

    G. Create a PSF configuration using either the WRKAPF2 command or the CRTPSFCFG command (Create PSF Configuration) depending on the OS/400 version and revision level.

> Note: Depending on OS/400 version use `WRKAPF2` command (V3R1 or V3R6) or `CRTPSFCFG` command (V3R2, V3R7 and later).
>
> In V3R1 and V3R6, `WRKAFP2` is used to specify `RMTLOCNAME, PORT,` and `ACTTMR`, along with other parameters for PSF. In V3R2, V3R7 and later, `CRTPSFCFG` (Create PSF Configuration Object), which replaced `WRKAFP2`, is used to specify these same parameters, along with other parameters. The PSF configuration object created with the `CRTPSFCFG` command is used by PSF/400 when printing IPDS files. The object is used only if the object is in the `QGPL` library and has the same name as the printer device description. This information overrides the `APPC` configuration information specified in the printer device description.
>
> For a more complete description of the configurations, link to the following IBM Document, [Configuring a *LAN IPDS Device Description](#), for details.

H. CRTPSFCFG creates a PSF configuration object to specify a TCP/IP attached printer. Specifying values for the remote location and TCP/IP port with CRTPSFCFG overrides the SNA configuration parameters specified in the printer device description. A PSF Configuration (PSFCFG) object is defined within a LAN IPDS Device Description, thus it is a good idea to name the CRTPSFCFG command the same name as the CRTPSFCFG command.

I. Vary the printer ON using the VFYCFG command.

J. Verify the IPDS.

K. Send a test file print job to the printer.

4.1 SUPPORTED IBM SOFTWARE

IntelliBar AS Net printers support the following IBM OS/400 services:

- OS/400 Operating System V3R1, V3R2, V3R6, V3R7, V4R1, V4R2, V4R3, V4R4, V4R5, V5R1, V5R2 or later using PSF/400. PTF SF29249 WRKAFP2 is required to print IPDS over TCP/IP through PSF/400 with V3R1 or V3R6.

- Print Services Facility (PSF) Version 3.1 or later, PSF/400.

- PSF/MVS 2.2 or later

- PSF/VSE 2.2 or later with APAR/PTF: DY45247/UD51162

- PSF/VM Version 2.1 or later with APAR PQ39895 (PTF UQ45995)

- PSF for AIX (PSF/6000) 2.1 or later.

- PSF for OS/2 (PSF/2) 2.0 or later.

4.2 SYSTEM REQUIREMENTS

The following system services are required for IPDS printing over TCP/IP.

A. Operating system. OS/400, V3R1 or later with accompanying PTFs as listed in the following table:

OS	Category	General	Sockets	Printer/ Network	WRLAFP	IPDS Pass Thru
V3R1	**Software**	Cum. tape C6198310 or later	PTF SF30018	PTF SF32911	PTF SF40039	
	Docs	Cover letters only: SF24140 IPDS Pass Through and SF35164 TCP/IP for PSF/400				
V3R2	**Software**			PTF SF33182		
	Docs	Standard V3R2 documentation.				
V3R6	**Software**	Cum. tape C5346360 or later	PTF SF30508	PTF SF33118	PTF SF31461	PTF SF45624
	Docs	Cover letter only: SF45620 (TCP/IP for PSF/400)				
V3R7	**Docs**	Standard V3R7 documentation.				
V4R1-R2	**Docs**	Standard V4R1-V4R2 documentation.				
V4R3-R5	**Docs**	Standard V4R2-V4R5 documentation.				
V5R1-2	**Docs**	Standard V5R1-V5R2 documentation.				
* PSF/400 with supporting documentation APAR SA44304 is required for all OS/400 versions.						

Table title: OS/400 System Requirements*

B. Print services facilities. PSF/400 is required. To verify that PSF/400 is installed on your system, type 'GO LICPGM' in a command line to display the 'Work with Licensed Programs' screen. Select option '10' and press the enter key to view the 'Display Installed Licensed Programs' screen. The PSF/400 licenses are as follows:

OS/400 Version/ Release	PSF/400 License Number
V3R1, V3R2	5763SS1

V3R6, V3R7	5716SS1
V4R1- V4R5	5769SS1
V5R1M0	5722SS1

C. TCP/IP. TCP/IP loaded and configured and the latest relevant PTFs applied. Go to IBM Technical Document 8203740, V4RxMx PTF Listing for TCP/LAN Printing, for print related TCP Fixes for OS/400.

The following sections provide differing instructions for various OS/400 configurations. Refer to your OS/400 version and revision level to reference the appropriate section.

4.3 CONFIGURING AS/400 V3R1

This Section provides the required settings for the CRTDEVPRT command and WRKAFP2 command used to configure OS/400 V3R1 to print to an IntelliBar AS Net printer.

4.3.1 V3R1 CRTDEVPRT Command.

Use the following user defined settings to create the device description:

A. Device Description (DEVD). Enter a name or description for the IntelliBar AS Net printer being configured (ex., M48ASN). The description must match the "DEVD" description in the WRKAFP2 command.

B. Device Class (DEVCLS). Select *RMT

C. Device Type (TYPE). Select *IPDS.

D. Device Model (MODEL). Select 0.

E. Advanced Function Printing (AFP). Select *YES.

F. AFP Attachment (AFPATTACH). Select *APPC.

G. Font (FONT). Select 11.

H. Print While Converting (PRTCVT). Select *YES

I. Remote Location (RMTLOCNAME). Enter the IntelliBar AS Net print server IP address.

J. Form Feed (FORMFEED). Select *AUTOCUT.

K. Text description of the printer (TEXT). Enter a name or description for the IntelliBar AS Net printer being configured (ex., `M48 AS Net Printer`).

Enter the following commands on the command line to configure `CRTDEVPRT` for **V3R1**:

```
CRTDEVPRT DEVD('M48ASN') DEVCLS(*RMT) TYPE(*IPDS) MODEL(0) AFP(*YES)
          AFPATTACH(*APPC) FONT(11) PRTCVT(*YES) RMTLOCNAME('0.0.0.0')
          FORMFEED(*AUTOCUT) TEXT(<M48 AS Net Printer>)
```

The `CRTDEVPRT` screen will appear as follows:

```
                          Display Device Description  Page 1
5763SS1 V3R1M0  889844                            IIIBAR1   10/21/03
07:53:23
 Device description . . . . . . . . :   DEVD       M48ASN
 Option . . . . . . . . . . . . . . :   OPTION     *ALL
 Category of device . . . . . . . . :              *PRT
 Automatically created  . . . . . . :   NO
 Device class . . . . . . . . . . . :   DEVCLS     *RMT
 Device type  . . . . . . . . . . . :   TYPE       *IPDS
 Device model . . . . . . . . . . . :   MODEL      0
 Advanced function printing . . . . :   AFP        *YES
 AFP attachment . . . . . . . . . . :   AFPATTACH  *APPC
 Online at IPL  . . . . . . . . . . :   ONLINE     *YES
 Font . . . . . . . . . . . . . . . :   FONT
   Identifier . . . . . . . . . . . :              011
   Point size . . . . . . . . . . . :              *NONE
 Form feed  . . . . . . . . . . . . :   FORMFEED   *AUTOCUT
 Separator drawer . . . . . . . . . :   SEPDRAWER  *FILE
 Separator drawer . . . . . . . . . :   SEPDRAWER  *FILE
   Library  . . . . . . . . . . . . :
 Printer error message  . . . . . . :   PRTERRMSG  *INQ
 Message queue  . . . . . . . . . . :   MSGQ       *CTLD
   Library  . . . . . . . . . . . . :                  *LIBL
Maximum pending requests . . . . . :   MAXPNDRQS  6
Print while converting . . . . . . :   PRTCVT     *YES
Print request timer  . . . . . . . :   PRTRQSTMR  *NOMAX
Form definition  . . . . . . . . . :   FORMDF     F1C10110
   Library  . . . . . . . . . . . . :                  *LIBL
Character identifier . . . . . . . :   CHRID      *SYSVAL
Remote location  . . . . . . . . . :   RMTLOCNAME 0.0.0.0
Local location . . . . . . . . . . :   LCLLOCNAME *NETATR
Remote network identifier  . . . . :   RMTNETID   *NETATR
Mode . . . . . . . . . . . . . . . :   MODE       QSPWTR
Text . . . . . . . . . . . . . . . :   TEXT       M48 AS Net Printer
              * * * * *  E N D   O F   L I S T I N G  * * * * *
```

4.3.2 V3R1 WRKAFP2 **Command.**

The WRKAFP2 command is used to configure AFP for OS/400 V3R1. WRKAFP2 is contained in a PTF. To find the PTF that contains WRKAFP2, see "OS/400 System Requirements" in Section 4.2 above.

> Note: WRKAFP2 creates a data area in library QGPL. This data area must have the same name as the printer device description.

Use the following user defined settings to create the AFP description:

A. Device Description (DEVD). Enter a name or description for the IntelliBar AS Net printer being configured (ex., M48ASN). The description must match the "DEVD" description in the CRTDEVPRT command.

B. IPDS pass through (IPDSPASTHR). Select *YES to print SCS files (transforms SCS into IPDS). Select *NO to print only IPDS files.

C. TCP/IP support (TCPIP). Select *YES.

D. Remote system (RMTSYS). Enter the IntelliBar AS Net print server IP address.

E. Port (PORT). Enter 5001.

F. Activation timer (ACTTMR). Enter the number of seconds for PSF/400 to wait for the IntelliBar printer to respond to an activation request. If the printer will be used only by one system, use the default value (170 seconds). If the printer will be used by more than one system, select *NOMAX.

G. Inactivity timer (INACTTMR). Enter a value equal to or greater than the TCP/IP TIMEOUT setting on the IntelliBar print server. IntelliTech recommends *SEC15. This sets the time PSF/400 maintains a session with the IntelliBar when there are no Ready Status (RDY) spooled files.

Configure the V3R1 AFP description by typing the following command on the command line:

```
WRKAFP2 DEVD(M48ASNet) IPDSPASTHR(*YES) TCPIP(*YES) RMTSYS('0.0.0.0')
        PORT(5001) ACTTMR *NOMAX INACTTMR(*SEC15)
```

> Note: for the RMTSYS ('0.0.0.0') entry, enter the IntelliBar AS Net print server IP address.

The `QPQXWAFP` screen will appear as follows:

```
QPQXWAFP
--------
DEVD            M48ASN
IPDSPASTHR      *YES
TCPIP           *YES
RMTSYS          '0.0.0.0'
PORT            5001
ACTTMR          *NOMAX
INACTTMR        *SEC15
SBP             *NO
PSC             *NO
DRF             *NO
DRR             *NO
EDGSNSTV        *NO
```

The OS/400 R3V1 configurations are now complete. Go Section 4.8, Verifying the IPDS Configuration on AS/400.

4.4 CONFIGURING AS/400 V3R2

This Section provides the required settings for the `CRTDEVPRT` command and `CRTPSFCFG` command used to configure OS/400 V3R2 to print to an IntelliBar AS Net printer.

4.4.1 V3R2 `CRTDEVPRT` Command.

Use the following user defined settings to create the device description:

A. Device Description (`DEVD`). Enter a name or description for the IntelliBar AS Net printer being configured (ex., M48ASN). The description must match the "`DEVD`" description in the `CRTPSFCFG` command.

B. Device Class (`DEVCLS`). Select `*RMT`.

C. Device Type (`TYPE`). Select `*IPDS`.

D. Device Model (`MODEL`). Select 0.

E. Advanced Function Printing (`AFP`). Select `*YES`.

F. AFP Attachment (`AFPATTACH`). Select `*APPC`.

G. Font (`FONT`). Select 11.

H. Print While Converting (`PRTCVT`). Select `*YES`

I. Remote Location (RMTLOCNAME). Enter the IntelliBar AS Net print server IP address.

J. Form Feed (FORMFEED). Select *AUTOCUT.

K. Text description of the printer (TEXT). Enter a name or description for the IntelliBar AS Net printer being configured (ex., M48 AS Net Printer).

Enter the following commands on the command line to configure CRTDEVPRT for V3R2:

```
CRTDEVPRT DEVD('M48ASN') DEVCLS(*RMT) TYPE(*IPDS) MODEL(O) AFP(*YES)
          AFPATTACH(*IP) FONT(11) PRTCVT(*YES) RMTLOCNAME('O.O.O.O')
          FORMFEED(*AUTOCUT) TEXT(<M48 AS Net Printer>)
```

The CRTDEVPRT screen will appear as follows:

```
Display Device Description                      Page     1
5769SS1 V3R2MO   000526                         IIIBAR1   10/23/03
 13:22:56
 Device description . . . . . . . . :  DEVD       M48ASN
 Option . . . . . . . . . . . . . . :  OPTION     *ALL
 Category of device . . . . . . . . :             *PRT
 Device class . . . . . . . . . . . :  DEVCLS     *RMT
 Device type  . . . . . . . . . . . :  TYPE       *IPDS
 Device model . . . . . . . . . . . :  MODEL      O
 LAN attachment . . . . . . . . . . :  LANATTACH  *IP
 Advanced function printing . . . . :  AFP        *YES
 AFP attachment . . . . . . . . . . :   AFPATTACH   *APPC
 Online at IPL  . . . . . . . . . . :  ONLINE     *YES
 Font . . . . . . . . . . . . . . . :  FONT
    Identifier . . . . . . . . . . . :             O11
    Point size . . . . . . . . . . . :             *NONE
 Form feed  . . . . . . . . . . . . :  FORMFEED   *AUTOCUT
 Separator drawer . . . . . . . . . :  SEPDRAWER  *FILE
 Separator program  . . . . . . . . :  SEPPGM     *NONE
    Library  . . . . . . . . . . . . :
 Printer error message  . . . . . . :  PRTERRMSG  *INQ
 Message queue  . . . . . . . . . . :  MSGQ       QSYSOPR
    Library  . . . . . . . . . . . . :             *LIBL
 Maximum pending requests . . . . . :  MAXPNDRQS  6
 Print while converting . . . . . . :  PRTCVT     *YES
 Print request timer  . . . . . . . :  PRTRQSTMR  *NOMAX
 Form definition  . . . . . . . . . :  FORMDF     F1C1011O
    Library  . . . . . . . . . . . . :             *LIBL
 Character identifier . . . . . . . :  CHRID      *SYSVAL
 Remote location  . . . . . . . . . :  RMTLOCNAME 'O.O.O.O'
 Local location . . . . . . . . . . :   LCLLOCNAME  *NETATR Name
 Remote network identifier  . . . . :   RMTNETID    *NETATR Name
 Mode . . . . . . . . . . . . . . . :   MODE        QSPWTR Name
 Dependent location name  . . . . . :   DEPLOCNAME  *NONE
 Text . . . . . . . . . . . . . . . :  TEXT       M48 AS Net Printer
 User-defined options . . . . . . . :  USRDFNOPT
 ----------------User-defined options-----------------
            * * * * *  E N D  O F  L I S T I N G  * * * * *
```

4.4.2 **V3R2** CRTPSFCFG **Command.**

The CRTPSFCFG command is used to configure AFP for OS/400 V3R2.

Use the following user defined settings to create the AFP description:

A. PSF configuration (PSFCFG). Enter a name or description for the IntelliBar AS Net printer being configured (ex., M48ASN).

B. Library. Select QGPL.

C. IPDS pass through (IPDSPASTHR). Select *YES to print SCS files (transforms SCS into IPDS). Select *NO to print only IPDS files.

D. Activate release timer (ACTRLSTMR). Select *NORDYF. This activates the release timer when there are no spooled files in the output queue with a Ready Status (RDY) after the last spooled has printed. *NORDYF provides that all RDY files are printed before releasing the session. *NORDYF does not terminate the writer).

E. Release timer (RLSTMR). Enter a value equal to or greater than the TCP/IP TIMEOUT setting on the IntelliBar print server. IntelliTech recommends *SEC15. This sets the time PSF/400 maintains a session with the IntelliBar when there are no Ready Status (RDY) spooled files.

F. Remote Location name (RMTLOCNAME). Enter the IntelliBar AS Net print server IP address.

G. TCP/IP port (PORT). Enter 5001.

H. TCP/IP activation timer (ACTTMR). Enter the number of seconds for PSF/400 to wait for the IntelliBar printer to respond to an activation request. If the printer will be used only by one system, use the default value (170 seconds). If the printer will be used by more than one system, select *NOMAX.

Configure the V3R2 AFP description by typing the following commands on the command line and completing the recommended settings:

> Note. For the RMTLOCNAME ('0.0.0.0') entry, enter the Intelli-Bar AS Net print server IP address.

```
CRTPSFCFG   PSFCFG(M48ASN) IPDSPASTHR(*YES) RLSTMR(*SEC15) TEXT
            (<M48 AS Net Printer>) RMTLOCNAME ('0.0.0.0') PORT(5001)
```

The CRTPSFCFG screen will appear as follows:

```
PSF configuration . . . . . . . . . :    M48ASN
Library . . . . . . . . . . . . . . :    QGPL
User resource library . . . . . . . :    *JOBLIBL
IPDS pass through . . . . . . . . . :     *YES
Activate release timer  . . . . . . :    *NORDYF
Release timer . . . . . . . . . . . :    *SEC15
Restart timer . . . . . . . . . . . :    *IMMED
SNA retry count . . . . . . . . . . :    2
Delay time between retries  . . . . :    0
Blank page  . . . . . . . . . . . . :    *YES
Page size control . . . . . . . . . :    *NO
Resident fonts  . . . . . . . . . . :    *YES
Resource retention  . . . . . . . . :    *YES
Edge orient . . . . . . . . . . . . :    *NO
Remote location:
   Name or address  . . . . . . . . :    '0.0.0.0'
TCP/IP port . . . . . . . . . . . . :    5001
TCP/IP activation timer . . . . . . :    170
PSF defined options . . . . . . . . :    *NONE
Text description  . . . . . . . . . :    M48 AS Net
Device resource library list. . . . :    *DFT
```

The OS/400 R3V2 configurations are now complete. Go to Section 4.8, Verifying the IPDS Configuration on AS/400.

4.5 CONFIGURING AS/400 V3R6

This Section provides the required settings for the CRTDEVPRT command and WRKAFP2 command used to configure OS/400 V3R6 to print to an IntelliBar AS Net printer.

4.5.1 V3R6 CRTDEVPRT **Command.**

Use the following user defined settings to create the device description:

A. Device Description (DEVD). Enter a name or description for the IntelliBar AS Net printer being configured (ex., M48ASN). The description must match the "DEVD" description in the WRKAFP2 command.

B. Device Class (DEVCLS). Select *RMT.

C. Device Type (TYPE). Select *IPDS.

D. Device Model (MODEL). Select 0.

E. Advanced Function Printing (AFP). Select *YES.

F. AFP Attachment (AFPATTACH). Select *APPC.

G. Font (FONT). Select 11.

H. Print While Converting (PRTCVT). Select *YES

I. Remote Location (RMTLOCNAME). Enter the IntelliBar AS Net print server IP address.

J. Form Feed (FORMFEED). Select *AUTOCUT.

K. Text description of the printer (TEXT). Enter a name or description for the IntelliBar AS Net printer being configured (ex., M48 AS Net Printer).

Enter the following commands on the command line to configure CRTDEVPRT for V3R6:

```
CRTDEVPRT DEVD('M48ASN') DEVCLS(*RMT) TYPE(*IPDS) MODEL(O) AFP(*YES)
          AFPATTACH(*APPC) FONT(11) PRTCVT(*YES) RMTLOCNAME('0.0.0.0')
          FORMFEED(*AUTOCUT) TEXT(<M48 AS Net Printer>)
```

The CRTDEVPRT screen will appear as follows:

```
                         Display Device Description   Page 1
5763SS1 V3R6M0  889844                              IIIBAR1   10/21/03
07:53:23
  Device description . . . . . . . . :   DEVD        M48ASN
  Option . . . . . . . . . . . . . . :   OPTION      *ALL
  Category of device . . . . . . . . :               *PRT
  Automatically created  . . . . . . :   NO
  Device class . . . . . . . . . . . :   DEVCLS      *RMT
  Device type  . . . . . . . . . . . :   TYPE        *IPDS
  Device model . . . . . . . . . . . :   MODEL       O
  Advanced function printing . . . . :   AFP         *YES
  AFP attachment . . . . . . . . . . :   AFPATTACH   *APPC
  Online at IPL  . . . . . . . . . . :   ONLINE      *YES
  Font . . . . . . . . . . . . . . . :   FONT
    Identifier . . . . . . . . . . . :               O11
    Point size . . . . . . . . . . . :               *NONE
  Form feed  . . . . . . . . . . . . :   FORMFEED    *AUTOCUT
  Separator drawer . . . . . . . . . :   SEPDRAWER   *FILE
  Separator drawer . . . . . . . . . :   SEPDRAWER   *FILE
    Library  . . . . . . . . . . . . :
  Printer error message  . . . . . . :   PRTERRMSG   *INQ
  Shadowing message queue (V3R6) . . :   MSGQ        QSYSOPR
    Library  . . . . . . . . . . . . :               *LIBL
Maximum pending requests  . . . . . :   MAXPNDRQS   6
Print while converting  . . . . . . :   PRTCVT      *YES
Print request timer . . . . . . . . :   PRTRQSTMR   *NOMAX
Form definition . . . . . . . . . . :   FORMDF      F1C10110
  Library . . . . . . . . . . . . . :               *LIBL
Character identifier  . . . . . . . :   CHRID       *SYSVAL
Remote location . . . . . . . . . . :   RMTLOCNAME  0.0.0.0
Local location  . . . . . . . . . . :   LCLLOCNAME  *NETATR
Remote network identifier . . . . . :   RMTNETID    *NETATR
Mode  . . . . . . . . . . . . . . . :   MODE        QSPWTR
Text  . . . . . . . . . . . . . . . :   TEXT        M48 AS Net Printer
            * * * * *  E N D   O F   L I S T I N G  * * * * *
```

4.5.2 V3R6 WRKAFP2 **Command.**

The WRKAFP2 command is used to configure AFP for OS/400 V3R6. WRKAFP2 is contained in a PTF SF31461.

> Note: WRKAFP2 creates a data area in library QGPL. This data area must have the same name as the printer device description.

Use the following user defined settings to create the AFP description:

A. Device Description (DEVD). Enter a name or description for the IntelliBar AS Net printer being configured (ex., M48ASN). The description must match the "DEVD" description in the CRTDEVPRT command.

B. IPDS pass through (IPDSPASTHR). Select *YES to print SCS files (transforms SCS into IPDS). Select *NO to print only IPDS files.

C. TCP/IP support (TCPIP). Select *YES.

D. Remote system (RMTSYS). Enter the IntelliBar AS Net print server IP address.

E. Port (PORT). Enter 5001.

F. Activation timer (ACTTMR). Enter the number of seconds for PSF/400 to wait for the In-telliBar printer to respond to an activation request. If the printer will be used only by one system, use the default value (170 seconds). If the printer will be used by more than one system, select *NOMAX.

G. Inactivity timer (INACTTMR). Enter a value equal to or greater than the TCP/IP TIMEOUT setting on the IntelliBar print server. IntelliTech recommends *SEC15. This sets the time PSF/400 maintains a session with the IntelliBar when there are no Ready Status (RDY) spooled files.

Configure the V3R6 AFP description by typing the following command on the command line:

```
 WRKAFP2 DEVD(M48ASNet) IPDSPASTHR(*YES) TCPIP(*YES) RMTSYS('0.0.0.0')
         PORT(5001) ACTTMR *NOMAX INACTTMR(*SEC15)
```

> Note: for the RMTSYS ('0.0.0.0') entry, enter the IntelliBar AS Net print server IP address.

The `QPQXWAFP` screen will appear as follows:

```
QPQXWAFP
--------
DEVD            M48ASN
IPDSPASTHR      *YES
TCPIP           *YES
RMTSYS          '0.0.0.0'
PORT            5001
ACTTMR          *NOMAX
INACTTMR        *SEC15
SBP             *NO
PSC             *NO
DRF             *NO
DRR             *NO
EDGSNSTV        *NO
```

The OS/400 R3V6 configurations are now complete. Go Section 4.8, Verifying the IPDS Configuration on AS/400.

4.6 CONFIGURING AS/400 V3R7, V4R3, AND V4R4

This Section provides the required settings for the `CRTDEVPRT` command and `CRTPSFCFG` command used to configure OS/400 V3R7, V4R3 and V4R4 to print to an IntelliBar AS Net printer.

4.6.1 V3R7, V4R3 and V4R4 `CRTDEVPRT` Command.

Use the following user defined settings to create the device description:

A. Device Description (`DEVD`). Enter a name or description for the IntelliBar AS Net printer being configured (ex., M48ASN). The description must match the "`DEVD`" description in the `CRTPSFCFG` command.

B. Device Class (`DEVCLS`). Select `*LAN`.

C. Device Type (`TYPE`). Select `*IPDS`.

D. Device Model (`MODEL`). Select `0`.

E. Advanced Function Printing (`AFP`). Select `*YES`.

F. AFP Attachment (`AFPATTACH`). Select `*APPC`.

G. Font (`FONT`). Select `11`.

H. Form Feed (FORMFEED). Select *AUTOCUT.

I. Print While Converting (PRTCVT). Select *YES.

J. Remote Location (RMTLOCNAME). Enter the IntelliBar AS Net print server IP address.

K. Text description of the printer (TEXT). Enter a name or description for the IntelliBar AS Net printer being configured (ex., M48 AS Net Printer).

Enter the following commands on the command line to configure CRTDEVPRT for V3R7, V4R3 and V4R4:

> Note. For the RMTLOCNAME ('0.0.0.0') entry, enter the Intelli-Bar AS Net print server IP address.

```
CRTDEVPRT  DEVD('M48ASN') DEVCLS(*LAN) TYPE(*IPDS) MODEL(O) LANATTACH
           *IP AFP(*YES) AFPATTACH(*APPC) PORT(5001) FONT(11)
           FORMFEED(*AUTOCUT) PRTCVT(*YES) RMTLOCNAME('O.O.O.O')
           TEXT(<M48 AS Net Printer>)
```

The CRTDEVPRT screen will appear as follows:

```
Display Device Description                       Page    1
5769SS1 V3R7MO  OOO526                           IIIBAR1  10/23/03
 13:22:56
 Device description . . . . . . . . :  DEVD       M48ASN
 Option . . . . . . . . . . . . . :  OPTION     *ALL
 Category of device . . . . . . . :             *PRT
 Device class . . . . . . . . . . :  DEVCLS     *LAN
 Device type  . . . . . . . . . . :  TYPE       *IPDS
 Device model . . . . . . . . . . :  MODEL      O
 LAN attachment . . . . . . . . . :  LANATTACH  *IP
 User-defined object  . . . . . . :  USRDFNOBJ  *NONE
 Data transform program . . . . . :  USRDTATFM  *NONE
User-defined driver program . . . :  USRDRVPGM  *NONE
Port number . . . . . . . . . . . :  PORT       5OO1
Advanced function printing . . . . :  AFP        *YES
 Online at IPL  . . . . . . . . . :  ONLINE     *YES
 Font . . . . . . . . . . . . . . :  FONT
   Identifier . . . . . . . . . . :             O11
   Point size . . . . . . . . . . :             *NONE
 Form feed  . . . . . . . . . . . :  FORMFEED   *AUTOCUT
 Separator drawer . . . . . . . . :  SEPDRAWER  *FILE
 Separator program  . . . . . . . :  SEPPGM     *NONE
   Library  . . . . . . . . . . . :
Activation timer  . . . . . . . . :  ACTTMR  170
Printer error message  . . . . . . :  PRTERRMSG  *INQ
 Message queue  . . . . . . . . . :  MSGQ       QSYSOPR
   Library  . . . . . . . . . . . :             *LIBL
 Maximum pending requests . . . . . :  MAXPNDRQS  6
 Print while converting . . . . . . :  PRTCVT     *YES
 Print request timer  . . . . . . :  PRTRQSTMR  *NOMAX
 Form definition  . . . . . . . . :  FORMDF     F1C10110
```

```
  Library  . . . . . . . . . . . . . :                        *LIBL
Character identifier . . . . . . . :      CHRID        *SYSVAL
Remote location  . . . . . . . . . :      RMTLOCNAME   '0.0.0.0'
Local location . . . . . . . . . . :      LCLLOCNAME   *NETATR Name
Remote network identifier  . . . . :      RMTNETID     *NETATR Name
Mode . . . . . . . . . . . . . . . :      MODE         QSPWTR Name
Dependent location name  . . . . . :      DEPLOCNAME   *NONE
Text . . . . . . . . . . . . . . . :      TEXT         M48 AS Net Printer
User-defined options . . . . . . . :      USRDFNOPT
----------------User-defined options------------------
                * * * * *  E N D   O F   L I S T I N G  * * * * *
```

4.6.2 V3R7, V4R3 and V4R4 CRTPSFCFG **Command.**

The CRTPSFCFG command is used to configure AFP for OS/400 V3R7.

Use the following user defined settings to create the AFP description:

A. PSF configuration (PSFCFG). Enter a name or description for the IntelliBar AS Net printer being configured (ex., M48ASN). The name must match the USRDFNOBJ name in the printer CRTDEVPRT DEVD command.

B. Library. Select QGPL.

C. IPDS pass through (IPDSPASTHR). Select *YES to print SCS files (transforms SCS into IPDS). Select *NO to print only IPDS files.

D. Activate release timer (ACTRLSTMR). Select *NORDYF. This activates the release timer when there are no spooled files in the output queue with a Ready Status (RDY) after the last spooled has printed. *NORDYF provides that all RDY files are printed before releasing the session. *NORDYF does not terminate the writer).

E. Release timer (RLSTMR). Enter a value equal to or greater than the TCP/IP TIMEOUT setting on the IntelliBar print server. IntelliTech recommends *SEC15. This sets the time PSF/400 maintains a session with the IntelliBar when there are no Ready Status (RDY) spooled files.

F. Remote Location name (RMTLOCNAME). Enter the IntelliBar AS Net print server IP address.

G. TCP/IP port (PORT). Enter 5001.

H. TCP/IP activation timer (ACTTMR). Enter the number of seconds for PSF/400 to wait for the IntelliBar printer to respond to an activation request. If the printer will be used only by one system, use the default value (170 seconds). If the printer will be used by more than one system, select *NOMAX.

Configure the V3R7, V4R3 and V4R4 AFP description by typing the following commands on the command line and completing the recommended settings:

Note. For the `RMTLOCNAME ('0.0.0.0')` entry, enter the IntelliBar AS Net print server IP address.

```
CRTPSFCFG   PSFCFG(M48ASN) IPDSPASTHR(*YES) RLSTMR(*SEC15) TEXT
            (<M48 AS Net Printer>) RMTLOCNAME ('0.0.0.0') PORT(5001)
```

The `CRTPSFCFG` screen will appear as follows:

```
PSF configuration . . . . . . . . . :    M48ASN
Library . . . . . . . . . . . . . . :    QGPL
User resource library . . . . . . . :    *JOBLIBL
IPDS pass through . . . . . . . . . :    *YES
Activate release timer  . . . . . . :    *NORDYF
Release timer . . . . . . . . . . . :    *SEC15
Restart timer . . . . . . . . . . . :    *IMMED
SNA retry count . . . . . . . . . . :    2
Delay time between retries  . . . . :    0
Blank page  . . . . . . . . . . . . :    *YES
Page size control . . . . . . . . . :    *NO
Resident fonts  . . . . . . . . . . :    *YES
Resource retention  . . . . . . . . :    *YES
Edge orient . . . . . . . . . . . . :    *NO
Remote location:
   Name or address  . . . . . . . . :    '0.0.0.0'
TCP/IP port . . . . . . . . . . . . :    5001
TCP/IP activation timer . . . . . . :    170
PSF defined options . . . . . . . . :    *NONE
Text description  . . . . . . . . . :    M48 AS Net Printer
Device resource library list. . . . :    *DFT
```

The OS/400 V3R7, V4R3 and V4R4 configurations are now complete. Go to Section 4.8, Verifying the IPDS Configuration on AS/400.

4.7 CONFIGURING AS/400 V4R5, V5R1 AND V5R2

This Section provides the required settings for the `CRTDEVPRT` command and `CRTPSFCFG` command used to configure OS/400 V4R5, V5R1 and V5R2 to print to an IntelliBar AS Net printer.

4.7.1 V4R5, V5R1 and V5R2 CRTDEVPRT Command.

Use the following user defined settings to create the device description:

A. Device Description (`DEVD`). Enter a name or description for the IntelliBar AS Net printer being configured (ex., M48ASN). The description must match the "`DEVD`" description in the `CRTPSFCFG` command.

B. Device Class (`DEVCLS`). Select `*LAN`.

C. Device Type (`TYPE`). Select `*IPDS`.

D. Device Model (MODEL). Select 0.

E. Advanced Function Printing (AFP). Select *YES.

F. AFP Attachment (AFPATTACH). Select *APPC.

G. Font (FONT). Select 11.

H. Form Feed (FORMFEED). Select *AUTOCUT.

I. Print While Converting (PRTCVT). Select *YES.

J. Remote Location (RMTLOCNAME). Enter the IntelliBar AS Net print server IP address.

K. Text description of the printer (TEXT). Enter a name or description for the IntelliBar AS Net printer being configured (ex., M48 AS Net Printer).

Enter the following commands on the command line to configure CRTDEVPRT for V4R5 and later:

> Note. For the RMTLOCNAME ('0.0.0.0') entry, enter the IntelliBar AS Net print server IP address.

```
CRTDEVPRT  DEVD('M48ASN') DEVCLS(*LAN) TYPE(*IPDS) MODEL(0) LANATTACH
           *IP AFP(*YES) AFPATTACH(*APPC) PORT(5001) FONT(11)
           FORMFEED(*AUTOCUT) PRTCVT(*YES) RMTLOCNAME('0.0.0.0')
           TEXT(<M48 AS Net Printer>)
```

The CRTDEVPRT screen will appear as follows:

```
Display Device Description              Page    1

5769SS1 V4R5M0   000526                          IIIBAR1   10/23/03
13:22:56
 Device description . . . . . . . . :    DEVD        M48ASN
 Option . . . . . . . . . . . . . . :    OPTION      *ALL
 Category of device . . . . . . . . :                *PRT
 Device class . . . . . . . . . . . :    DEVCLS      *LAN
 Device type  . . . . . . . . . . . :    TYPE        *IPDS
 Device model . . . . . . . . . . . :    MODEL       0
 LAN attachment . . . . . . . . . . :    LANATTACH   *IP
 Advanced function printing . . . . :    AFP         *YES
 Port number  . . . . . . . . . . . :    PORT        5001
 Online at IPL  . . . . . . . . . . :    ONLINE      *YES
 Font . . . . . . . . . . . . . . . :    FONT
   Identifier . . . . . . . . . . . :                011
   Point size . . . . . . . . . . . :                *NONE
 Form feed  . . . . . . . . . . . . :    FORMFEED    *AUTOCUT
 Separator drawer . . . . . . . . . :    SEPDRAWER   *FILE
 Separator program  . . . . . . . . :    SEPPGM      *NONE
   Library  . . . . . . . . . . . . :
 Printer error message  . . . . . . :    PRTERRMSG   *INQ
```

```
Message queue  . . . . . . . . . :    MSGQ         *CTLD
Current message queue . . . . . . :                QSYSOPR
  Library . . . . . . . . . . . . :                  QSYS
Activation timer . . . . . . . . :    ACTTMR       170
Image configuration  . . . . . . :    IMGCFG       *NONE
Maximum pending requests . . . . . :   MAXPNDRQS    6
Print while converting . . . . . :    PRTCVT       *YES
Print request timer  . . . . . . :    PRTRQSTMR    *NOMAX
Form definition  . . . . . . . . :    FORMDF       F1C10110
  Library . . . . . . . . . . . . :                  *LIBL
Character identifier . . . . . . :    CHRID        *SYSVAL
Remote location  . . . . . . . . :    RMTLOCNAME
  Name or address . . . . . . . . :                0.0.0.0
User-defined object  . . . . . . :    USRDFNOBJ    *NONE
  Object type  . . . . . . . . . :                  *NONE
Data transform program . . . . . :    USRDTATFM    *NONE
User-defined driver program  . . . :   USRDRVPGM    *NONE
Dependent location name  . . . . . :   DEPLOCNAME   *NONE
Allocated to:
Job name . . . . . . . . . . . . :                 PT
  User . . . . . . . . . . . . . :                  QSPLJOB
  Number . . . . . . . . . . . . :                  123456
Text . . . . . . . . . . . . . . :    TEXT         *BLANK
User-defined options . . . . . . :    USRDFNOPT
---------------User-defined options-----------------
             * * * * *  E N D   O F   L I S T I N G   * * * * *
```

4.7.2 V4R5, V5R1 and V5R2 CRTPSFCFG Command.

The CRTPSFCFG command is used to configure AFP for OS/400 V4R5, V5R1 and V5R2.

Use the following user defined settings to create the AFP description:

A. PSF configuration (PSFCFG). Enter a name or description for the IntelliBar AS Net printer being configured (ex., M48ASN). The name must match the USRDFNOBJ name in the printer CRTDEVPRT DEVD command.

B. Library. Select QGPL.

C. IPDS pass through (IPDSPASTHR). Select *YES to print SCS files (transforms SCS into IPDS). Select *NO to print only IPDS files.

D. Activate release timer (ACTRLSTMR). Select *NORDYF. This activates the release timer when there are no spooled files in the output queue with a Ready Status (RDY) after the last spooled has printed. *NORDYF provides that all RDY files are printed before releasing the session. *NORDYF does not terminate the writer).

E. Release timer (RLSTMR). Enter a value equal to or greater than the TCP/IP TIMEOUT setting on the IntelliBar print server. IntelliTech recommends *SEC15. This sets the time PSF/400 maintains a session with the IntelliBar when there are no Ready Status (RDY) spooled files.

F. Remote Location name (RMTLOCNAME). Enter the IntelliBar AS Net print server IP address.

G. TCP/IP port (PORT). Enter 5001.

H. TCP/IP activation timer (ACTTMR). Enter the number of seconds for PSF/400 to wait for the IntelliBar printer to respond to an activation request. If the printer will be used only by one system, use the default value (170 seconds). If the printer will be used by more than one system, select *NOMAX.

Configure the V4R5, V5R1 and V5R2 AFP description by typing the following commands on the command line and completing the recommended settings:

> Note. For the RMTLOCNAME ('0.0.0.0') entry, enter the IntelliBar
> AS Net print server IP address.

```
CRTPSFCFG   PSFCFG(M48ASN) IPDSPASTHR(*YES) RLSTMR(*SEC15) TEXT
            (<M48 AS Net Printer>) RMTLOCNAME ('0.0.0.0') PORT(5001)
```

The CRTPSFCFG screen will appear as follows:

```
PSF configuration . . . . . . . . . :      M48ASN
Library . . . . . . . . . . . . . . :      QGPL
User resource library . . . . . . . :      *JOBLIBL
IPDS pass through . . . . . . . . . :      *YES
Activate release timer . . . . . . :      *NORDYF
Release timer . . . . . . . . . . . :      *SEC15
Restart timer . . . . . . . . . . . :      *IMMED
SNA retry count . . . . . . . . . . :      2
Delay time between retries . . . . :      0
Blank page . . . . . . . . . . . . :      *YES
Page size control . . . . . . . . . :      *NO
Resident fonts . . . . . . . . . . :      *YES
Resource retention . . . . . . . . :      *YES
Edge orient . . . . . . . . . . . . :      *NO
Remote location:
   Name or address . . . . . . . . :      '0.0.0.0'
TCP/IP port . . . . . . . . . . . . :      5001
TCP/IP activation timer . . . . . . :      170
PSF defined options . . . . . . . . :      *NONE
Text description . . . . . . . . . :      M48 AS Net Printer
Device resource library list. . . . :      *DFT
```

The OS/400 V4R5, V5R1 and V5R2 configurations are now complete. Go to Section 4.8, Verifying the IPDS Configuration on AS/400.

4.8 VERIFYING THE IPDS CONFIGURATION ON AS/400

A. Start the Printer. Turn the printer on and wait until the printer operator panel displays 'ONLINE READY.'

Verify the IPDS setup as follows:

B. Verify Communications. Ping the IntelliBar AS Net print server from the AS/400 or iSeries host to verify TCP/IP connection by typing the following on the command line:

PING('0.0.0.0'), where '0.0.0.0' is the IP address of the IntelliBar AS Net printer.

> Note. After re-booting the IntelliBar AS Net printer, it may take up to 30 seconds for TCP/IP to initialize and respond to a PING request.

The AS/400 will immediately display the message 'Verifying connection to host system' if successful.

If the host is unable to reach the IntelliBar AS Net print server, it will display 'No response from host within "N" seconds for connection verification'. If the host is unable to reach the printer, recheck all physical connections and the configuration settings on both the printer and the host and refer to Section 6, Troubleshooting.

C. Vary the IntelliBar AS Net printer ON. At the command line, type: WRKCFGSTS *DEV ('Device Name') and select option 1 for Vary ON or type: VRYCFG CFGOBJ ('Device Name') CFGTYPE(*DEV)   STATUS(*ON)

D. Verify IPDS communications between the host and the IntelliBar AS Net printer by starting the Print Writer and releasing an appropriate IPDS print job to the printer.

> NOTE: If the IntelliBar AS Net printer is powered down or reset while the writer is started, it is necessary to end the writer and then go to step

If you are having difficulties printing after completing the above instructions go to Section 6, Troubleshooting, for assistance.

5 IPDS and LAN Diagnostics, Settings and Firmware Updates

This section explains the available IPDS and TCP/IP diagnostic functions, configuration settings and firmware updating for the IntelliBar AS Net printer.

5.1 DIAGNOSTICS OVERVIEW

IntelliBar AS Net printers feature IPDS diagnostic mode functions that are enabled via a web browser, DIP switches located on the rear of the printer or data stream commands sent from the host to the printer parallel port.

The diagnostic functions are used to configure the printer for EBCDIC hex dump, reset the printer to IPDS factory default settings, enable IPDS printing on the parallel port, or to print out the current IPDS and network configuration settings.

Data stream command strings can set certain diagnostic functions and set the default page size.

The following table illustrates the diagnostic settings available from the various configuration methods:

IntelliBar AS Net Printers Configuration and Diagnostic Methods

Configuration Method	Diagnostic Mode Function				
	EBCDIC Hex Dump	Reset Factory Settings	Enable IPDS on Parallel Port	Print Configuration Self Test	Set Default Page Size
Browser	Yes	Yes	No	Yes	No
DIP Switches	Yes	Yes	Yes	Yes	No
Data Stream	No	Yes	No	Yes	Yes

5.1.1 Diagnostic Mode Function Descriptions

In EBCDIC Hex Dump Mode, the IntelliBar AS Net prints the hex values of the IPDS commands received from the host computer. The EBCDIC hex dump diagnostic is useful for discerning printing problems related to the IPDS data stream. When unusual print error artifacts are encountered, outputting the data stream in hex dump mode allows the

programmer to examine the content of the data and IPDS commands being sent to the printer.

5.1.1.1 Factory Reset Mode.

The Factory Reset Mode restores the IntelliBar AS Net IPDS interpreter parameters to their factory default values. Resetting to factory defaults clears all IPDS configuration settings that may have been causing an error condition. Once the configuration settings are in a known state, you will be able to correctly test and configure the IPDS interpreter.

The next time the printer is powered on, all parameters (for example, node name, serial port speed, etc.) will be returned to the factory defaults. If you use this switch, don't forget to put it back to the OFF position after the factory default settings have been restored.

> Note: After a factory reset is performed, the TCP/IP address will be reset to the default value of 192.0.0.192. This address will have to be reconfigured before communications can be re-established with the host.

5.1.1.2 Set IPDS Active on Parallel Port Mode.

The IPDS Active on Parallel Port Mode enables the IntelliBar AS Net printer to accept IPDS commands on its parallel communications port. This is useful for printing IPDS data when the printer is attached to a terminal such as an IBM 5250 or for preparing the printer for a firmware download.

5.1.1.3 Print Configuration Self-Test Settings Mode.

The Print Configuration Self Test Mode is useful for understanding the programmed state of the IPDS interpreter and the print server.   The Print Configuration Self Test Mode prints the current default IPDS page size settings, IPDS and TCP/IP configuration settings, as well as, the ROM version and checksum of the IPDS interpreter firmware. The Print Configuration Self Test is also used to confirm that the IntelliBar print server and IPDS interpreter are operating correctly.

5.1.2 Configuring Diagnostic Functions Via the DIP Switches

The diagnostic DIP switches are located on the rear of the printer directly above the RJ45 Ethernet socket.

To enter the diagnostic mode, power up the printer and set DIP switch 4 to ON. The bi-color IPDS Status Indicator LED will flash green indicating the printer is ready for setting of the dip switches 1, 2, and 3 for diagnostic tests. After setting the appropriate switches for the desired diagnostic function, set DIP switch 4 to the OFF position and the board will execute the selected diagnostic function.   The following illustration shows the DIP switch layout where switches 1 and 4 are 'ON' and switches 2 and 3 are 'OFF.'

IntelliBar AS Net DIP Switch Layout

```
┌─────────────────────┐
│                     │
│      Sw4  ┌───┬───┐  │
│      Sw3  ├───┼───┤  │
│ OFF       │   │   │  ON
│      Sw2  ├───┼───┤  │
│      Sw1  └───┴───┘  │
│                     │
└─────────────────────┘
```
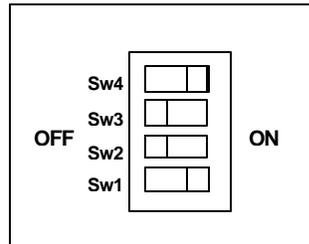
The diagnostic DIP switch setting functions are as follows:

IntelliBar AS Net DIP Switch Settings Functions

DIP 1	DIP 2	DIP 3	Diagnostic Function
ON	ON	OFF	EBCDIC Hex Dump*
OFF	OFF	ON	Factory Reset
ON	OFF	ON	IPDS Active On Parallel Port
ON	ON	ON	Self Test/Print Configuration

*Note: After completing EBCDIC Hex Dump operations, set all DIP switches to the 'OFF' position and reinitialize the printer by powering it off and back on again.

After completing diagnostic functions on the IntelliBar AS Net printer, set all DIP switches to the 'OFF' position.

5.1.3 Setting Diagnostic Functions and Configurations via Data Stream

The IntelliBar AS Net IPDS settings can be configured via the parallel port by sending a short string that identifies the parameter to be set and the value it is to have. The data stream commands can perform a factory reset, print the IPDS interpreter configuration self-test and set the printer default IPDS page size. The following table describes the data stream command strings and their functions.

IntelliBar AS Net Data Stream Command Functions

Command String	Function
&%S93$	Reset Factory Defaults
&%S94$	Print Configuration Self-Test
&%S40xxxxyyyy$	Set default page width to xxxx, length to yyyyy

5.1.4 Setting Diagnostic Functions and Configurations via Data Stream

The IntelliBar AS Net IPDS settings can be configured via the parallel port by sending a short
string that identifies the parameter to be set and the value it is to have. The data stream
commands can perform a factory reset, print the IPDS interpreter configuration self-test and set
the printer default IPDS page size. The following table describes the data stream command
strings and their functions.

IntelliBar AS Net Data Stream Command Functions

Command String	Function
&%S93$	Reset Factory Defaults
&%S94$	Print Configuration Self-Test
&%S40xxxxyyyy$	Set default page width to xxxx, length to yyyyy

5.1.4.1 Setting the IPDS Default Page Size

To set the IPDS default page size, the size values xxxx and yyyy must be in hex format in 1/1440
inches. This is the raw value that is sent to the host computer in the IPDS data stream. It is not
always necessary to set the default page size because the host computer will usually set the page
size in the data stream. If the host computer instructs the printer to use the default page size, then
the value stored in the printer will be used to calculate the page size. The following table cross
references inches to IPDS units:

Inch to IPDS Conversion Table

Inches	IPDS units	Inches	IPDS units	Inches	IPDS units
1.0	05A0	3.6	1440	6.2	22E0
1.1	0630	3.7	14D0	6.3	2370
1.2	06C0	3.8	1560	6.4	2400
1.3	0750	3.9	15F0	6.5	2490
1.4	07E0	4.0	1680	6.6	2520
1.5	0870	4.1	1710	6.7	25B0
1.6	0900	4.2	17A0	6.8	2640

1.7	0990	4.3	1830	6.9	26D0
1.8	0A20	4.4	18C0	7.0	2760
1.9	0AB0	4.5	1950	7.1	27E0
2.0	0B40	4.6	19E0	7.2	2880
2.1	0BD0	4.7	1A70	7.3	2910
2.2	0C60	4.8	1B00	7.4	29A0
2.3	0CF0	4.9	1B09	7.5	2A30
2.4	0D80	5.0	1C20	7.6	2AC0
2.5	0E10	5.1	1CB0	7.7	2B50
2.6	0EA0	5.2	1D40	7.8	2BE0
2.7	0F30	5.3	1DD0	7.9	2C70
2.8	0FC0	5.4	1E60	8.0	2D00
2.9	1050	5.5	1EF0	8.1	2D90
3.0	10E0	5.6	1F80	8.2	2E20
3.1	1170	5.7	2010	8.3	2EB0
3.2	1200	5.8	20A0	8.4	2F40
3.3	1290	5.9	2130	8.5	2FD0
3.4	1320	6.0	21C0		
3.5	13B0	6.1	2250		

Note. The default page size can also be set using a web browser to access the embedded web server in the IntelliBar AS Net printer.

5.1.5 Setting the Diagnostic Functions and Configurations via a browser.

The IntelliBar AS Net printer features an embedded web server for performing configurations and diagnostics over the network. The embedded web server is accessed via a web browser. Type the printer TCP/IP address in the browser URL locator window and press the enter key. The embedded web server will serve a page that provides links to IPDS Options, Print Server Options and the IntelliTech home page. Select the appropriate link and configure the printer with the options presented.

5.2 FIRMWARE UPDATES

The IntelliBar AS Net has a separate firmware update procedure for the IPDS interpreter and for the print server.

5.2.1 IPDS Interpreter Firmware Update Procedure

The IntelliBar AS Net IPDS interpreter firmware is Flash-ROM based, so firmware changes can be easily and quickly made in the field without removing any hardware or returning the printer to the factory. The firmware consists of an ASCII Hex file.

Firmware updates are downloaded to the IPDS interpreter via the printer's Centronics parallel communication port. The file transfer is most commonly made using the DOS copy command: `C:\>copy 'file name' lpt1,` where `'file name'` is the name of the firmware update file. The command must be sent from the same root directory as the update file in order to successfully copy the file.

Once the file is completely downloaded, IntelliBar IPDS interpreter automatically programs the update onto the Flash memory. The firmware updating procedure requires from 1-5 minutes, depending on the speed of the parallel port of the device sending the file to the IntelliBar AS Net printer.

The IPDS bi-colored LED indicates the status of the update as it progresses. As the update file is being received, the LED will rapidly flash red and green. After receiving the file, the flash memory will begin the programming cycle and the LED will alternate red and green flashing at a slower rate. If the programming was successful, the IPDS interpreter will reset itself and the LED will flash green ten (10) times. If for any reason the programming was unsuccessful, the LED will flash red.

Print a configuration self-test printout to confirm the version update change.

5.2.2 Print Server Firmware Update Procedure

The IntelliBar AS Net print server firmware is Flash-ROM based, so firmware changes can be easily and quickly made in the field without removing any hardware or returning the printer to the factory. The firmware consists of an ASCII Hex file.

IntelliBar print server firmware updates are downloaded via the printer RJ45 port. This is most commonly done using the DOS tftp command: `tftp –I '0.0.0.0' put 'file name' access,` where `'0.0.0.0'` is the printer IP address, `'file name'` is the name of the firmware update file and `access` is the default password required to access the print server configuration settings. The command must be sent from the same root directory as the update file in order to successfully copy the file.

Ping the print server following the update to verify network communications. Print a configuration self-test printout to confirm the version update change.

The following screen shows the print server update and successful ping test.
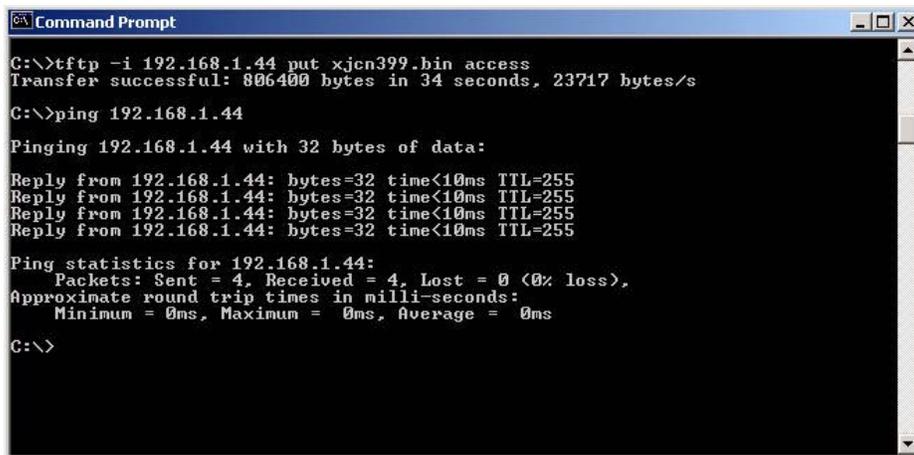
```
Command Prompt                                                        _ □ ×

C:\>tftp -i 192.168.1.44 put xjcn399.bin access
Transfer successful: 806400 bytes in 34 seconds, 23717 bytes/s

C:\>ping 192.168.1.44

Pinging 192.168.1.44 with 32 bytes of data:

Reply from 192.168.1.44: bytes=32 time<10ms TTL=255
Reply from 192.168.1.44: bytes=32 time<10ms TTL=255
Reply from 192.168.1.44: bytes=32 time<10ms TTL=255
Reply from 192.168.1.44: bytes=32 time<10ms TTL=255

Ping statistics for 192.168.1.44:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum =  0ms, Average =  0ms

C:\>
```

6 Troubleshooting

6.1 TROUBLESHOOTING OVERVIEW

This section describes procedures for troubleshooting network printing problems you may encounter with IntelliBar AS Net printers. Network printing problems generally fall into three categories:

1. Installation Problems

2. Intermittent Problems

3. Protocol-Specific Troubleshooting

If you have followed the steps in this section and you believe that you have a faulty product, contact IntelliTech International technical support via e-mail at support@intellitech-intl.com or by calling 978-568-0370 x213 for information on obtaining service.

6.1.1 Installation Problems

If you are unable to print to the IntelliBar AS Net printer after you have completed the printer hardware set up, verify the following items:

- The printer has correct media (labels and ribbon) installed.
- The printer has been configured for the installed media.
- All cables are securely plugged in.
- The printer is powered on and 'ONLINE READY' appears in the display.
- The printer main controller has been configured for 'PARALLEL' port communications in user control panel, Configuration Menu.
- The print server has been properly configured.
- The network status LEDs on the rear of the printer are indicating proper operation.
- The diagnostic DIP switches are all set to the OFF position.

6.1.1.1 *Printer does not come up 'ONLINE READY.'*

If the IntelliBar printer does not display ONLINE READY after power up, there is a printer hardware problem. If you are receiving an error message in the printer display, take corrective action by following the appropriate procedure as described in the IntelliBar User's Guide.

6.1.1.2 Printer comes up 'ONLINE READY' BUT CANNOT PRINT JOBS SENT BY HOST

If the printer powers up properly and is able to print a test label from the printer control panel, but cannot print a print job from the host, the problem could be one of the following scenarios.

There may be a problem with the interface between the IntelliBar AS Net print server, the IPDS interpreter card and the printer main controller. Verify that the interface between the print server, the IPDS interpreter and the printer main controller is operating properly by following the steps below:

A. Observe the network status LED indicators at the rear of the printer. Note whether the indicators show normal or abnormal network operation.

B. Print a configuration self-test printout (see Sections 5.1.1.3, 5.1.2, 5.1.4 or 5.1.5 for information on the various means of printing the configuration self-test).

C. If the network status LED indicators are normal and the print server was able to print a configuration self-test, the print server/IPDS interpreter/printer main controller interface is not the problem. Verify that the print server is correctly configured by checking the settings with XAdmin32 or via a browser query to the IntelliBar embedded web server. If the settings are correct, go to the TCP/IP Troubleshooting section below.

D. If the network status LED indicators show abnormal network conditions and the print server was able to print a self-test, the print server/printer main controller interface is not the problem. Go to Section 6.1.1.3 below.

E. If the print server self-test does not print, then there is possibly a print server hardware problem. Contact IntelliTech technical support for assistance.

If the network status LED indicators show abnormal network conditions there may be a problem with the physical network connection or cabling. Check the network connection and cabling by following the instructions below:

A. If you are connecting to a 10BaseT network, verify that BOTH the RECEIVE and TRANSMIT network status LEDs on the rear of the printer are lit.

B. If possible, try a different cable and hub port or switch port, or try connecting a different device (such as a PC workstation) to the cable.

C. If you are using a repeater or hub, make sure that SQE (heartbeat) is turned off at the hub (this is the default setting for most hubs).

D. If you have a hub or multiport repeater, verify that the hub or repeater port is operating properly by connecting the IntelliBar printer cable on a different port.

E. If you have a bridge or router located between the printer and the host computer, make sure that the device is set up to allow the print server to send and receive data from the host. For example, a bridge can be set up to allow only certain types of Ethernet addresses to pass through (a process known as filtering); therefore, such a bridge must be configured to allow IntelliBar print server addresses. Likewise, a router can be set up to pass only certain protocols, so be sure that the desired protocol can be passed through to the IntelliBar AS Net print server. In the case of routers, also make sure that the protocol is routable (LAT, NetBEUI, and DLC/LLC are not routable).

If all of the physical hardware connections and cabling check OK, check the TCP/IP protocol troubleshooting section below for additional causes of intermittent printer problems.

6.1.2 Intermittent Problems

If you are able to print configuration self-tests from the front control panel main controller and through diagnostic settings for the print server and IPDS interpreter, but you intermittently have problems printing jobs from the host, check the following:

A. If you able to print small jobs without errors, but large graphics jobs are distorted or incomplete, make sure that you have adequate memory in your printer. IntelliBar printer memory is expandable up to 10 Mbytes. You can check how much memory is installed in your printer by printing a test page from the printer control panel that will list the installed memory.

B. If you have sufficient memory for your print job size, check the TCP/IP troubleshooting section below for additional causes of intermittent printer problems.

C. If you have sufficient memory for your print job size, verify that you have 'Page Protect *ON set in the main control panel LJIII setup menu.

D. If you are seeing data shifting, character substitutions diagonal lines or overprinting, you are attempting to on an area that is off the printer's logical page. Remove all borders in your print job. Verify that your line length does not exceed the width of the label you are attempting to print.

6.1.3 Network Protocol Problems

Protocol problems generally fall into two categories: a TCP/IP protocol-related problem or an OS/400 setup problem.

- TCP/IP Problems

- OS/400 AFP/IPDS Problems

6.1.3.1   TCP/IP Troubleshooting

If you are using TCP/IP and cannot print to the IntelliBar AS Net print server and you have checked the printer hardware and network connection and cabling as described in the previous steps, then check the following:

A. Verify that TCP/IP been configured on your host systems in the network (CFGTCP).

B. Verify that TCP/IP has been started on your iSeries systems in the network (STRTCP).

C. Ping the IntelliBar printer from the AS/400 or iSeries <u>host</u> (not from a workstation). If you do not get a 'reply' from the IntelliBar printer, then TCP/IP may not be configured correctly on either the printer or on the AS/400. Verify all host, printer and network devices TCP/IP settings for accuracy and correctness.

D. Verify that there are no mismatched or duplicate IP addresses. Verify that the desired IP address is correctly loaded into the IntelliBar AS Net print server (via print server self-test print) and verify that no other nodes on the network have this address. If the address is not correct, reload the desired address following the instructions in Section 3 of this guide.

> Note: DUPLICATE IP ADDRESSES ARE THE MOST COMMON CAUSE OF TCP/IP PRINTING PROBLEMS.

E. Verify that the host computer and the IntelliBar print server are both on the same subnet. For example, if the print server has a subnet mask of 255.255.255.0, the host must have the same subnet mask. Or if routing between subnets, verify that the router is properly configured to pass data between the two devices. If the subnet mask address is not correct, reload the desired address following the instructions in Section 3 of this guide.

F. If you have problems with queues locking up when the active print job is deleted, try setting the IP timeout to one minute with the console command SET IP TIMEOUT 1.

G. If you are using certain IP switch models with an IntelliBar print server, you may not be able to communicate unless you set the Keepalive Timer to 1 using the embedded IntelliBar web server configure TCP/IP facility or the console command SET IP KEEPALIVE 1. This sends out a ping command every minute to notify the network that the print server is still active on the network.

H. If you are using a Domain Name Server (DNS), verify that the system names in your network entered correctly, both the short name and the long name. Both must be named.

I. Is the domain information specified correctly (host name and domain name: CFGTCP, opt 12)?

J. If you are not using DNS, verify that the host table is set up properly (both short and long name: CFGTCP, opt 10). Both must be named.

K. Verify that there is not a port conflict. View the Service Entry Table (CFGTCP, opt 21, opt 1) to identify port assignments.

6.1.3.2 OS/400 AFP/IPDS Problems

OS/400, AFP and IPDS configuration problems are generally beyond the scope of this guide. Refer to your system administrator for assistance. However, the following suggestions are offered as a place to start a review of the problem:

A. Review the set up instructions and verify the settings as presented in Section 4 of this guide. If all settings and configurations are correct, ask your system administrator for assistance.

> Note: It is always a good idea to try creating another print queue to eliminate the possibility of setup errors.

B. If the problem is related to abnormal print artifacts, output a hex dump of the IPDS data stream and examine it for errors. The hex dump output configuration can be achieved via a web browser or by setting the DIP switches on the back of the printer for hex dump mode and then sending a print job to the printer. See Section 5 of this guide for setting the printer diagnostic mode for EBCDIC hex dump.

> Note: If the print job consists of multiple labels, reduce the job down to just a single page that contains the print error before sending the hex dump print job. This will minimize the amount of code to decipher.

C. For example, using the embedded web server function of method of configuring the printer for hex dump:

-   Access the IntelliBar AS Net web server by typing in the IP address of the print server into the URL line of a web browser.

- Once the URL is entered, the server will deliver a page with 3 links: IPDS Options, Print Server Options and the IntelliTech home page.

- Select IPDS Options. Once the IPDS Options window opens, set the value for the "Diagnostics" field to a value of 03. This configures the printer to print out a hex dump.

- Once the setting has been entered, exit the configuration utility.

- Send the print job to the printer. The print job should print in a formatted EBCDIC hex dump. Examine the hex code for IPDS errors

6.1.4 Additional IPDS trouble shooting resources

Additional documentation about AS/400, iSeries printing may be obtained from the IBM website:

IBM AS/400 iSeries On-line Technical Documents	
AFP Printing	Advanced Function Print (AFP) References
8203740	V4RxMx PTF Listing for TCP/LAN Printing
8234913	Configuring a *LAN IPDS Device Description
11301431	Performance Issues with TCP/IP LPR Printing

End of Document

Appendix A: Glossary

This glossary lists some of the common terms encountered in IPDS printing over TCP/IP.

10base2. A type of Ethernet that uses RG58 coaxial cable. Also called Thin Ethernet, ThinNet, and CheaperNet.

10base5. The original Ethernet standard that uses a thick coaxial cable. Also called thick Ethernet or standard Ethernet.

10baseT. A type of Ethernet that uses unshielded twisted pair cable.

100baseT4. A 100 megabit/second networking standard based on Ethernet technology that uses four pairs on a Category 3 twisted pair cable. Not widely used.

100baseTX. The most popular 100 megabit/second networking standard based on Ethernet technology. It uses two pairs on a Category 5 twisted pair cable.

802.2.   1. The IEEE standard for the Logical Link Control layer of the Ethernet protocol. The LLC layer is implemented as special fields containing control information within an IEEE compatible Ethernet frame. 2. The NetWare Ethernet frame type that includes both the IEEE 802.3 and 802.2 fields.

802.3. 1. The IEEE standard for Ethernet. 2. The default Ethernet frame type for NetWare 3.xx and 2.xx (also called 802.3 raw; the NetWare 802.3 is technically not IEEE compatible because it does not have the 802.2 fields).

802.11. The IEEE standard for wireless Ethernet networks.

A4. The international standard paper size (210 x 297mm).

Address. An identifier. Every device on a network has a unique address.

AFP. Advanced **F**unction **P**rinting. AFP is a worldwide standard for medium- to high-speed electronic printing. AFP is a way to describe complex documents on IBM mainframe and mini-computers, and the AFP format is converted to a print language by the operating system on the computer. It creates a structured, high-performance print data stream that is system and printer independent. AFP provides output flexibility, with support for view, fax, archive and desktop print. Additionally, AFP printing utilizes Intelligent Printer Data Stream™ (IPDS™), which pro-vides "industrial strength," system-managed printing even across the network.

AIX. The IBM variation of UNIX that runs on IBM computers.

Anonymous FTP. A method by which any user on a network can access certain files on a given host computer by logging in under the name *anonymous* after connecting to that computer with the FTP protocol.

AppleTalk. A protocol developed by Apple Computer for file sharing and print sharing. AppleTalk runs over Ethernet, LocalTalk, and Token Ring.

ARP **A**ddress **R**esolution **P**rotocol is a protocol for mapping an IP address to a physical machine address (the physical machine address is also known as a Media Access Control or MAC address.) that is recognized in the local network. For example, in IP Version 4, the most common level of IP in use today, an address is 32 bits long. In an Ethernet local area network, however, addresses for attached devices are 48 bits long. A table, usually called the ARP cache, is used to maintain a correlation between each MAC address and its corresponding IP address. ARP provides the protocol rules for making this correlation and providing address conversion in both directions.

ASCII. **A**merican **N**ational **S**tandard **C**ode for **I**nformation **I**nterchange. ASCII represents the western character sets based on the ANSI X3.XX standard. There are many variants of this standard, typically to allow different code pages for language encoding, but they all basically follow the same format. ASCII is essentially a 7-bit code which allows the 8th most significant bit (MSB) to be used for error checking, however most modern computer systems tend to use ASCII values of 128 and above for extended character sets.

AT&T UNIX. One of two major variants of UNIX on which operating systems like HP/UX, Solaris, and SCO UNIX are based. Originally developed by AT&T.

AUI. **A**ttachment **U**nit **I**nterface; the 15-pin Ethernet connector that is used to connect to a transceiver. Also called a DIX connector or a thick Ethernet port. *See also 10base5.*

Batch File. A file containing a number of system-level commands. When this file is run, each of the commands in the file are executed, thereby eliminating the need to type in each command individually.

Berkeley UNIX. One of two major variants of UNIX on which operating systems like Digital UNIX and SunOS are based. Originally developed by the University of California-Berkeley.

Bidirectional. Capable of communications in two directions. With printers, this usually means that the printer is capable of receiving data and sending back status information to the host computer.

Binary File. A file that contains data that is not in a standard format like ASCII. In printing, binary files typically contain graphical information such as scanned photographs.

Binary services. Binary services pass data through a port in an unmodified manner, thus allowing binary executables to operate directly on the print server or printer controller.

Bindery. In NetWare 2.xx and 3.xx, a database containing definitions for network entities, including users, file servers, print servers, etc., along with the properties associated with such entities. In NetWare 4.xx, bindery emulation is available for compatibility with older versions.

BOOTP. BOOTstrap **P**rotocol. A protocol described in RFCS 951 and 1084 and used for booting diskless workstations (ex., print servers). BOOTP lets a network user be automatically configured to receive an IP address initiated without user involvement. The BOOTP server automatically assigns the IP address from a pool of addresses for a specified duration of time. BOOTP is the basis for a more advanced network manager protocol, the Dynamic Host Configuration Protocol (DHCP).

Centronics. The de facto standard for parallel printer ports that is used on the vast majority of all printers.

Chooser. A Macintosh program that allows a user to select a printer on a network.

Circuit. A logical connection between two or more devices on a network.

Client. A computer on a local area network that obtains services from a server on the network.

Command File. The VMS equivalent of a batch file. See *batch file*.

Console. A program running on a device (such as print server) that allows a user to configure and monitor that device.

DAEMON. The acronym for "**D**isk **A**nd **E**xecution **MON**itor". A program that is not invoked explicitly, but lies dormant waiting for some condition(s) to occur.

Data Stream. A data stream is a continuous ordered stream of data elements and objects conforming to a given format.

DDS. Data **D**escription **S**pecifications

DECNET. A network operating system and the corresponding protocol developed by Digital Equipment Corporation. Not to be confused with LAT, which is a different DEC protocol.

DHCP. **D**ynamic **H**ost **C**onfiguration **P**rotocol. This is a protocol that lets network administrators centrally manage and automate the assignment of IP Addresses on the network. When a company sets up its computer users with a connection to the Internet, an IP address must be assigned to each machine. Without DHCP , the IP address must be entered manually at each computer. DHCP lets a network administrator supervise and distribute IP addresses from a central point and automatically sends a new IP address when a computer is plugged into a different place in the network. The administrator assigns a range of IP addresses to DHCP and each client computer on the LAN has its TCP/IP software configured to request an IP address from the DHCP server. The request and grant process uses a lease concept with a controllable time period.   DHCP is defined in RFC 2131.

Digital UNIX. The latest Digital Equipment Corporation version of UNIX. It replaces OSF/1 and ULTRIX, and uses standard Berkeley UNIX TCP/IP and lpr/lpd for printing.

Direct Mode IPX. The protocol used by Windows 95 for peer-to-peer communications.

DLC. The **D**ata **L**ink **C**ontrol is the service provided by the Data Link Layer of function defined in the Open Systems Interconnection (OSI) model for network communication. The Data Link layer is responsible for providing reliable data transfer across one physical link (or telecommunications path) within the network. Some of its primary functions include defining frames, performing error detection or ECC on those frames, and performing flow control (to prevent a fast sender from overwhelming a slow receiver).

DLL. **D**ata **L**ink **L**ayer. The Data-Link layer is the protocol layer in a program that handles the moving of data in and out across a physical link in a network. The Data-Link layer is layer 2 in the Open Systems Interconnect (OSI) Reference Model that assembles and disassembles frames, handles synchronization, and detects errors for a set of telecommunication protocols. The Data-Link layer contains two sub layers that are described in the IEEE-802 LAN standards: Media Access Control (MAC) and Logical Link Control (LLC).

The Data-Link layer ensures that an initial connection has been set up, divides output data into data frames, and handles the acknowledgements from a receiver that the data arrived successfully. It also ensures that incoming data has been received successfully by analyzing bit patterns at special places in the frames.

DMA. **D**irect **M**emory **A**ccess. A high performance computer architecture in which data is transferred in large blocks between the processor's memory and an external device without any processor intervention.

DOS. **D**isk **O**perating **S**ystem; now commonly refers to the PC operating system developed by Microsoft that is officially called MS-DOS.

Download. The process of copying firmware or software from a computer to another computer or other device on the network (such as a print server).

Driver. Low-level software that interfaces a hardware device such as a printer to the computer's operating system. The driver allows programs running on the computer to access the hardware device in a relatively simple manner.

EBCDIC. **E**xtended **B**inary **C**oded **D**ecimal **I**nterchange **C**ode. EBCDIC is a character encoding set used by IBM mainframes and AS/400s. EBCDIC is an 8-bit extension of BCDIC (Binary Coded Decimal Interchange Code), an earlier 6-bit character set used on early IBM main frames. EBCDIC is IBM's equivalent to ASCII.

IBM created 57 national EBCDIC character sets and an International Reference Version (IRV) based on ISO 646 (and hence ASCII compatible). US EBCDIC uses more or less the same characters as ASCII, but different code points. It has non-contiguous letter sequences, some ASCII characters do not exist in EBCDIC (e.g. square brackets), and EBCDIC has some characters ("cent" sign, "not" sign) not in ASCII. As a consequence, the translation between ASCII and EBCDIC was never officially completely defined. Users defined one translation, which resulted in a so-called de-facto EBCDIC containing all the characters of ASCII that all ASCII-related programs use.

File Server. A computer responsible for the central storage and management of data files so that other computers on the same network can access the files.

Gateway. A hardware or software set-up that translates between two dissimilar protocols, or more commonly used to describe any mechanism for providing access to another system.

Escape Sequence. A series of characters, usually starting with the ESCAPE character (ASCII 27), that is used to control a printer or print job. PCL commands use escape sequences.

Ethernet. The most popular Local Area Network standard, which was developed originally by Xerox, Intel, and Digital Equipment Corporation.

Ethernet II. 1. The second generation of Ethernet, which was developed before the IEEE 802.3 standard. 2. A frame that is compatible with the Ethernet II standard.

Ethernet_SNAP. Ethernet **S**ub-**N**etwork **A**ccess **P**rotocol, an Ethernet frame type that is derived from the 802.2 standard.

FTP. File Transfer Protocol, a TCP/IP-related protocol for transferring files between devices on a network.

File Server. A device on a local area network that provides services to client computers on the network, such as file sharing, print services, etc.

Firmware. The program that operates a microprocessor-based device like a print server. Essentially the same as software, but the term "software" usually applies to general-purpose computers. *Appendix C.*

Flash Memory. A type of memory which allows read and write operations, but permanently stores data when the power is turned off. Useful for storing firmware, because it can be easily updated by downloading new code.

Font. A set of characters (usually the alphabet plus numbers punctuation, and special characters) that have a particular style.

Form. A template describing the way a page will appear when printed.

Frame. A group of data and control information that is sent over a network. Often used interchangeably with *packet*, although *frame* is normally used with lower-layer protocols like Ethernet, while *packet* is associated with higher layer protocols like IP and IPX.

Gateway. 1. In TCP/IP jargon, a gateway is the same as a router (see *Router*). 2. A device that converts one higher-level network protocol to a different higher level protocol (for example, a LAT-to-TCP/IP gateway).

Hops. The number of routers that are located between two devices, such as the print server and the file server.

Host Computer. A computer that provides services to one or more users.

Hosts File. The file on a UNIX host computer (usually in the /etc directory) that contains a list of host computers on the network).

HPT. **H**ost **P**rint **T**ransform. Provides printing of AS/400 office documents to ASCII printers. HPT also produces more consistent output when different emulators and print drivers are used. Ex., HP4 PDT

HP/UX. The variation of UNIX that runs on Hewlett-Packard computers.

HTTP. HYPERTEXT TRANSFER PROTOCOL. HTTP IS THE PROTOCOL FOR MOVING HYPERTEXT FILES ACROSS THE INTERNET. HTTP REQUIRES A HTTP CLIENT PROGRAM ON ONE END, AND AN HTTP SERVER PROGRAM ON THE OTHER END. HTTP IS THE MOST IMPORTANT PROTOCOL USED IN THE WORLD WIDE WEB

Hub. 1. A multiport repeater for connecting several network segments together; this term is usually associated with 10baseT networks. 2. A sophisticated network device consisting of a chassis plus several plug-in boards, including bridges, routers, 10baseT hubs, and other devices. .

IEEE. **I**nternational **E**lectronics and **E**lectrical **E**ngineers. A standards body that controls the specifications for Ethernet and other networking-related standards, as well as many other electrical and electronics standards.

IETF. **I**nternet **E**ngineering **T**ask **F**orce. The group that defines the de facto IEEE standards for TCP/IP.

IP. **I**nternet **P**rotocol. IP is the method or protocol by which data is sent from one computer to another on the Internet. IP provides for the transmission of data ("datagrams") from sources to destinations, where sources and destinations are host computers identified by fixed length addresses. The Internet protocol also provides for fragmentation and reassembly of long datagrams, if necessary, for transmission through 'small packet' networks.

IP Address. All machines on an Internet network must have a unique IP address. An IP address is a 32-bit number broken up into 4 bytes (each 8 bits in size) that identifies each sender or receiver of information that is sent in packets across the Internet. The number is represented as a decimal number with a period or dot (".") separating each of the 4 bytes. This is sometimes known as the dot address and, more technically, as dotted quad notation for example: 196.168.0.101. In the decimal notation each of the four numbers can contain a value between 0 and 255.

An IP address has two parts, a network and host portion. The network portion is the identifier of a particular network on the Internet and the host portion is used as a unique identifier of the particular device (which can be a server or a workstation) within that network.

IPDS. **I**ntelligent **P**rinter **D**ata **S**tream. IPDS is an IBM proprietary page description language used by IBM mainframes and minicomputers for complex printing. The IPDS architecture defines the data stream used by print server programs and device drivers to manage all-points-addressable page printing. IPDS data stream is interpreted and presented by microcode executing in printer hardware.

IPP. **I**nternet **P**rinting **P**rotocol, an emerging standard for printing across LANs and the Internet.

IPX. **I**nternet **P**acket **E**xchange. IPX is a datagram (connectionless) service protocol that allows individual packets to be sent to and received from user processes. It does not support the concept of a connection or reliable delivery. However, guaranteed services (like SPX) can be built on top of IPX. IPX is used in situations where a guaranteed service is not required or where an

occasional lost packet is not critical. The TLI (Transport Layer Interface) library provides routines with which to access IPX.

IPX/SPX. **I**nternet **P**acket **E**xchange/**S**equenced **P**acket **E**xchange, one of the NetWare core protocols. Used in conjunction with SPX for printing and other applications..

JetAdmin A Hewlett-Packard printer management program available for NetWare and TCP/IP.

JetSend A protocol originally designed by Hewlett-Packard for simple device-to-device communications.

JetStatus A feature of IntelliBar Net print servers that allows a user to view the status of the printer. The SHOW SERVER QUEUE command that invokes JetStatus with more detailed information is available via the SHOW PORT P1 STATUS command.

Job. In printing, a document that is sent to the printer from a computer.

LAN. **L**ocal **A**rea **N**etwork; a high-speed method of interconnecting devices in a local or campus environment.

LAN Manager. A network operating system developed by Microsoft Corporation.

LAN Server. A network operating system based on Microsoft's LAN Manager; developed by IBM Corporation.

Landscape mode. Printing a document with the long edge of the paper at the top.

LAT. **L**ocal **A**rea **T**ransport. A DEC-specific, non-routable network protocol.

LAT port. A logical port through which LAT devices can send data to other LAT devices. A LAT application port is the default type of LAT port that is used for printing applications (the other type of LAT port is a dedicated port that always accesses a single service on the host computer).

LATCP. A VMS utility program used to configure LAT ports.

LATSYM. LAT **Sym**biont. A VMS program that controls the printing of jobs via LAT ports.

Legal Size. The U.S. long paper size (8.5 x 14 inches).

Letter Size. The U.S. standard paper size (8.5 x 11 inches).

LLC. The **L**ogical **L**ink **C**ontrol layer is one of two sub layers of the Data-Link layer and is concerned with managing traffic (flow and error control) over the physical medium. The Logical Link Control layer identifies a line protocol, such as SDLC, NetBIOS or NetWare, and may also assign sequence numbers to frames and track acknowledgements.
The other Data-Link sub layer is the Media Access Control layer.

LocalTalk. A low-speed (230.4Kbps) local area network standard developed by Apple Computer. Normally used with the AppleTalk protocol.

Logical. Refers to conceptual rather than physical. For example, a computer may have a single physical connection to the network (an Ethernet adapter card), but may have logical connections to many different devices on the network.

Lpd. **L**ine **P**rinter **D**aemon. A program that runs on a host computer or a dedicated print server that allows other host computers to print jobs on that computer or print server. IntelliBar print servers use lpd to allow printing from computers on the network.

lpd-Plus. A feature of IntelliBar print servers that allows the user to define multiple services, each with a different setup and reset string. For example, a user could have one service for landscape printing and another for portrait printing. Also called *logical printers*.

LPR. Line printer. The Unix print command. This does not actually print files but rather copies (or links) them to a spool area from where a daemon copies them to the printer.

Lpq. A Berkeley UNIX command for obtaining the status of printers.

Lpstat. An AT&T UNIX command for obtaining the status of printers.

LPT. Line printer. See LPR.

LPT1 The primary parallel port on a PC. Many networking programs allow transparent printing to network printers by accepting output intended for LPT1 and redirecting it over the network.

LU. **L**ogical **U**nit(s). LUs are specialized IBM network service program products such as Customer Information Control System (CICS) and Information Management System (IMS). LU2 is used for host communication sessions with workstations such as 3270s. LU 3 is defined for host sessions driving line printers. These include emulation of LU2 (IBM 3278/3279 Model 2, 3, 4, or 5 display) and LU1/LU3 (IBM 3287 host printer) type devices. IPDS printers have to be defined as LU type 1 in the VTAM log mode. In IBM's SNA, a logical unit (LU) identifies an end user in an SNA network. By end user, IBM means either a human being that is interacting with the network or an application program that is indirectly representing such an end user. Two logical units that communicate depend on physical connections being established through associated

physical units (PUs). Typically, a logical unit is a unique connection to an application program. A physical unit is usually a hardware device, such as a terminal control unit.

MAC. **M**edia **A**ccess **C**ontrol. MAC is used to address a computer's unique hardware number. (On an Ethernet LAN, the device MAC and the device Ethernet address are the same, however they are not to be confused with the IP address.) When connected to the Internet (e.g., a host computer), a correspondence table relates the computer's IP address to your computer's physical (MAC) address on the LAN.

MAC Address. The hardware address of a device connected to a shared network medium. The MAC address is the device's unique hardware number. On an Ethernet LAN, it's the same as your Ethernet address. The MAC address is used by the Media Access Control sub layer of the Data-Link Layer (DLC) of telecommunication protocols. There is a different MAC sub layer for each physical device type. The other sub layer level in the DLC layer is the Logical Link Control sub layer. When connected to the Internet a correspondence table relates the device's IP address to its physical (MAC) address on the LAN.

man page. In UNIX systems, the man pages are an on-line help facility that provide information on various topics.

MAPI. **M**essaging **A**pplications **P**rogram **I**nterface, a popular method for applications programs to send E-mail messages through Windows operating systems.

MIB. **M**anagement **I**nformation **B**ase. A MIB is a formal description of a set of network objects that can be managed using the Simple Network Management Protocol (SNMP). The format of the MIB is defined as part of the SNMP. (All other MIBs are extensions of this basic management information base.) MIB-I refers to the initial MIB definition; MIB-II refers to the current definition. SNMPv2 includes MIB-II and adds some new objects.

MOP. **M**aintenance-**O**riented **P**rotocol, the protocol used by the VMS NCP and NCL utilities and for downloading files.

Multiprotocol. Refers to the ability to handle multiple protocols simultaneously. In a print server, this means that multiple computers can concurrently send print jobs to the same printer.

Name Server. A node on a TCP/IP network that provides a list of all nodes on the network. The name server is accessible from any node, and eliminates the need to have separate hosts files on each node.

NCL. **N**etwork **C**ontrol **L**anguage. The method in OpenVMS V6.1 and later for accessing and maintaining remote devices. Replaces NCP.

NCP. **N**etwork **C**ontrol **P**rogram, a VMS utility for accessing and maintaining remote devices.

NDS. **N**etWare **D**irectory **S**ervices, a database of network entities in NetWare 4.xx, such as users, file servers, print servers, etc. NDS is a global directory service, which means that users anywhere on a network can access a service such as a printer by name without being logged into the file server that offers that service.

NDPS. **N**ovell **D**istributed **P**rint **S**ervices, a method for configuring printers in NetWare 5.0 and later systems.

NetBEUI. **NetB**IOS **E**xtended **U**ser **I**nterface. The network transport protocol used by all of Microsoft's network systems and IBM's LAN Server based systems.

NetBEUI is often confused with NetBios. NetBIOS is the API and NetBEUI is the transport protocol. Although NetBEUI can be used for printing, it is being replaced by newer printing protocols like the Windows 95 Peer-to-Peer direct mode IPX and TCP/IP.

NetBIOS. **Net**work **B**asic **I**nput **O**utput **S**ystem. *A*n API that augments the DOS BIOS by adding special functions for local-area networks.. Almost all LANs for PCs are based on the NetBIOS. Some LAN manufacturers have even extended it, adding additional network capabilities.

NetWare. A network operating system developed by Novell.

Network Layer. Layer 3 of the OSI Reference Model; establishes paths to allow packets to be routed throughout the network. IP and IPX are examples of this layer.

Network Operating System. A program that controls the operation of a network.

Nibble A nibble is four binary digits or half of an eight-bit byte. A nibble can be conveniently represented by one hexadecimal digit.

NLM. **N**etWare **L**oadable **M**odule. In NetWare 3.xx or 4.xx, a program that runs on the file server that performs a specific function such as communications.

Node. A device connected to a network, such as a computer or print server.

NPRINTER. The method for connecting a remote printer to a print server in NetWare V4.xx. See also *Remote Printer.*
NWADMIN. The Windows-based NetWare Administrator utility that is used to manage NetWare file servers from a client workstation.

OpenVMS. DEC's latest name for the VMS operating system, which was originally called VAX/VMS.

OS/2. IBM's PC operating system. Primarily significant because it is used as the file server operating system on LAN Manager and LAN Server networks.

OS/400. The operating system used on IBM AS/400, iSeries and system 3X minicomputers.

OSF/1. DEC's version of UNIX that was originally called ULTRIX and is now called Digital UNIX. OSF/1 uses the standard Berkeley lpr/lpd procedures for printing to remote host computers and print servers.

OSI Reference Model. A seven-layer model developed by the International Standards Organization which is used as a reference for developing protocols. Since each layer performs a different function, development and debugging are simplified, and there is greater flexibility (for example, this approach allows TCP/IP to run over both Ethernet and Token Ring).

P1284. An IEEE standard that defines a high-speed bi-directional parallel printer port. P1284 ports are also compatible with the Centronics standard. There are three types of physical connectors associated with the 1284 standard: 1284A (25-pin DB25), 1284B (36-pin standard Centronics), and 1284C (miniature Centronics).

Packet. A group of data and control information that is sent over a network. Often used interchangeably with *frame*, although *frame* is normally used with lower-layer protocols like Ethernet, while *packet* is associated with higher layer protocols like IP and IPX.

Parallel Port. On a printer, a port that transfers data 8 bits at a time for maximum performance. The parallel port usually has a 36-pin Centronics connector.

PATHWORKS. The Digital Equipment Corporation network operating system for PCs and Macintosh computers.

PCL. **P**rinter **C**ontrol **L**anguage. A command language based on escape sequences that was developed by Hewlett-Packard for its LaserJet printers.

PCONSOLE. A NetWare utility program for configuring and managing printers.

PDL. **P**age **D**escription **L**anguage. A control language usually consisting of commands embedded within a document that control the way the document will look when printed. Such commands would set the type of fonts, page margins, colors, graphics, etc. within the document.

PDF. Printer Definition File. The Graphical Device Interface (GDI) default standard for PC5250 printing, and it is the easiest of the three methods to use. Its disadvantages are that it cannot print AS/400 office documents with embedded images and it cannot print AFP documents.

PDT. **P**rinter **D**efinition **T**able. A PDT bypasses both AS/400 and Windows printer drivers; however, a PDT cannot print AS/400 office documents with embedded images and cannot print AFP documents

Peer-to-Peer. 1. A LAN in which nodes communicate with each other without the need for a file server. 2. A new protocol for peer-to-peer communications that is included with Windows 95 (also known as Direct Mode IPX).

Physical Layer. Layer 1 of the OSI Reference Model; defines the physical and electrical connection to the network.

Ping. A TCP/IP command utility. The ping command sends test information to another device and waits for the information to return. The ping command accepts one parameter, the IP address or host name of the remote system to send/receive the data. The utility displays the amount of data sent and received and the amount of time elapsed while doing so. The ping utility is very useful when testing the TCP/IP configuration.

PJL. **P**age **J**ob Control **L**anguage. PJL is an industry standard printer job control language originally developed by Hewlett-Packard. PJL is independent of the page description language. HP-PJL is used to encapsulate the user jobs to provide job and printer control information. PJL can be viewed as functioning above the level of other printer languages.

POP3. **P**ost **O**ffice **P**rotocol. The most recent protocol used to retrieve E-mail from the server.

Port. A logical channel or channel endpoint in a communications system. The TCP and UDP transport layer protocols used on Ethernet use port numbers to distinguish between (demultiplex) different logical channels on the same network interface on the same computer. IntelliBar AS Net print servers use port 9100 for PCL printing and port 5001 for IPDS printing.

Portrait mode. Printing a document with the short edge of the paper at the top (the normal method of printing).

PPD. See Printer Description File.
PPL. An ANSI-standard page description language originally used in the DEC LN03 laser printer.

Printcap File. The file on a UNIX host computer (usually in the /etc directory) that contains a list of printers.

PRINTCON. A NetWare utility program for defining the characteristics of the print job.

PRINTDEF. A NetWare utility program for defining the characteristics of a printer or form. These characteristics are associated with the print job via the PRINTCON utility.

Print Server. 1. A device that allows multiple host computers to share a printer over a local area network. 2. In Novell NetWare, a logical device that services print queues on a file server.

Protocol. A method of sending and receiving data between two or more nodes on a network, and insuring that the data is received without errors.

PSF. **P**rinter **S**ervices **F**acility. IBM's system software that generates the native IBM printer language, IPDS. PSF is supported as a standard part of the operating system under OS/400. PSF manages printer resources such as fonts and electronic forms, and provides error recovery for print jobs. Multiple data streams are accepted by PSF and converted into an IPDS data stream for printing.

PSF/400. **P**rint **S**ervices **F**acility for AS**/400**. PSF/400 is a feature of OS/400, the AFP system manager and IPDS printer manager for AS/400-iSeries servers. PSF/400 manages the delivery of AS/400-iSeries output. It directs a dialog with the IPDS printer that enables each page and each job to be printed completely, with full error recovery and page range support. PSF/400 also manages all of the elements required for each page, such as fonts, images and overlays, dynamically delivered as needed to the printer. SCS applications with PSF/400 can now use IPDS printers.

PTF. **P**rogram **T**emporary **F**ix. A PTF is a temporary solution to a problem (bug) in an IBM software product that is made available for customers to install.

PU. **P**hysical **U**nit. PUs are IBM network components that are responsible for managing network resources such as lines, memory, terminals, controllers, etc.

Queue. A region on the computer or file server's disk where files are temporarily stored before printing. Since the queue can store multiple files, it effectively allows users to send their jobs to the printer even if the printer is busy (a procedure called *spooling*).

Queue Server. In Novell NetWare, a queue server is basically the same as a NetWare print server. Queue Server mode is a NetWare printing method in which the printer is directly connected to the print server with no PSERVER NLM installed on the file server.

Rarp. **R**everse **A**ddress **R**esolution **P**rotocol is a protocol by which a physical machine in a local area network can request to learn its IP address from a gateway server's Address Resolution Protocol (ARP) table or cache.

RAW. TCP Data Port. The TCP/IP print servers usually have two (or more) different ports, one named raw and another text. The difference between these two is that for the raw port, no

processing on the data is done. Normally, the raw queue is used to avoid interpretation of codes by the print server that are intended for the printer itself.   When printing from an AS/400 to an IntelliBar print server over TCP/IP, the LPD function of the server is used to access the raw port.

RCONSOLE. A NetWare utility program that allows a workstation user to access the file server console.

Remote Console. A method of accessing the print server console remotely via protocols like TELNET or NCP for configuration and management purposes.

Remote Printer. In Novell NetWare, a remote printer is a device that connects a printer to a NetWare print server via a network connection rather than through the parallel or serial port of the print server.

Repeater. A network devices that connects two or more network segments together and provides the additional function of strengthening and reshaping the electrical signals, thereby allowing the network to be extended over greater distances.

Reset. In printing, a reset is a one or more characters sent before and/or after a print job. Usually, the purpose of a reset is to restore the printer back to its normal state

RJ45. A type of modular jack connector similar to a telephone connector but with 8 wires instead of 4 wires.   Used for 10baseT Ethernet connections and for serial port connections.

Router. A device that connects networks together. A router operates at level 3 of the OSI Reference model. A router is called a *gateway* in TCP/IP terminology.

RPRINTER. The method for connecting a remote printer to a print server in NetWare V3.xx and V2.xx. Replaced by NPRINTER in NetWare V4.xx. See also *Remote Printer*.

RS-232. The most common serial communications interface electrical standard.

RS/6000. IBM's RISC-based family of computers usually running AIX, IBM's variant of UNIX.

SAP R/3 AFP. Advanced function printing utilities for SAP R/3 platforms. SAP R/3 AFP dynamically transforms the output of R/3 applications, providing enhanced documents with electronic forms, images, logos, bar codes and fonts for printing with IPDS printers.

SCS. SNA **C**haracter **S**tream. SCS is an IBM printer control code table that enables control of the printer data stream. SCS is used for non-IPDS printing. Following is the SCS control code table for the IBM 4028 emulation used in IntelliBar AS printers:

SCS Control Code Table for an IBM 4028

Code Name	EBCDIC	Value
SHF	Set Horizontal Format	2BC1
HT	Horizontal Tab	05
VT	Set Vertical Format	2BC2
VCS	Vertical Channel Select	04
LF	Line Feed	25
FF	Form Feed	0C
IRS	Inter-Record Separator	1E
NL	New Line	15
CR	Carriage Return	0D
BS	Back Space	16
SLD	Set Line Density	2BC6
STO	Set Text Orientation	2BD10683
SPD	Set Print Density	2BD2NN29
PPM	Page Presentation Media	2BD2NN48
TRN	Transparent	35
BEL	Bell	2F
ENP	Enable Presentation	14
INP	Inhibit Presentation	24
GE	Graphic Escape	08
SA	Set Attribute	28

SCO UNIX. A PC-based UNIX developed by the Santa Cruz Operation.

Segment. A physically or logically separate part of a network, usually a different cable, that is joined with other segments of the network via a repeater, bridge, or router to form the complete network.

Serial Port. On a printer or print server, a port that transfers data one bit at a time. Serial ports usually have either 25-pin, 9-pin "D", or RJ45 connectors.

Server. A device on a local area network that provides services to client computers on the network. See *File Server, Print Server.*

Service. A capability offered by a node on a network. A single node can have multiple services available.

Setup string. A series of characters that is sent before a print job. Usually the purpose of a setup string is to put the printer in a special state (for example, landscape mode).

Shell Script. The UNIX equivalent of a batch file. See *batch file.*

SMTP. **S**imple **M**ail **T**ransfer **P**rotocol. A protocol used to send E-mail messages over the Internet.

SNA. **S**ystems **N**etwork **A**rchitecture. SNA is IBM's proprietary high level networking protocol standard used by IBM and IBM compatible mainframes. SNA involves two separate kinds of environments, centralized computing solutions and peer-based computing, although a number of key concepts are central to all SNA routing situations.

SNAP. See *Ethernet_SNAP.*

SNMP. **S**imple **N**etwork **M**anagement **P**rotocol. SNMP defined in STD 15, RFC 1157, is the protocol governing network management and the monitoring of network devices and their functions. It is not necessarily limited to TCP/IP networks.

Solaris. A UNIX operating system developed by Sun Microsystems that runs on Sun computers and Intel-based PCs.

Spoofing. A method normally associated with AppleTalk in which the print server simulates a bi-directional communications link by sending back control information to the printer rather than relying on the printer to send back this information.

Spool Directory. On UNIX systems, a directory that contains the names of files being spooled to a printer.

Spooling. In printing applications, spooling is the transfer of data to a temporary storage area on disk (the print queue) prior to printing. Spooling allows many jobs to be queued to a single printer. Since printers are relatively slow devices compared to disk drives, spooling allows a user to submit a job to the printer and then perform other tasks while the job is being printed.

SPX. **S**equenced **P**acket **E**xchange. SPX is a transport layer protocol built on top of IPX. SPX is used in Novell NetWare systems for communications in client/server applications programs,

e.g. BTRIEVE (ISAM manager). SPX is not used for connections to the file server itself; this uses NCP. It has been extended as SPX-II. SPX/IPX perform equivalent functions to TCP/IP.

Subnetwork. One of several small networks that are joined together into a single large network.

Subnet Mask. A TCP/IP method of dividing a network into several smaller subnetworks. The subnet mask is used to determine what bits of the IP Address are used to assign the network portion. Any bits within the subnet mask that are set to 1 are used to determine the network.

Symbiont. Software that handles job queuing and printing on an operating system.

SYSCON. A NetWare utility for managing file servers from a client workstation.

TCP/IP. **T**ransmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol. Technically, this means the TCP and IP protocols, but the term has come to encompass all of the related protocols, such as TELNET, FTP, lpd, etc.TCP/IP is the basic communication language of the Internet. It can also be used as a communications protocol in a private network. TCP/IP uses the client/server model of communication in which a computer user (a client) requests and is provided a service (such as sending a Web page) by another computer (a server) in the network. TCP/IP communication is primarily point-to-point, meaning each communication is from one point (or host computer) in the network to another point or host computer.

TCP. **T**ransmission **C**ontrol **P**rotocol. TCP is a highly reliable host-to-host protocol between hosts in packet-switched computer communication networks, and in interconnected systems of such networks.

TCP Port. A method of accessing a TCP/IP service, where a device with a single IP address can have multiple TCP ports. For example, TELNET is port 23, lpd is port 515, etc.; to access a service, you would specify the IP address of the device plus the TCP port number of the service.

TCPware A popular VMS TCP/IP software package sold by Process Software.

TELNET. Telnet is a TCP/IP protocol for remote computing on the Internet. It allows a computer to act as a remote terminal on another machine, anywhere on the Internet. This means that when you telnet to a particular host and port, the remote computer (which must have a telnet server) accepts input directly from your computer (which must have a telnet client) and output for your session is directed to your screen. There are many library and information resources that are accessible through telnet.

TELNET interpretation. In the TELNET protocol, certain characters are intercepted and handled in a special manner, rather than being sent directly to the device.

Text file. A file that contains ASCII formatted information, with each line of text usually separated by a line feed and/or carriage return.

tftp. **T**rivial **F**ile **T**ransfer **P**rotocol, a simple method of transferring information between two TCP/IP devices.

TGV Multinet. A TCP/IP software package that runs on VMS.

Thin Ethernet. *See 10base2.*

Transport layer. Layer 4 of the OSI Reference Model; provides end-to-end data integrity. TCP is an example of this layer.

Transceiver. In Ethernet networks, a small box that plugs into the AUI port of a device to allow that device to connect to the Ethernet cable. Many Ethernet devices have one or more built-in transceivers, which eliminate need for the AUI port.

UCX. The old name for DEC's TCP/IP services for VMS.

ULTRIX. The original DEC UNIX. ULTRIX supports both TCP/IP and LAT printing.

UNIX. A general-purpose computer operating system used on many different kinds of computers.

VAP. **V**alue **A**dded **P**rocess, a program that runs on a NetWare 2.xx file server and performs a specific function such as communications.

VAX. Digital Equipment Corporation's family of 32-bit computers that runs either VMS or some variation of UNIX (ULTRIX, OSF/1, or Digital UNIX).

WAN. **W**ide **A**rea **N**etwork, a network that interconnects computers and other devices over large distances, most often via telephone company facilities but also via private networks, public data networks, and satellites.

Warp. IBM's latest version of the OS/2 operating system.

WCO. **W**orkstation **C**onfiguration **O**bject/ Workstation Customization Object. A WCO is an object that allows customization of a workstation device (such as a printer). When a WCO is used with an AS/400 printer output queue, it allows the user to customize printing functions ranging from font selection to line spacing.

Web JetAdmin.   A Hewlett-Packard software program for Windows NT that allows HP, In-telliBar and other print servers to be configured and managed over the network using a web browser.

WebXAdmin   A feature of IntelliBar Net print servers that allows configuration and management via a web browser.

Windows 95 and Windows 98.   Microsoft's PC operating systems that feature built-in peer-to-peer networking.

Windows NT   Microsoft's multitasking operating system that can be used either as a client or as a server (Windows NT Advanced Server).

Windows 2000   Microsoft's multitasking operating system that replaces Windows NT. Win-dows 2000 can be used either as a client or as a server.

Windows XP.   Microsoft's latest multitasking operating system that replaces Windows 2000. Windows XP can be used either as a client or as a server.

WINSOCK.   A popular applications program interface for TCP/IP networking using Windows operating systems.

Wollongong PATHWAY.   A TCP/IP software package for VMS.

XAdmin.   Windows-based 16 bit utility for managing and configuring print servers.

XAdmin32.   Windows-based 32-bit bit utility for managing and configuring print servers.

Zone.   In AppleTalk, a zone is a sub-network; that is, a given network can be subdivided into multiple zones.

End of Appendix A

Appendix B: Using Remote Console Services (LPD-Plus)

1. OVERVIEW

This section describes the remote console services available on IntelliBar Net print servers.

A service is a resource that can be accessed by computers, in this case to access and configure the IntelliBar print the print server. IntelliBar print servers provide the following predefined services (do a `SHOW SERVICE` command in the print server remote console to get a list of available services; note that the serial port services will only be displayed if the serial port has been enabled for printing):

IntelliBar AS Net Telnet Console Commands

Service	Definition
`XCD_xxxxxx_P1`	P1 port binary service
`BINARY_P1`	P1 port binary service
`TEXT_P1_TX`	P1 port TCP/IP text service (adds carriage return after each line feed)
`PCL_P1`	P1 port PCL service (switches PJL-compatible printer to PCL mode)
`XCD_xxxxxx_P1_AT`	P1 port AppleTalk service
`XCD_xxxxxx_S1`	S1 port binary service
`BINARY_S1`	S1 port binary service
`TEXT_S1`	S1 port TCP/IP text service (adds carriage return after each line feed)
`PCL_S1`	S1 port PCL service (switches PJL-compatible printer to PCL mode)
`XCD_xxxxxx_S1_AT`	S1 port AppleTalk service

where "*xxxxxx*" is the last six digits of the Ethernet address (for example, `XCD_009C53_P1`). Note that any of the services, not just the user-defined ones, can be modified to meet a user's particular requirements.

IntelliBar print servers provide the capability to customize any of the services to meet specific user requirements through the use of setup and reset strings. Such strings are printer command sequences that are sent to the printer before or after the print job. For example, you could define one of the services to provide bar code printing by defining a setup string that contains the appropriate commands to configure the printer to print data as
a specific barcode symbology, including setting the aspect ratio, bar code height, symbology density, check digit, position of human readable text, etc.

The IntelliBar print server provides several predefined strings for popular PCL commands. These include (do a SHOW SERVER STRING command in the remote console to see the available strings):

No.	String	Definition
0	(special)	Using this number causes printer not to be automatically reset at the end of each job.
1	NULL	Null string
2	\1BE	PCL reset (<ESC>E)
9	\FF\04\FF\05\FF\06\FF\07	Enter Language=PCL
11	\0C	Formfeed

To define a new string, use the command:

        SET SERVER STRING *number* "*string*"

where *number* is the number of the string (12 through 31) and *string* is the desired string (must be enclosed in quotation marks).

A given string can include hexadecimal characters by preceding the value with a "\" character. The next two characters after the "\" will then be interpreted as the hexadecimal value of a character. For example, to specify <ESC>E as string number 12, you would enter:

        SET SERVER STRING 12 "\1BE"

Please note that when you associate a string number with a service, the new string number completely replaces any previous string numbers. Also, if you are using one of the predefined PCL services, the new string will nullify the language switching function of these services.

However, you can combine several string numbers together by preceding the string number with "\FF". For example, if you defined string number 21 as "\1B" (<ESC>), and string number 22 as "&l1O", you can create a new string number 23 that contains <ESC>&l1O (the PCL landscape mode command) by entering:

        SET SERVER STRING 23 "\FF\15\FF\16"

Note that the string numbers within the quotation marks are expressed in hexadecimal when used with this command.
To associate a string with the service, use the following commands:

```
SET SERVICE servicename BOT stringnumber
SET SERVICE servicename EOT stringnumber
```

where *servicename* is the name or number of the service and *stringnumber* is the number of the
string as defined above. The first command (BOT) adds the specified string to the beginning of
the job, while the second command (EOT) adds the specified string to the end of the job. A
given service can have both a setup and reset string associated with it.

To clear a string number, type:

```
CLEAR SERVER STRING stringnumber
```

To clear a setup or reset string, set the string number to 1 (the null string):

```
SET SERVICE servicename BOT 1
SET SERVICE servicename EOT 1
```

2. ENABLING PROTOCOLS ON A SERVICE

You may enable or disable protocols that can access a given service with the following com-
mands:

```
SET SERVICE name LAT ENABLED
SET SERVICE name IP ENABLED
SET SERVICE name NETWARE ENABLED
SET SERVICE name APPLE ENABLED
SET SERVICE name NETBEUI ENABLED
SET SERVICE name DLC ENABLED
```

where *name* is the name or number of the service. Do a SHOW SERVICE command to see the
enabled protocols. Note that a given service must have at least one protocol enabled.

3. ADDING FILTERS TO A SERVICE

A filter is a program built into the print server that performs a specific function. The following fil-
ters are available:

3.1 <u>**filter no.**</u>   <u>**Description**</u>

1   This filter substitutes one user-specified character string for another character
                  string. By default, it substitutes a carriage return character plus a linefeed
                  character every time a linefeed character is encountered in the data stream. It
                  is useful for printing UNIX text files, because such files do not have carriage
                  returns at the end at the end of lines.

3.2 <u>**filter no**</u>.   <u>**Description**</u>

2   This filter species that AppleTalk can be used on the service.

3.3   **filter no.**   **Description**

         4   This filter enables the HP Tagged Binary Communications Protocol to allow AppleTalk binary jobs to be printed via the P1 port.

The service TEXT_*pp* is predefined with the text filter, while the service XCD_xxxxxx_*pp*_AT has the AppleTalk filter enabled. To use a filter with other services, use the following command:

```
SET SERVICE name FILTER fltrno ENABLED
```

where *name* is the name of the service and *fltrno* is the number of the filter (e.g., 1 for the text filter).

3.4 Changing the Service Name

The default service names are rather long and difficult to remember. If you want to change a service name to something more meaningful, execute the following command from the print server remote console:

```
SET SERVICE oldname NAME newname
```

4. USING SERVICE NAMES WITH LAT, TCP/IP, OR NETWARE

To use a service in LAT, specify the /SERVICE option instead of the /PORT option when defining the LATCP port. For example:

```
LATCP> CREATE PORT LTA555
LATCP> SET PORT LTA555/NODE=XCD_OOO9C3-
/SERVICE=BINARY_P1
```

To use services from TCP/IP, specify the service name as the remote printer or "rp" parameter in the printcap file or the printer setup program (e.g., SAM or SMIT). Remember that if you want to print text files to a UNIX service, you should enable the TEXT filter (filter number 1).

To use a service with NetWare, use PCONSOLE to specify the default NetWare service name as one of the print servers for the queue (this service is XCD_*xxxxxx*_P1 by default, where "*xxxxxx*" is the last six digits of the Ethernet address). If you want to use a different service, you must also specify this service as one of the print servers for the print queue.

5. USING THE CHARACTER SUBSTITUTION FILTER

The character substitution filter (filter 1) allows a user to substitute any text string for any other text string (strings may be up to 64 characters, and the two strings may have different lengths). To use this filter:

1. Define the desired strings using the `SET SERVER STRING` *stringnumber string* command (the same command used to define `EOT` and `BOT` strings).   For example:

    ```
    SET SERVER STRING 15 "\01"
    SET SERVER STRING 16 "This is a test\0D"
    ```

    sets string 15 as <CONTROL-A> and string 16 as "This is a test"<RETURN>. The command `SHOW SERVER STRINGS` shows the string settings.

2. Enable filter 1 on the desired service with `the SET SERVICE` *servicename* `FILTER 1` command. The command `SHOW SERVICE` displays which filters are enabled on the services, and the `SHOW SERVICE FILTER` displays the filter settings.

3. Define the service with the desired match string and replacement string with the following commands:

    ```
    SET SERVICE servicename FMS matchnumber
    SET SERVICE servicename FRS replacenumber
    ```

    where *matchnumber* and *replacenumber* are the numbers of the strings defined in step 1. Note that if the match string is set to 00, the default match string <LINEFEED> and replacement string <CARRIAGE RETURN><LINEFEED> will be used. If the replacement string is set to 00 (and the match string is not zero), then the replacement is NULL, and any matches are just deleted from the input stream.

4. As an example of the use of filter 1, in certain types of IBM CICS print jobs, pages end with a <CONTROL-A>. By using filter 1, you can substitute each occurrence of <CONTROL-A> with <FORMFEED>. This would be implemented as follows on a service called "CICS":

    ```
    SET SERVER STRING 12 "\01"
    SET SERVICE CICS FILTER 1
    SET SERVICE CICS FMS 12
    SET SERVICE CICS FRS 11
    ```

When jobs are printed to the CICS service, all occurrences of <CONTROL-A> will be replaced with <FORMFEED>. Note that filter 11 is predefined as <FORMFEED>.

End of Appendix B