

Chapter 22

Printer Server

Introduction	22-2
Line Printer Daemon (LPD)	22-2
LPD on the Router	22-3
Configuring LPD	22-3
Printer Operation	22-6
Troubleshooting	22-7
Stream Printing	22-8
Stream Printing on the Router	22-9
Configuring Stream Printing	22-9
Permanent Assignments	22-11
Setting up a Permanent Assignment	22-11
Command Reference	22-13
add perm	22-13
add stream	22-14
create lpd	22-15
delete perm	22-16
delete stream	22-16
destroy lpd	22-17
disable lpd	22-17
enable lpd	22-18
reset lpd	22-18
reset perm	22-19
reset stream	22-19
set lpd	22-20
set perm	22-21
show lpd	22-21
show perm	22-22
show stream	22-23

Introduction

This chapter describes the printer server capabilities of the router, and how to configure the router to provide remote, network printing services.



The printer server capabilities are available on the AR410 routers only.

The router provides the following mechanisms for implementing remote printing services in a network:

- **The Line Printer Daemon (LPD) protocol**, a TCP-based client/server application originally developed for UNIX systems. An LPD client sends print requests to an LPD server that performs the printing operation. A router with one or more printers attached to asynchronous ports can act as an LPD server.
- **Stream printing**, a TCP-based printing service provided as an alternative to the LPD protocol. A raw TCP data connection is opened between the client application and the asynchronous port on the router to which the printer is attached. The mechanism is much simpler than that of LPD and is appropriate for TCP-based systems that do not support LPD.
- **Permanent assignments**, a TCP-based proprietary mechanism for creating a permanent data pipe between any two asynchronous ports on a router. The two ports may be on the same or different routers.



Permanent assignments are supported on AR410 routers only.

Line Printer Daemon (LPD)

The Line Printer Daemon (LPD) is a print server program originally developed for BSD UNIX systems. The LPD program sends and receives print jobs from other systems using a protocol based on TCP/IP. The LPD protocol was originally defined in BSD documentation but more recently has been specified in an RFC. The latest definition of the LPD protocol appears in RFC 1179, published in August 1990.

The LPD protocol uses a client/server model. An LPD client opens a TCP connection to an LPD server, to the TCP port reserved for LPD (port 515). The client then sends control sequences to the server. These sequences are used to control the LPD server, to obtain information about server print queues and to send print jobs to the server. A print job consists of 2 files, a data file that contains the actual data to be printed, and a control file that contains information about the data file, such as its name and attributes. The control file may be sent to the LPD server before or after the data file.

Software that uses the LPD protocol for handling print jobs is more widespread than just the BSD UNIX family of operating systems. Versions of LPD have been produced for Sun, DEC and IBM PC systems, including public domain and shareware versions. The widespread support of LPD for printing makes the protocol a good choice for implementing printer services in a network.

LPD on the Router

The LPD protocol has been adopted for use in print serving on the router. The router acts as an LPD server only, accepting print jobs for printing to one or more printers attached to asynchronous ports on the router. The router cannot act as an LPD client, that is, it cannot send print jobs to another system for printing.

A feature of the LPD protocol that the router does not support is the use of information in the control file sent with each print job. The control file is accepted by the router, but the information in the control file is ignored. The reason for this is that the specification of LPD states that the control file may be sent before or after the data file. To properly implement the information in the control file, the LPD server has to be able to store the data file until the control file had been received. Since the router has no facilities for storing large data files, the control file is ignored and the data file is sent directly to the printer as it is received.

Since banner pages, if requested, are specified in the control file, ignoring the control file means that banner pages are lost. To overcome this, the router provides an option to print a simplified banner page for each data file.

Configuring LPD

The steps required to set up LPD on the router are:

1. Configure TCP/IP on the router.
2. Set up the printer ports.
3. Set up the LPD queues.

Configuring TCP/IP

Configuring TCP/IP on the router is described in [Chapter 14, Internet Protocol \(IP\)](#). To display information about the currently active TCP sessions, including the state and port number, use the command:

```
show tcp
```

which produces a display like [Figure 22-1 on page 22-4](#).

Each line in the output represents an open TCP socket in the router. Some of the sockets are LISTEN sockets, which means that the router is waiting for connections for those sockets. A TCP socket is opened in the LISTEN state when the first **create lpd** command is issued. One of the LISTEN sockets has local port number 515. This is the “well-known” port for the LPD protocol. A TCP socket in the LISTEN state with port number 515 is the indication that TCP/IP has been enabled correctly and that the router is ready to act as an LPD server. The TCP socket is left open until the router is restarted.

[Figure 22-1 on page 22-4](#) also demonstrates the output seen when an active LPD connection exists. The TCP connection with index 5 in the example shows that the host with IP address 172.16.15.4 has an active connection to the LPD server with address 172.16.15.254.

Figure 22-1: Example output from the **show tcp** command

```

TCP MIB parameters, counters and connections
-----
RTO Algorithm:          vanj
RTO Min (ms):          0000000500   RTO Max (ms):          0000020000

Maximum connections:    00040

Active Opens:           00000   Passive Opens:         00006
Attempt Fails:          00000   Established Resets:    00000
Current Established:    00001

In Segs:                0000000070   In Segs Error:         0000000000
Out Segs:                0000000104   Out Segs Retran:       0000000000
Out Segs With RST:      0000000000

Connection Table:
Index   State           Local port and address   Remote port and address
-----
  00    listen          00023  0.0.0.0                00000  0.0.0.0
  01    listen          00515  0.0.0.0                00000  0.0.0.0
  02    listen          01998  0.0.0.0                00000  0.0.0.0
  03    listen          05025  0.0.0.0                00000  0.0.0.0
  04    listen          05026  0.0.0.0                00000  0.0.0.0
  05    established     00515  172.16.15.254          01020  172.16.15.4
-----

```

Setting up Printer Ports

LPD can use any asynchronous port as a printer port. However, ports to be used for printers may need to be configured differently from normal terminal ports by using the command:

```
set asyn=port-number option...
```

which is described in [Chapter 7, Interfaces](#). In particular, the options **cdcontrol** and **flow** may need to be changed. If **cdcontrol** is set to **online** and the DTR line from the printer is connected to the DCD input on the asynchronous port (using a suitably wired cable), then the router can detect when the printer is offline. This ensures that print jobs are not sent to a printer that is switched off or offline. The **flow** option sets the flow control mechanism used by the router to **character** (XON/OFF), **hardware** (using the RTS/CTS lines) or **none**. Other options that should be checked are **speed**, **parity**, **databits** and **stopbits**. The current settings for any port can be displayed with the command:

```
show asyn=port-number
```

For more information about this command, see [Chapter 7, Interfaces](#).

Setting up LPD Queues

The final step in configuring LPD to run on the router is to set up the LPD queues. An LPD queue is a named entity that must be made known to LPD clients. The LPD queue name must therefore be set up both on the router and on machines that use LPD to send print jobs.

An LPD queue is created with the command:

```
create lpd=queue-name asyn=port [banner={on|off}]
      [insertff={on|off}] [expandlf={on|off}]
```

Both the queue name and the printer port that the queue uses must be specified, the printer port being specified by port number, not by name. The queue must not already be defined on the router for this command to work properly.

Additional queue characteristics may be set when the queue is created, or at a later time (Table 22-1 on page 22-5). These options are provided to compensate for the lack of the ability to process the control file for each print job. This file would normally contain instructions similar to those provided in the options.

Table 22-1: Optional user-configurable parameters for LPD queues

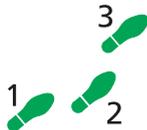
Option	Meaning
Banner	A flag indicating whether a banner page is to be printed before every print job.
ExpandLF	A flag indicating whether line feeds in the data file are expanded into carriage return and line feeds.
InsertFF	A flag indicating whether a form feed character is inserted after every print job.

Queue parameters can be changed after the queue is created by using the command:

```
set lpd=queue-name [asyn=port] [banner={on|off}]
  [insertff={on|off}] [expandlf={on|off}]
```

Example

The following example shows the steps required to set up two LPD queues and illustrates most of the configuration options available for setting up LPD on the router. Example outputs are shown at each step.



To configure LPD

1. Set up the printer ports.

Set up two ports to act as printer ports. Port 1 is to use the CD line as an online indication, have a speed of 4800 bps and character (XON/XOFF) flow control. Port 2 is to ignore CD, have a speed of 9600 bps and hardware flow control. The commands are:

```
set asyn=1 cd=online flow=char speed=4800
set asyn=2 cd=ignore flow=hardware speed=9600
```

2. Set up the LPD queue for port 0.

The queue name is `example1`. This printer is to be a laser printer so banner pages cannot be used. The expansion of line feeds and the insertion of form feeds would cause problems for the printer so are turned off. The command is:

```
create lpd=example1 asyn=1 expandlf=off insertff=off
  banner=off
```

3. Set up the LPD queue for port 2.

The queue name is example2. This printer is to be a dot matrix printer. Banner pages are required, and the line feed expansion and form feed insertion options are to be left on. The command is:

```
create lpd=example2 asyn=2
```

4. Check the configuration.

Check the LPD configuration using the command:

```
show lpd
```

The output looks like the display shown in [Figure 22-2 on page 22-6](#).

Figure 22-2: Example output from the **show lpd** command for LPD queue

```

LPD queue information
-----
EXAMPLE1
  Printer port   : 01
  Queue Status  : ENABLED
  Jobs printed   : 0
  Bytes printed : 0
  Jobs queued   : 0
  Banner page   : OFF
  Expand LF     : OFF
  Insert FF     : OFF

Queued Jobs:
  No jobs currently queued.

EXAMPLE2
  Printer port   : 02
  Queue Status  : ENABLED
  Jobs printed   : 0
  Bytes printed : 0
  Jobs queued   : 0
  Banner page   : ON
  Expand LF     : ON
  Insert FF     : ON

Queued Jobs:
  No jobs currently queued.
-----

```

Printer Operation

An LPD queue can be temporarily started or stopped with the commands:

```
enable lpd=queue-name
disable lpd=queue-name
```

An LPD queue can be removed permanently with the command:

```
destroy lpd=queue-name
```

The current job on the LPD queue can be aborted with the command:

```
reset lpd=queue-name [entry=entry-number]
```

The following command displays the status of an LPD queue (Figure 22-3 on page 22-7):

```
show lpd=queue-name
```

Figure 22-3: Example output from the **show lpd** command during the processing of a print job

```
LPD queue information
-----
EXAMPLE2
Printer port   : 01
Queue Status  : ENABLED
Jobs printed   : 21
Bytes printed  : 1008556
Jobs queued   : 2
Banner page   : ON
Expand LF     : ON
Insert FF     : ON

Queued Jobs:
  dfA001pc-miker.admin.co.com      size: 51317      recv: 5248      ACTIVE
-----
```

In Figure 22-3 on page 22-7, one print job is currently printing, while another is queued. Besides PRINTING and QUEUED, there is another possible state for a queue entry to be in, namely WAITING. This state means that the job is the current job, but that the printer is still printing the previous job. When the printer has finished the job, the waiting entry starts printing.

Troubleshooting

Generally, problems with LPD and printers can be categorised as follows:

- Printer set up and wiring
- Queue hang-ups

The initial printer set up typically causes most of the problems. The printer port on the router needs the DTR modem control signal from the printer to say that the printer is ONLINE before printing begins. Also, some printers have unusual configurations with regard to the data pins. Some experimentation may be required before the printer is set up correctly. The following command shows whether the printer is online:

```
show asyn
```

For correct operation, the printer should go OFFLINE when the printer is turned off or taken offline. If the printer shows as ONLINE even when the printer is turned off or taken offline, the router continues to send data to the port and the data is lost.

A typical symptom of problems in an otherwise working LPD system is an LPD queue getting hung up on the host machine. A number of things can be checked in this case to try to track down the problem.

The router can be checked in a number of ways:

- Use **show asyn** to see what the printer is doing.
- Use **show lpd** to see if jobs are queued or the queue is stopped.

- Use **show tcp** to look for active TCP connections for LPD. The LPD port on the router is 515.
- Use **show ip route** to verify that there is a route to the host machine making the LPD connection.
- Use **ping** to verify that there is an active path to the host and back.

The host machine can be checked for active TCP connections as well. It should also be possible to reset the host queue or stop it and restart it. A check should be made to see that there is a route to the router. The link to the router can be checked with the PING utility.

In the event of problems, a number of courses of action are possible on the router. These include issuing the following commands:

- **reset asyn** command on page 7-33 of Chapter 7, *Interfaces* on the printer port.
- **reset lpd** command on page 22-18 on the LPD queue.
- **disable lpd** command on page 22-17, followed by the **enable lpd** command on page 22-18, on the LPD queue.
- **reset ip** to restart the IP router and reinitialise the LPD module.
- **restart** or power cycle to totally reinitialise the router.



*We recommend that you do not use the **restart** command as a normal course of action. It may result in disruption to other users, even on remote systems.*

If the link between the host and the router has been lost, then the normal courses of action to re-establish the link must be followed. These might include reporting line faults, issuing a **restart** command on the router or waiting for power to be restored.

Stream Printing

Stream printing is a TCP-based printing service provided by the router as an alternative to LPD. A printer is connected to one of the terminal ports on the router. A client machine wishing to send data to the printer opens a raw TCP data connection to the terminal port on the router and sends the print data down the connection straight to the printer. There are no overheads associated with stream printing above the TCP setup phase, in contrast to the protocol that LPD runs to manage print jobs.

Stream printing is a TCP-based printing service provided by the router. A printer is connected to one of the terminal ports on the router. A client machine wishing to send data to the printer opens a raw TCP data connection to the terminal port on the router and sends the print data down the connection straight to the printer. There are no overheads associated with stream printing above the TCP setup phase.

The advantages of stream printing include:

- There is no need for a complicated printer driver on the client machine as there is for LPD.
- It does not tie up an asynchronous port on the client machine as does a permanent assignment.
- It circumvents the problem that the router cannot process LPD control files.

The printer driver required for stream printing is very simple. A raw TCP connection is opened to the required IP address and TCP port and the print file is sent down the connection. Such a driver can be written very quickly for any environment that supports TCP system calls. Some commercial and public domain TCP/IP implementations support stream printing.

Stream Printing on the Router

The router supports stream printing on any terminal port. Printer ports cannot be used for stream printing as they are reserved for use by LPD. The terminal port(s) used for stream printing must be configured as stream ports, so that the router establishes the required TCP ports for incoming calls.

The TCP port numbers used for stream printing are required to set up the client machine that will be printing. The TCP port number is related to the router terminal port number to which the printer is attached by a simple mapping: TCP port number = router terminal port number + 5000 (decimal)

For example, if port 4 on the router is set up as a stream port, the client machines printing to this port must use TCP port number 5004.



The router sets up TCP LISTEN ports for stream printing only for those ports that have been configured as stream printer ports. Attempting to send data to a TCP port that corresponds to a port that has NOT been set up for stream printing results in failure of the connection.

The documentation for the particular stream printing implementation in use should be consulted in order to set up printing from the client machine.

Stream printer ports on the router are named. Names are any combination of non-whitespace characters, up to 15 characters long. Names are used for managerial convenience and for specifying which stream port is being dealt with in commands. Stream names are not case sensitive.

Configuring Stream Printing

To set up a stream printer port on the router use the command:

```
add stream port
```

Both the stream name and port number used for the stream printer must be specified. The stream name should be unique on the router and not already in use, and the port must be a terminal port not already in use. The port must also be set to a fixed speed (i.e. not be set to autobauding).

To check that the stream port has been set up correctly, use the command:

```
show stream
```

This command shows the stream printers, the ports that the stream printers are using, and counts of the connections made and the number of characters that have been sent to each printer. To display the status for only one printer, specify the printer by name (Figure 22-4 on page 22-10).

Figure 22-4: Example output from the **show stream** command

Name	Port	Connects	Characters
Printer1	01	0012	0000023854
Printer2	02	0002	0000003531

A further check can be made by displaying the status of the TCP ports in use by using the command:

```
show tcp
```

See [Chapter 14, Internet Protocol \(IP\)](#) for complete details of this command. Each stream printer has a TCP LISTEN port open, the TCP port number being 5000 (decimal) + the router port number.

To remove a stream printer, use the command:

```
delete stream
```

The stream name must be specified in the command. This command removes the stream printer, closes the TCP LISTEN port for the printer and frees the printer's terminal port.

To reset stream printers, use the command:

```
reset stream
```

The stream name must be specified in the command. Resetting the stream printer clears any current TCP connection, resets the stream printer's terminal port and reopens the TCP LISTEN port for the stream printer.

It is not possible to disable a stream printer. If a stream printer is to be turned off for a period of time, it is possible to DELETE the printer and then ADD it later.

Example

In this example, two stream printers are required. One is to be called printLab, the other printOffice. The router ports allocated for these printers are ports 1 and 2 respectively. Since these ports have not been modified since the router was installed, they are currently set to autobauding. Both ports are to be set to 9600 baud.

The commands are:

```
set asyn=1 speed=9600
set asyn=2 speed=9600
add stream=printlab port=1
add stream=printoffice port=2
show stream
```

The output is shown in [Figure 22-5 on page 22-11](#).

Figure 22-5: Example output from the **show stream** command

Name	Port	Connects	Characters
printLab	01	0000	0000000000
printOffice	02	0000	0000000000

Permanent Assignments

Permanent assignments provide a method for creating permanent links between terminal ports on routers. Any two terminal ports on a single router or on routers that can communicate with each other via TCP/IP can be set up to have a permanent assignment between them. Asynchronous traffic coming into each port is sent via TCP to other port and then sent out that port.

The most common use of permanent assignments is to provide access to network printers. However, permanent assignments can connect any asynchronous devices together. Other examples include connecting a terminal to a host computer asynchronous port and connecting an asynchronous port on a data logger to a computer for capturing the results of experiments.



Permanent assignments are supported on AR410 routers only.

Setting up a Permanent Assignment

To set up a permanent assignment, the port numbers of the ports and the IP addresses of the routers at each end of the link must be specified. Each permanent assignment is also given a name. The name is used for management convenience and for identification purposes when the permanent assignment's TCP connection is made at router boot or when the permanent assignment is created or reset. A short dialogue takes place between the two routers involved in the permanent assignment when the assignment is set up, to verify that the correct ports are being connected. This dialogue uses the permanent assignment name for verification. The name is case sensitive and must be identical for both ends of the permanent assignment.

Each end of the permanent assignment must be set up for the assignment to work correctly. A common cause of problems for permanent assignments is one end of the assignment being set up incorrectly.

A given permanent assignment has a different view looking from each end of the assignment. The terms *local* and *remote* are used to denote the ends of the assignment from one point of view. Thus there is a local and remote port and a local and remote router for each permanent assignment. Note that the local router is the router that the command is being entered on.

To set up one end of a permanent assignment use the command:

```
add perm=name
```

The name of the permanent assignment, the local and remote ports and the IP address of the remote router must all be specified in this command.

To display the configuration of the permanent assignment (Figure 22-6 on page 22-12), use the command:

```
show perm
```

Figure 22-6: Example output from the **show perm** command

Name	Port		IP address
	Local	Remote	
laser-print	12	04	172.16.8.37

If the two ports of the permanent assignment are on different routers, the **add perm command** on page 22-13 must be entered on each router. If both ports are on the same router, the command only needs to be entered once. The IP address specified may be any one of the IP addresses of the router in question.

A permanent assignment can be removed with the command:

```
delete perm=name
```

This command removes the permanent assignment from the local router. If the other port of the permanent assignment is on a remote router, the permanent assignment should also be removed from the remote router.

A permanent assignment can be reset with the command:

```
reset perm
```

This command breaks the current TCP connection being used for the permanent assignment and attempts a new connection. The terminal port being used for the permanent assignment is also reset.

Example

This example illustrates the process of setting up a permanent assignment. The assignment is to be established between port 2 on a router with IP address 172.26.4.1 and port 2 on a router with IP address 172.20.34.9, and is to be named main office. The commands to be executed on the router with address 172.26.4.1 are:

```
add perm=main office lport=2 rport=3 ip=172.20.34.9
show perm
```

which produces the output shown in Figure 22-7 on page 22-12.

Figure 22-7: Example output from the **show perm** command for router 172.26.4.1

Name	Port		IP address
	Local	Remote	
main office	02	03	172.20.34.9

The commands to be executed on the router with address 172.20.34.9 are:

```
add perm=main office lport=3 rport=3 ip=172.26.4.1
show perm
```

which produces the output shown in Figure 22-8 on page 22-13.

Figure 22-8: Example output from the **show perm** command for router 172.20.34.9

Name	Port		IP address
	Local	Remote	
main office	03	02	172.26.4.1



Since the name of the permanent assignment in this example contains embedded spaces, the whole name must be in double quotes when entered in a command.

Command Reference

This section describes the commands available on the router to configure and manage the router's printer server capabilities — LPD, permanent assignments and stream printing.



The printer server capabilities are available on the AR410 routers only.

LPD and stream printing require the IP module to be enabled and configured correctly. See [Chapter 14, Internet Protocol \(IP\)](#) for detailed descriptions of the commands required to enable and configure IP.

See “Conventions” on page xcv of Preface in the front of this manual for details of the conventions used to describe command syntax. See [Appendix A, Messages](#) for a complete list of messages and their meanings.

add perm

Syntax `ADD PERM=perm-name LPORT=lport RPORT=rport IP=ipadd`

where:

- *perm-name* is the name of the permanent assignment. The name is case-sensitive and must be identical on each router in the permanent assignment. If the name contains spaces, it must be in double quotes.
- *lport* is the number of the local asynchronous port for this permanent assignment. Ports are numbered sequentially starting with port 0.
- *rport* is the number of the remote asynchronous port for this permanent assignment. Ports are numbered sequentially starting with port 0.
- *ipadd* is the IP address of the remote router.

Description This command adds one end of a permanent assignment. The permanent assignment must be specified by name, and the local and remote terminal ports and the IP address of the remote router must be specified.



Permanent assignments are supported on AR410 routers only.

The other end of the permanent assignment must also be specified, on the remote router.

Examples To add a permanent assignment called DataLogger between port 1 on the local router and port 1 on a remote router with the IP address 172.16.38.5, use the command:

```
add perm=datalogger lport=1 rport=1 ip=172.16.38.5
```

Related Commands [delete perm](#)
[reset perm](#)
[set perm](#)
[show perm](#)

add stream

Syntax `ADD STream=stream-name PORT=port`

where:

- *stream-name* is the name of the stream printer to add.
- *port* is the number of the asynchronous port to use for this stream printer. Ports are numbered sequentially starting with port 0.

Description This command adds a stream printer to a router. A name must be given to the printer, unique among stream printers defined on the router, and a port must be allocated to the printer. The port must be a terminal port, not already in use as a stream printer, and with a fixed speed value.

The port specified is set up to receive stream printing, and a TCP LISTEN port is created, with a port number of 5000 (decimal) plus the printer port number. The details of the stream printer just defined are shown, in the same format as in the [show stream command on page 22-23](#).

Examples To add a stream printer called Stores on port 3, use the command:

```
add str=stores po=3
```

Related Commands [show stream](#)

create lpd

Syntax CREate LPD=*queue-name* ASYn=*port* [Banner={ON|OFF}]
[Insertff={ON|OFF}] [Expandlf={ON|OFF}]

where:

- *queue-name* is a string from 1 to 10 characters long. Valid characters are uppercase and lowercase letters, and decimal digits (0–9). It is not case sensitive.
- *port* is the number of the asynchronous port that the LPD queue uses. Ports are numbered sequentially starting with port 0.

Description This command creates an LPD queue. The LPD queue must be specified and must not already exist.

The **asyn** parameter specifies the port to be used for the LPD queue. The port should be configured as a printer port with the [set asyn command on page 7-37 of Chapter 7, Interfaces](#).

The **banner** parameter specifies whether a banner page is to be printed with each print job. This parameter can take the values **on** or **off**. Having the banner attribute turned on can be useful when the machine that is sending print jobs does not generate its own banner page, and the printer is used by a number of people.

The **insertff** parameter specifies whether a form feed character is automatically sent to the printer after each job has been printed. This parameter can take the values **on** or **off**. Having the insert form feed attribute turned on is useful when the machine sending print jobs does not place form feeds between jobs, and it is desired that print jobs be separated from each other.

The **expandlf** parameter specifies whether line feed characters are expanded to a line feed and carriage return on output to the printer. This parameter can take the values **on** or **off**. Turning on the expand line feed attribute can be useful when the machine sending print jobs separates all lines with a line feed only. Expanding the line feed means that the printer can print properly by returning to the beginning of the line with every line feed.

Examples To create an LPD queue called LaserJet on port 2, with banner pages printed before each print job and a formfeed character inserted after every print job, use the command:

```
cre lpd=laserjet asy=2 b=on i=on e=off
```

Related Commands [set lpd](#)
[reset lpd](#)
[show lpd](#)

delete perm

Syntax DELEte PERM=*perm-name*

where *perm-name* is the name of the permanent assignment. The name is case sensitive and must be identical on each router in the permanent assignment. If the name contains spaces, it must be in double quotes.

Description This command removes a named permanent assignment from the local router. The permanent assignment must also be removed from the remote router.

Examples To delete the permanent assignment called DataLogger, use the command:

```
del perm=datalogger
```

Related Commands [add perm](#)
[reset perm](#)
[set perm](#)
[show perm](#)

delete stream

Syntax DELEte STReam=*stream-name*

where:

- *stream-name* is the name of an existing stream printer.

Description This command deletes an existing stream printer. The name of the printer to delete must be given, and this must name an existing stream printer. The printer is removed, and the port that the printer was using is freed. Any printing that was taking place is aborted, and no more print jobs are accepted for the printer. The TCP LISTEN port is removed.

Examples To delete the stream printer called Stores, use the command:

```
del str=stores
```

Related Commands [reset stream](#)
[show stream](#)

destroy lpd

Syntax DESTroy LPD=*queue-name*

where *queue-name* is a string from 1 to 10 characters long. Valid characters are uppercase and lowercase letters, and decimal digits (0–9). It is not case sensitive.

Description This command deletes an LPD queue, aborting all print jobs currently printing, waiting or queued for the queue. The queue is removed from the router and no more print jobs can be sent to the queue.

Examples To destroy the LPD queue called LaserJet, use the command:

```
dest lpd=laserjet
```

Related Commands [disable lpd](#)
[enable lpd](#)
[reset lpd](#)

disable lpd

Syntax DISable LPD=*queue-name*

where *queue-name* is a string from 1 to 10 characters long. Valid characters are uppercase and lowercase letters, and decimal digits (0–9). It is not case sensitive.

Description This command stops an active LPD queue. LPD queues are started by default when they are created or when a router reboots.

Examples To disable the LPD queue called LaserJet, use the command:

```
dis lpd=laserjet
```

Related Commands [destroy lpd](#)
[enable lpd](#)
[show lpd](#)

enable lpd

Syntax ENAbLe LPD=*queue-name*

where *queue-name* is a string from 1 to 10 characters long. Valid characters are uppercase and lowercase letters, and decimal digits (0–9). It is not case sensitive.

Description This command starts an LPD queue that has been previously stopped with the [disable lpd command on page 22-17](#). LPD queues are started by default when they are created or when a router reboots.

Examples To enable the LPD queue called LaserJet, use the command:

```
ena lpd=laserjet
```

Related Commands [destroy lpd](#)
[disable lpd](#)
[show lpd](#)

reset lpd

Syntax RESET LPD=*queue-name* [Entry=*entry-number*]

where:

- *queue-name* is a string from 1 to 10 characters long. Valid characters are uppercase and lowercase letters, and decimal digits (0–9). It is not case sensitive.
- *entry-number* is the number of an entry in the LPD queue.

Description This command aborts jobs on the specified LPD queue. The **entry** parameter specifies a the entry number of a particular job to abort. If **entry** is not specified, all entries in the LPD queue are aborted. The queue remains enabled.

Examples To abort all jobs on the LPD queue called LaserJet, use the command:

```
reset lpd=laserjet
```

To abort job number 3 on the LPD queue called LaserJet, use the command:

```
reset lpd=laserjet e=3
```

Related Commands [destroy lpd](#)
[disable lpd](#)
[enable lpd](#)

reset perm

Syntax RESET PERM=*perm-name*

where *perm-name* is the name of the permanent assignment. The name is case sensitive and must be identical on each router in the permanent assignment. If the name contains spaces, it must be in double quotes.

Description This command resets a named permanent assignment. The port being used by the permanent assignment is reset and the TCP connection being used for the permanent assignment is reset. A new TCP connection is established for the permanent assignment.

Examples To reset the permanent assignment called DataLogger, use the command:

```
reset perm=datalogger
```

Related Commands [add perm](#)
[delete perm](#)
[set perm](#)
[show perm](#)

reset stream

Syntax RESET STReam=*stream-name*

where *stream-name* is the name of an existing stream printer

Description This command performs a reset operation on the given stream printer. The printer is cleared of any existing print job and the port is reset. Any TCP connection for the given stream printer is reset. The result of this operation is to leave the stream printer in a well defined state, ready to accept new print jobs.

Examples To reset the stream printer called Stores, use the command:

```
reset str=stores
```

Related Commands [delete stream](#)
[show stream](#)

set lpd

Syntax SET LPD=*queue-name* ASYN=*port* [Banner={ON|OFF}]
[Insertff={ON|OFF}] [Expandlf={ON|OFF}]

where:

- *queue-name* is a string from 1 to 10 characters long. Valid characters are uppercase and lowercase letters, and decimal digits (0–9). It is not case sensitive.
- *port* is the number of the asynchronous port that the LPD queue uses. Ports are numbered sequentially starting with port 0.

Description This command sets parameters for an LPD queue. The LPD queue must be specified and must already exist.

The **asyn** parameter specifies the port to be used for the LPD queue. The port should be configured as a printer port with the [set asyn command on page 7-37 of Chapter 7, Interfaces](#).

The **banner** parameter specifies whether a banner page is to be printed with each print job. This parameter can take the values **on** or **off**. Having the banner attribute turned on can be useful when the machine that is sending print jobs does not generate its own banner page, and the printer is used by a number of people.

The **insertff** parameter specifies whether a form feed character is automatically sent to the printer after each job has been printed. This parameter can take the values **on** or **off**. Having the insert form feed attribute turned on is useful when the machine sending print jobs does not place form feeds between jobs, and it is desired that print jobs be separated from each other.

The **expandlf** parameter specifies whether line feed characters are expanded to a line feed and carriage return on output to the printer. This parameter can take the values **on** or **off**. Turning on the expand line feed attribute can be useful when the machine sending print jobs separates all lines with a line feed only. Expanding the line feed means that the printer can print properly by returning to the beginning of the line with every line feed.

Examples To disable the insertion of a formfeed character after every print job on the LPD queue called LaserJet, use the command:

```
set lpd=laserjet i=off
```

Related Commands [create lpd](#)
[reset lpd](#)
[show lpd](#)

set perm

Syntax SET PERM=*perm-name* [LPORT=*lport*] [RPORT=*rport*] [IP=*ipadd*]

where:

- *perm-name* is the name of the permanent assignment. The name is case sensitive and must be identical on each router in the permanent assignment. If the name contains spaces, it must be in double quotes.
- *lport* is the number of the local asynchronous port for this permanent assignment. Ports are numbered sequentially starting with port 0.
- *rport* is the number of the remote asynchronous port for this permanent assignment. Ports are numbered sequentially starting with port 0.
- *ipadd* is the IP address of the remote router.

Description This command changes the configuration of an existing permanent assignment. The permanent assignment must be specified by name. At least one other parameter must be specified.

The remote end of the permanent assignment must also be configured, on the remote router.

Examples To change the local and remote asynchronous ports used by the permanent assignment called DataLogger to port 0, use the command:

```
set perm=datalogger lport=0 rport=0
```

Related Commands [delete perm](#)
[reset perm](#)
[show perm](#)

show lpd

Syntax SHOW LPD[=*queue-name*]

where *queue-name* is a string from 1 to 10 characters long. Valid characters are uppercase and lowercase letters, and decimal digits (0–9). It is not case sensitive.

Description This command displays the configuration and status of LPD queues on the router. If a queue name is specified, information about the specified queue is displayed. If a queue name is not specified, information about all LPD queues is displayed (Figure 22-9 on page 22-22).

In Figure 22-9 on page 22-22, a single queue has been set up to use printer port 0, and is in the STARTED state. The number of print jobs already processed, the number of bytes sent to the printer and the options for the queue are shown. The queue currently has no print jobs queued. If jobs are either printing, waiting or queued, they are shown at the bottom of the listing.

Figure 22-9: Example output from the **show lpd** command

```

LPD queue information
-----
Admin
  Printer port   : 00
  Queue status  : ENABLED
  Jobs printed   : 4
  Bytes printed  : 23747
  Jobs queued    : 0
  Banner page    : OFF
  Expand LF      : OFF
  Insert FF      : ON

Queued Jobs:
  No jobs currently queued.
-----

```

Examples To display the status of the LPD queue called LaserJet, use the command:

```
sh lpd=laserjet
```

Related Commands [create lpd](#)
[set lpd](#)

show perm

Syntax SHOW PERM[=*perm-name*]

where:

- *perm-name* is the name of a permanent assignment.

Description This command displays the name, local and remote ports and remote IP address for all permanent assignments currently defined on the router. If a permanent assignment is specified by name, only that permanent assignment is displayed (Figure 22-10 on page 22-22, Table 22-2 on page 22-23).

Figure 22-10: Example output from the **show perm** command

Name	Port		IP address
	Local	Remote	
laser-print	12	04	172.16.8.37

Table 22-2: Parameters displayed in the output of the **show perm** command

Parameter	Meaning
Name	The name of the permanent assignment.
Local	The local port for the permanent assignment.
Remote	The remote port for the permanent assignment.
IP address	The IP address of the remote router.

Examples To display all the permanent assignments configured on the local router, use the command:

```
show perm
```

Related Commands [add perm](#)
[delete perm](#)
[reset perm](#)
[set perm](#)

show stream

Syntax `SHow STReam [=stream-name]`

where *stream-name* is the name of an existing stream printer

Description This command displays the status of one or all stream printers. All stream printers are displayed if the stream printer name is not specified in the command ([Figure 22-11 on page 22-23](#), [Table 22-3 on page 22-23](#)).

Figure 22-11: Example output from the **show stream** command

Name	Port	Connects	Characters
Printer1	01	0012	0000023854
Printer2	02	0002	0000003531

Table 22-3: Parameters displayed in the output of the **show stream** command

Parameter	Meaning
Name	The name of the stream printer.
Port	The terminal port used by the stream printer.
Connects	The number of connections that have been made to the stream printer.
Characters	The number of characters that have been sent to the stream printer.

Examples To display details of the stream printer called Stores, use the command:

```
sh str=stores
```

Related Commands [add stream](#)