

## Chapter 61

# Line Printer Daemon (LPD)

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## Introduction

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This chapter describes the Line Printer Daemon (LPD) protocol and how to configure LPD on the router to provide remote network printing services.

LPD is only available on AR725 and AR745 routers.

## Line Printer Daemon (LPD)

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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 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

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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.

The router does not support the use of information in the control file sent with each print job. The control file may be sent before or after the data file. This means that the LPD server must 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 configure 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 21, 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 61-1 on page 61-3](#).

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 61-1 on page 61-3](#) 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 61-1: 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
-----

```

## Configuring 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 terminals ports by using the command:

```
set asyn=port-number [cdcontrol={connect|ignore|online}]
[flow={character|hardware|none}] [other-options...]
```

which is described in [Chapter 9, 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 9, Interfaces](#).

## Configuring LPD Queues

The final step in configuring LPD 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 61-1](#)). 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 61-1: Optional user-configurable parameters for LPD queues

Parameter	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}]
```

**Configuration Example**

The following example shows how 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.

**1. Set up the printer ports.**

Set up two ports to act as printer ports. Asynchronous 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 inserttff=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 61-2](#).

Figure 61-2: Example output from the **show lpd** command for LPD queue

```

LPD queue information
-----
EXAMPLE1
  Printer asyn   : 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 asyn   : 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:

```

show lpd=queue-name

```

In [Figure 61-3](#), 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.

Figure 61-3: Example output from the **show lpd** command during the processing of a print job

```
LPD queue information
-----
EXAMPLE2
  Printer asyn   : 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
-----
```

## 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 9-34 of Chapter 9, [Interfaces](#) on the printer port.
- **reset lpd** command on page 61-12 on the LPD queue.
- **disable lpd** command on page 61-11, followed by the **enable lpd** command on page 61-12, on the LPD queue.
- **reset ip** command on page 21-136 of Chapter 21, [Internet Protocol \(IP\)](#) to restart the IP router and reinitialise the LPD module.
- **restart** command on page 5-39 of Chapter 5, [Managing Configuration Files and Software Versions](#) 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.



## Command Reference

---

This section describes commands available on the router to configure and manage the Line Printer Daemon (LPD) protocol.

LPD is only available on AR725 and AR745 routers.

LPD requires IP to be enabled and configured correctly. See [Chapter 21, Internet Protocol \(IP\)](#) for detailed descriptions of the commands required to enable and configure IP.

See “Conventions” on page lxiv of [About this Software Reference](#) 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.

## create lpd

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

**Description** This command creates an LPD queue.

Parameter	Description				
LPD	Unique name for the LPD queue you want to create. The <i>queue-name</i> is not case sensitive and consists of: <ul style="list-style-type: none"> <li>a string 1 to 10 characters long</li> <li>uppercase letters (A–Z), lowercase letters (a–z), and digits (0–9)</li> </ul> Default: no default				
ASYn	Asynchronous port the LPD queue is attached to. The <i>port</i> is the asynchronous port number. Ports are numbered sequentially starting with 0. The port should be configured as a printer port with the <a href="#">set asyn command on page 9-40 of Chapter 9, Interfaces</a> . Default: no default				
Banner	Whether a banner page is printed with each job. Enabling a banner page is useful if the host sending print jobs does not generate its own banner page and the printer is used by more than one person. Default: <b>on</b> <table> <tr> <td>ON</td><td>A banner page is generated for each print job.</td></tr> <tr> <td>Off</td><td>Banner pages are not generated.</td></tr> </table>	ON	A banner page is generated for each print job.	Off	Banner pages are not generated.
ON	A banner page is generated for each print job.				
Off	Banner pages are not generated.				
Insertff	Whether a form feed character is sent to the printer after each job. Inserting form feeds is useful if the host sending print jobs does not generate form feeds between jobs. Default: <b>on</b> <table> <tr> <td>ON</td><td>A form feed is inserted after each print job.</td></tr> <tr> <td>Off</td><td>Form feeds are not inserted.</td></tr> </table>	ON	A form feed is inserted after each print job.	Off	Form feeds are not inserted.
ON	A form feed is inserted after each print job.				
Off	Form feeds are not inserted.				
Expandlf	Whether line feed characters are expanded to a line feed and carriage return on output to the printer. Enabling line feed expansion is useful if the host sending print jobs separates all lines with only a line feed character. Default: <b>on</b> <table> <tr> <td>ON</td><td>All line feed characters are expanded to a line feed and carriage return.</td></tr> <tr> <td>Off</td><td>Line feed characters are not expanded.</td></tr> </table>	ON	All line feed characters are expanded to a line feed and carriage return.	Off	Line feed characters are not expanded.
ON	All line feed characters are expanded to a line feed and carriage return.				
Off	Line feed characters are not expanded.				

**Examples** To create an LPD queue called *LaserJet* on asynchronous port 0, with banner pages printed before each print job and a formfeed character inserted after every print job, use the command:

```
cre lpd=laserjet asy=0 b=on i=on e=off
```

**Related Commands** [destroy lpd](#)  
[disable lpd](#)  
[enable lpd](#)  
[reset lpd](#)  
[set lpd](#)  
[show lpd](#)

---

## destroy lpd

---

**Syntax** DESTroy LPD=*queue-name*

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

The **lpd** parameter specifies the name of the LPD queue to destroy.

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

```
dest lpd=laserjet
```

**Related Commands**

- [create lpd](#)
- [disable lpd](#)
- [enable lpd](#)
- [reset lpd](#)
- [set lpd](#)
- [show lpd](#)

---

## disable lpd

---

**Syntax** DISable LPD=*queue-name*

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

The **lpd** parameter specifies the name of the LPD queue to stop.

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

```
dis lpd=laserjet
```

**Related Commands**

- [create lpd](#)
- [destroy lpd](#)
- [enable lpd](#)
- [reset lpd](#)
- [set lpd](#)
- [show lpd](#)

## enable lpd

---

**Syntax** ENAbLe LPD=*queue-name*

**Description** This command starts an LPD queue that has been previously stopped with the [disable lpd command on page 61-11](#). LPD queues are started by default when they are created or when a router reboots.

The **lpd** parameter specifies the name of the LPD queue to start.

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

```
ena lpd=laserjet
```

**Related Commands**

- [create lpd](#)
- [destroy lpd](#)
- [disable lpd](#)
- [reset lpd](#)
- [set lpd](#)
- [show lpd](#)

## reset lpd

---

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

**Description** This command aborts jobs in an LPD queue. The queue remains enabled.

Parameter	Description
LPD	Name of the LPD queue. The <i>queue-name</i> is not case sensitive and consists of: <ul style="list-style-type: none"><li>• a string 1 to 10 characters long</li><li>• uppercase letters (A–Z), lowercase letters (a–z), and digits (0–9)</li></ul> Default: no default
Entry	Entry number of the job in the LPD queue to abort. If you do not specify an entry, all jobs in the queue are aborted. Default: no default

**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**

- [create lpd](#)
- [destroy lpd](#)
- [disable lpd](#)
- [enable lpd](#)
- [set lpd](#)
- [show lpd](#)

# set lpd

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

**Description** This command modifies the parameters of an LPD queue.

Parameter	Description				
LPD	Name of the LPD queue you want to modify. The <i>queue-name</i> is not case sensitive and consists of: <ul style="list-style-type: none"> <li>a string 1 to 10 characters long</li> <li>uppercase letters (A–Z), lowercase letters (a–z), and digits (0–9)</li> </ul> Default: no default				
ASYn	Asynchronous port the LPD queue is attached to. The <i>port</i> is the asynchronous port number. Ports are numbered sequentially starting with 0. The port should be configured as a printer port with the <a href="#">set asyn command on page 9-40 of Chapter 9, Interfaces</a> . Default: no default				
Banner	Whether a banner page is printed with each job. Enabling a banner page is useful if the host sending print jobs does not generate its own banner page and the printer is used by more than one person. Default: <b>on</b> <table> <tr> <td>ON</td><td>A banner page is generated for each print job.</td></tr> <tr> <td>Off</td><td>Banner pages are not generated.</td></tr> </table>	ON	A banner page is generated for each print job.	Off	Banner pages are not generated.
ON	A banner page is generated for each print job.				
Off	Banner pages are not generated.				
Insertff	Whether a form feed character is sent to the printer after each job. Inserting form feeds is useful if the host sending print jobs does not generate form feeds between jobs. Default: <b>on</b> <table> <tr> <td>ON</td><td>A form feed is inserted after each print job.</td></tr> <tr> <td>Off</td><td>Form feeds are not inserted.</td></tr> </table>	ON	A form feed is inserted after each print job.	Off	Form feeds are not inserted.
ON	A form feed is inserted after each print job.				
Off	Form feeds are not inserted.				
Expandlf	Whether line feed characters are expanded to a line feed and carriage return on output to the printer. Enabling line feed expansion is useful if the host sending print jobs separates all lines with only a line feed character. Default: <b>on</b> <table> <tr> <td>ON</td><td>All line feed characters are expanded to a line feed and carriage return.</td></tr> <tr> <td>Off</td><td>Line feed characters are not expanded.</td></tr> </table>	ON	All line feed characters are expanded to a line feed and carriage return.	Off	Line feed characters are not expanded.
ON	All line feed characters are expanded to a line feed and carriage return.				
Off	Line feed characters are not expanded.				

**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](#)  
[destroy lpd](#)  
[disable lpd](#)  
[enable lpd](#)  
[reset lpd](#)  
[show lpd](#)

## show lpd

**Syntax** SHow LPD [=queue-name]

**Description** This command displays information about LPD printer queues and any queued jobs (Figure 61-4, Table 61-2).

If you specify a value for the **lpd** parameter, only information about the specified LPD queue is displayed.

If you do not specify a value for the **lpd** parameter, information about all LPD queues is displayed.

Figure 61-4: Example output from the **show lpd** command

LPD queue information			
-----			
Admin			
Printer asyn	:	00	
Queue Status	:	ENABLED	
Jobs printed	:	4	
Bytes printed	:	23747	
Jobs queued	:	2	
Banner page	:	OFF	
Expand LF	:	OFF	
Insert FF	:	ON	
Queued Jobs:			
dfA103admin1.ho.company.com	size:	37943	recv: 8071 ACTIVE
dfE117labuser.eng.company.com	size:	123598	recv: 86153 QUEUED
-----			

Table 61-2: Parameters in output of the **show lpd** command

Field	Meaning
queue-name	The name of the LPD printer queue.
Printer asyn	The asynchronous port used by the LPD queue.
Queue status	The current status of the queue; one of "unknown", "ENABLED", or "DISABLED".
Jobs printed	The number of jobs printed to the queue.
Bytes printed	The number of bytes of data printed to the queue.
Jobs queued	The number of jobs queued for printing. If there are jobs queued, each job is listed under Queued Jobs.
Banner page	Whether or not a banner page is to be printed with each print job; one of "ON" or "OFF".
Expand LF	Whether or not line feed characters in the print job are expanded to a character return and line feed when transmitted to the printer; one of "ON" or "OFF".
Insert FF	Whether or not a form feed is transmitted to the printer after every print job; one of "ON" or "OFF".

Table 61-2: Parameters in output of the **show lpd** command (Continued)

Field	Meaning
Queued Jobs	A list of the queued jobs, or "No jobs currently queued". For each queued job, the output displays: <ul style="list-style-type: none"><li>• the filename</li><li>• the file size in bytes</li><li>• the number of bytes received</li><li>• the job status; one of "IDLE", "ACTIVE", "QUEUED", "UNKNOWN", "WAITING", or "UNKNOWN"</li></ul>

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

```
sh lpd=laserjet
```

**Related Commands**

- [create lpd](#)
- [destroy lpd](#)
- [disable lpd](#)
- [enable lpd](#)
- [reset lpd](#)
- [set lpd](#)

