

# Unix - TCP/IP

*This document explains how to configure and use the IOPRINT+ Print Server in the Unix TCP/IP environment.*

## Software Requirements

- TCP/IP protocol, FTP (Optional: - BOOTP, Rarp, Telnet)
- LPD printing system (for LPD printing)
- C Compiler (for PSfilter proprietary printing system only).

## Device Configuration

Configuration of your IOPRINT+ Print Server can be done by any of the following methods. Follow each link for further details.

<a href="#"><u>BiAdmin</u></a>	If you have Windows 95/98/NT, this is the recommended program for configuration and management.
<a href="#"><u>FTP</u></a>	Command-line FTP (File Transfer Protocol) clients are supported.  FTP can be used to assign an IP Address to the IOPRINT+ Print Server, provided that the <b>Unix Host Configuration</b> (described later in this document) has been completed.
<a href="#"><u>Web Browser</u></a>	The IOPRINT+ Print Server incorporates a HTTP server, allowing you to configure it with a Web Browser. Most browser will work, provided they support tables and forms.  This method can be used to assign an IP Address to the IOPRINT+ Print Server, provided that the <b>Unix Host Configuration</b> (described later in this document) has been completed.

## IP Address Configuration

The IOPRINT+ Print Server allows the following IP Addresses to be entered. (The entry in brackets shows the line number and token in the device's configuration file. This information is for people using FTP.)

<b>IP Address</b> (4000 IP_ADDR)	The IOPRINT+ Print Server is able to obtain an IP Address dynamically, or use a static IP Address assigned during configuration. Because of the support for dynamic IP Addresses, the IOPRINT+ Print Server ships with an IP Address of 0.0.0.0.  See the following section for more details on using either a static or dynamic IP Address.
<b>Gateway Address</b> (4001 GATEWAY)	If your network segment has a router, enter the router address here. If there is no router, leave the address as 0.0.0.0.
<b>Subnet Mask</b> (4002 MASK)	If the Gateway Address above is 0.0.0.0 the Subnet Mask should also be left at 0.0.0.0. If you have a router, enter the Subnet mask for the segment to which the IOPRINT+ Print Server is attached.

### Device IP Address

Normally, the IOPRINT+ Print Server is assigned a static IP Address. If you leave its IP Address at the default value of 0.0.0.0, its sequence for finding an IP Address dynamically is as follows:

DHCP, BOOTP, RARP.

See *Dynamic IP Address Configuration* on page 5 for more details.

## Other Configuration Settings

When assigning the IP Addresses, you should also check the following configuration settings.

<b>Device Name</b> (0001 BOX_NAME)	The default name will be in the form SCxxxxxx (SC followed by 6 numbers). This can be changed. The new name MUST NOT exceed 19 characters, nor include any spaces.
<b>TCP Session Retry Interval</b> (4010 TCP_INT)	Sets how long the IOPRINT+ Print Server should wait before retrying a TCP/IP connection which is lost. Allowable values are from 0 to 255 seconds, with 2 as the default.
<b>TCP Session Retry Count</b> (4011 TCP_CNT)	Sets how many attempts at reconnection will be made. After that, the TCP/IP session will be terminated. Allowable values are from 0 to 255, with 254 as the default.

Serial Port Setup (if exists)

<b>Baud Rate (bps)</b> (0030 BAUDRATE)	Allowable values are 300, 600, 1200, 2400, 4800, 9600, 19200, 38400
<b>Stop bits</b> (0031 STOPBITS)	Allowable values are 1 or 2
<b>Parity</b> (0032 PARITY)	Allowable values are NONE, ODD, EVEN
<b>Data bits</b> (0033 DATABITS)	Allowable values are 7 or 8
<b>Handshake</b> (0034 HANDSHAK)	Allowable values are NONE, HARDWARE, XON/XOFF, BOTH

Logical Printers

Logical Printers can be used to create a “Virtual” printer. For example, to create a Landscape printer, you could define a Logical Printer as follows:

- Pre-string

Printer Control codes to switch the printer to Landscape mode
- Post-string

Printer Control codes to reset the printer, restoring the default settings.

Another logical printer could be used to print Unix-format text files for a DOS printer, by converting Unix-style LF (Line Feeds) to DOS-style LF/CR (Line Feed, Carriage Return) pairs.

IOPRINT+ Print Server models with 1 parallel port support 3 Logical Printers, otherwise they support 8 Logical Printers. The names (L1..L8) cannot be changed. Each Logical Printer has 4 settings as shown below.

Logical Printer Setup Data

<b>Physical Port</b> (0100 L1_PROUT)	IOPRINT+ Print Server Port to which the printer is attached (P1 to P3 for parallel ports and SP for the serial port).
<b>String Before Job</b> (0101 L1_PREST)	The printer control string (in hex) to be sent to the printer before each print job.
<b>String After Job</b> (0102 L1_POSTR)	The printer control string (in hex) to be sent to the printer after each print job.
<b>Convert LF to CR+LF</b> (0103 L1_CHGLF)	If ON, LF (line feed) characters are changed to CR+LF (carriage return + line feed). If OFF, no conversion is done.



The maximum size of a printer control string is 15 characters.

The line numbers in the IOPRINT+ Print Server’s CONFIG file are listed below. This information is useful if you use FTP for configuration.

Logical Printer	Line Numbers
L1	0100 to 0103
L2	0120 to 0123
L3	0140 to 0143
L4	0160 to 0163
L5	0180 to 0183
L6	0200 to 0203
L7	0220 to 0223
L8	0240 to 0243

## Unix Host Configuration

The IOPRINT+ Print Server must be provided with a IP Address so that it will be a valid device on the LAN. This can be done using either *Static* or *Dynamic* IP Address configuration.

### Static IP Address Configuration

1. Determine the **Physical Address** of the IOPRINT+ Print Server from the *default name* shown on a sticker on the base of the unit. The default name is in the form SCxyyz (SC followed by 6 numbers).

The **Physical Address** of the device is formed by joining "00:c0:02:" to the digits in the default name.

For example, a name is SC123456 means the physical address is 00:c0:02:12:34:56.

2. Login to the UNIX host as root.
3. Add the IOPRINT+ Print Server to the /etc/hosts file by adding the following line to the file:

```
IP_Address NAME # comment
```

Where:

*IP\_Address* is the IP address for the IOPRINT+ Print Server. This address **must match** the address stored in the device.

*NAME* is the IOPRINT+ Print Server's name. This **must match** the name stored in the device.

*# comment.* Add the *Default Name* as a comment.

Example:

```
192.10.2.54 PS_Rm203 #Default name SC123456
```

In the example above, SC123456 is assigned the IP address 192.10.2.54 and the name "PS\_Rm203".

4. Associate the physical address with the IP address of the IOPRINT+ Print Server, by using the **arp** command as follows:

```
arp -s NAME 00:c0:02:xx:yy:zz
```

Where:

*NAME* is the name assigned to the device

00:c0:02:xx:yy:zz is the physical address of the IOPRINT+ Print Server, as determined from the default name.

Example:

```
arp -s PS_Rm203 00:c0:02:12:34:56
```

5. Check the IP Address using the **ping** command:

```
ping NAME
```

You should receive a response. If you get a *Timeout* message, the above procedure has failed.

6. If the IOPRINT+ Print Server is not configured yet, you can now connect and configure it using FTP or your Web Browser.

## Dynamic IP Address Configuration

If the device's IP Address is left at 0.0.0.0 it will try to obtain a dynamic IP Address by using the following methods in sequence: DHCP, BOOTP, RARP.

### Using DHCP

Using DHCP is only possible if you have DHCP management software which allows you to take advantage of this feature. Otherwise, the IOPRINT+ Print Server's IP Address will be unknown, and connection to it will be impossible. In this case, configure the IOPRINT+ Print Server for a static IP Address. (See the preceding section.)

### Using BOOTP

1. Perform steps 1 to 3 for assigning a static IP Address.
2. Add the following entry to the Boot Table /etc/boottab

```
NAME:ht=ether:vm=rfc1024::ha=PA:ip=IP:sm=SM:gw=GW
```

Where

*NAME* is the IOPRINT+ Print Server's name

*PA* is the physical address of the IOPRINT+ Print Server

*IP* is the IOPRINT+ Print Server's IP Address

*SM* is the Subnet Mask

*GW* is the Gateway IP Address

3. If it is not running, start the bootp daemon (the usual command is `bootpd`) and then reset the IOPRINT+ Print Server. It should then acquire an IP Address using bootp.
4. If the IOPRINT+ Print Server is not configured yet, you can now configure it using FTP. or your Web Browser. Otherwise, check with the ping command:

```
ping NAME
```

You should receive a response. If you get a *Timeout* message, the above procedure has failed.

### Using RARP

1. Perform steps 1 to 3 for assigning a static IP Address.
2. If the rarp daemon is not running, start it with the command:

```
rarpd -a
```

3. Add a line to the Ethernet Address table /etc/ethers

```
00:c0:02:xx:yy:zz NAME
```

Where

00:c0:02:xx:yy:zz is the physical address of the IOPRINT+ Print Server

NAME is the name of the IOPRINT+ Print Server.

4. Reset the IOPRINT+ Print Server. When it reboots, it should acquire an IP Address from rarp.
5. If the IOPRINT+ Print Server is not configured yet, you can now configure it using FTP or your Web Browser. Otherwise, check the Address with the ping command:

```
ping NAME
```

You should receive a response. If you get a *Timeout* message, the above procedure has failed.

## Printing Methods Overview

There are 4 printing methods to choose from. All are explained in the following sections. Select whichever is the most convenient in your environment.

### LPD

LPD is a standard print method for most UNIX systems. The benefit of this method is that it eliminates the need to install additional software on the host.

The problem is that in most cases the LPD protocol sends out the data file before the control file. The IOPRINT+ Print Server will print the data file immediately, ignoring any print options set in the control file. To solve this problem, use PSfilter instead.

### Direct Socket Interface

The Direct Socket Interface (DSI) is a Unix-based method of providing a “direct” connection between a host computer and a printer. The host and the IOPRINT+ Print Server establish a TCP connection, using a special socket number. All data sent over this connection is treated as print data, and sent transparently to a logical printer defined on the IOPRINT+ Print Server.

### PSfilter

PSfilter is a proprietary print method provided with the IOPRINT+ Print Server. The benefit of this method is that it provides many print options such as banner print, copies, and so on. To use PSfilter, a C compiler must be installed on every UNIX host so that the PSfilter source code can be compiled into executable code and installed on the UNIX host.

### FTP (File Transfer Protocol)

FTP is also a standard print method in most UNIX systems, but it is NOT recommended except as a test and back-up method of printing.

LPD and PSfilter work well with a large number of users because they both employ print queue processes. FTP does not implement a print queue. If the printer is busy, the print command will fail, creating an error situation.

See the [FTP document](#) for details on using FTP.

# LPD Printing Configuration

LPD is a built-in printing protocol for most UNIX systems, and is also supported in Windows NT 3.5 or later.

## LPD on IBM AIX 4.15

Before proceeding, ensure that the IOPRINT+ Print Server has been assigned an IP Address. To setup your AIX system for LPD printing, perform the following steps.

1. Add the IOPRINT+ Print Server to **/etc/hosts.lpd**, using the name you assigned to the IOPRINT+ Print Server.

2. Start the LPD daemon if it is not running, using the following command:

```
start src -s qdaemon
```

3. Start the system administration tool **smit** and select *Print Spooling*

4. Create the required number of queues (one for each logical printer) by selecting:

- Add a Print Queue
- Remote (Printer attached to Remote Host)
- Standard Processing

5. Use the following information:

Field	Entry
Name of queue to add	Use a single-word queue name which indicates which printer is attached.
Hostname for remote server	IOPRINT+ Print Server name as used in /etc/hosts.lpd.
Name of queue on remote server	Logical printer number (L1..L3 or L1..L8) to service this queue.
Type of print spooler on remote server.	Use default value (AIX Version xxx)

6. Ensure that the logical printers are configured in the IOPRINT+ Print Server. Refer to **Logical Printers** earlier in this document.

7. Print using the following command:

```
lp -d printer_queue file_name
```

Where

*printer\_queue* is one of the entries used in *Name of queue to add*.

*file\_name* is the file you wish to print.



# LPD on System V

Before beginning LPD Setup, ensure that an IP Address has been assigned to the IOPRINT+ Print Server. Keep the following points in mind:

- The **remote host name** is the name of the IOPRINT+ Print Server.
- The **remote printer name** is the print queue name for the Logical Printer. Logical printers also need to be configured on the IOPRINT+ Print Server itself. (See page 3).
- If your UNIX asks for the LPD type, be sure to identify the service type as BSD. The IOPRINT+ Print Server’s LPD protocol meets BSD system standards.
- In the sample commands shown, *printer\_name* is the name of the Print Queue serviced by the IOPRINT+ Print Server, and *Spooler\_directory* is the name of the directory used to spool the print jobs.

## Procedure

Action	Sample Command
Stop Print Services	/usr/lib/lps shut
Add a System Printer	/usr/lib/lpadm in -p <i>printer_name</i> -v /dev/null
Restart the Print Services	/usr/lib/lpsched
Enable printing to the new printer device	enable <i>printer_name</i>
Start accepting jobs for the new printer device	accept <i>printer_name</i>
Create a spooling directory	mkdir /usr/spool/ <i>Spooler_directory</i>
Make spooling daemon the owner of this directory	chown daemon /usr/spool/ <i>Spooler_directory</i>
Create read/write permissions	chmod 775 /usr/spool/ <i>Spooler_directory</i>
Give permissions to LPD processes.	chgrp daemon /usr/spool/ <i>Spooler_directory</i>
Add remote printer(s)	See following section.

## Adding Remote Printers

A remote printer is added by inserting the following line in the /etc/printcap file.



The entry is really one line, but can be entered as shown. Use a TAB character where shown.

```
printer_name | Remote_Printer_Alias:\n[ TAB ] :lp=:\n[ TAB ] :rm=PS_NAME:\n[ TAB ] :rp=Logical_Printer_name:\n[ TAB ] :sd=Spooler_directory:\n
```

```
[TAB] :mx#0:
```

Where:

*printer\_name* is the Print Queue name used to store jobs for the corresponding logical printer

*PS\_NAME* is the IOPRINT+ Print Server name defined in /etc/hosts

*Logical Printer\_name* is the logical printer name on the IOPRINT+ Print Server (L1..L3 or L1..L8, depending on your model)

*Spooler\_directory* is the directory you created in Step 6.

Example:

```
Marketing|RP1_SC123456:\
[TAB] :lp=:\
[TAB] :rm=PS_Rm203:\
[TAB] :rp=L1:\
[TAB] :sd=/usr/spool/Marketing:\
[TAB] :mx#0:
```

Repeat this process for each Logical Printer/Print Queue combination that you wish to create.

# LPD on BSD

Before continuing, ensure that an IP Address has been assigned to the IOPRINT+ Print Server. Remember the following:

- The **remote host name** is the name of the IOPRINT+ Print Server.
- The **remote printer name** is the logical printer (L1..L3, or L1..L8) on the IOPRINT+ Print Server.
- If asked for the LPD type, enter the service type as BSD.
- In the sample commands shown, *printer\_name* is the Print Queue serviced by the logical printer on the IOPRINT+ Print Server, and *Spooler\_dir* is the name of the directory used to spool the print jobs.

## Procedure

Action	Sample Command
Create a spooling directory	<code>mkdir /usr/spool/Spooler_dir</code>
Set spooling daemon as owner of this directory.	<code>chown daemon /usr/spool/Spooler_dir</code>
Create read/write permissions.	<code>chmod 775 /usr/spool/Spooler_dir</code>
Give permissions to LPD processes.	<code>chgrp daemon /usr/spool/Spooler_dir</code>
Add remote printer(s)	See below.
Start lpc print mechanism	<code>lpc start printer_name</code>

## Adding Remote Printers

A remote printer is added by inserting the following line in the /etc/printcap file.



The entry is really one line, but can be entered as shown. Use a TAB character where shown.

```
printer_name | Remote_Printer_Alias:\
[ TAB ] :lp=: \
[ TAB ] :rm=PS_NAME:\
[ TAB ] :rp=Logical_Printer_name:\
[ TAB ] :sd=Spooler_directory:\
[ TAB ] :mx#0:
```

Where:

- printer\_name* is the Print Queue name used to store jobs for the corresponding logical printer
- PS\_NAME* is the IOPRINT+ Print Server name defined in /etc/hosts
- Logical\_Printer\_name* is the logical printer name on the IOPRINT+ Print Server (L1..L3 or L1..L8, depending on your model)
- Spooler\_directory* is the directory you created in Step 6.

Example:

```
Marketing|RP1_SC123456:\
[ TAB] :lp=:\
[ TAB] :rm=PS_Rm203:\
[ TAB] :rp=L1:\
[ TAB] :sd=/usr/spool/Marketing:\
[ TAB] :mx#0:
```

Repeat this process for each Logical Printer/Print Queue combination that you wish to create.

## Printing using LPD

For LPD printing instructions, refer to your UNIX manual. The following example is for a BSD system:

```
lpr -P printer_name filename
```

Where:

*printer\_name* is the name of the Print Queue defined on the Unix host.

*filename* is the name of the file you wish to print.

Example:

```
lpr -P Marketing /etc/hosts
```

In the above example, the `/etc/hosts` file is sent to the printer queue `Marketing`. It will then be sent to the logical printer associated with this queue.

## Other Printing Methods

The IOPRINT+ Print Server supports 2 other printing methods:

- DSI (Direct Socket Interface)
- PSfilter (Proprietary print method)

## Printing Using DSI

Logical printers must be configured on the IOPRINT+ Print Server as explained in **Logical Printers** earlier in this document. Your model may support 8 logical Printers. However, DSI on the IOPRINT+ Print Server supports only 3 Logical Printers

Socket numbers are defined as follows:

Logical Printer No.	Socket No.
1	4010
2	4020
3	4030

## Printing Using PSfilter

PSfilter is a proprietary printing system which provides many print options. To use PSfilter, a C compiler and Socket Library must exist on the host so that psfilter.c can be compiled to an executable file.

The PSfilter program is shipped in source code as *psfilter.c*. Detailed instructions for installing, configuring, and using PSfilter are provided in the following files. These files, along with PSfilter.c, are stored on the CD-ROM in the following directories:

\driver\lpti\lpsource (text format)

\driver\lpti\tar (tar format)

Operating System	Filename
SCO UNIX System V Release 3	SCO.TXT
HP UXIX on HP workstation	HP.TXT
Sun 5.x on Sun SPARC workstation	SUN5.TXT
Sun 4.x on Sun SPARC workstation	SUN4.TXT
AT&T UNIX SV Release 4	SVR4.TXT
DEC/OSF1	DECOSF1.TXT
IBM AIX	AIX.TXT
UNIXWare	UNIXWARE.TXT



If your system is not listed above, do not attempt to use the PSfilter method of printing.

## Telnet

Telnet can be used to monitor the status of the printers attached to the IOPRINT+ Print Server.

## Operation

Establish a connection to the IOPRINT+ Print Server, by starting your Telnet program and providing the IP Address of the IOPRINT+ Print Server. (No port number is required.)

e.g.

```
telnet 192.168.0.21
```

The IOPRINT+ Print Server will respond with "Welcome to Print Server".

From the resulting prompt, 3 commands are possible:

- **Help:** Show brief help
- **Monitor:** show printer status
- **Exit:** leave telnet

## Monitoring

The "Monitor" command will show the status of the printer, on each port, as shown in the following example.

```
(P1)STATE: Idle
TYPE: Parallel
PRINTER STATUS: Out Of Paper

(P2)STATE: Printing
TYPE: Parallel
PRINTER STATUS: On-Line
BYTES SERVICED:      75264
OCCUPIED BY: LPD

(SP)STATE: Idle
TYPE: Serial
PRINTER STATUS: Offline
```

The display is updated once per second.