Printer Configuration

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Introducing the Access Server

The multiprotocol access server software supplied by Xyplex, Inc. operates on Xyplex-supplied communication hardware modules, which are part of the MAXserver family and Network 9000 family of Ethernet-based communication products. This combination of software and hardware is called an access server, or sometimes a communication server.

Access servers support connections between serial-interface devices and other devices connected to the Ethernet network. The serial-interface devices include: terminals, serial printers, personal computers running terminal emulation or networking software, modems, serial ports on other communication servers, and host computer serial ports. Figure 1 represents a communication server configuration.

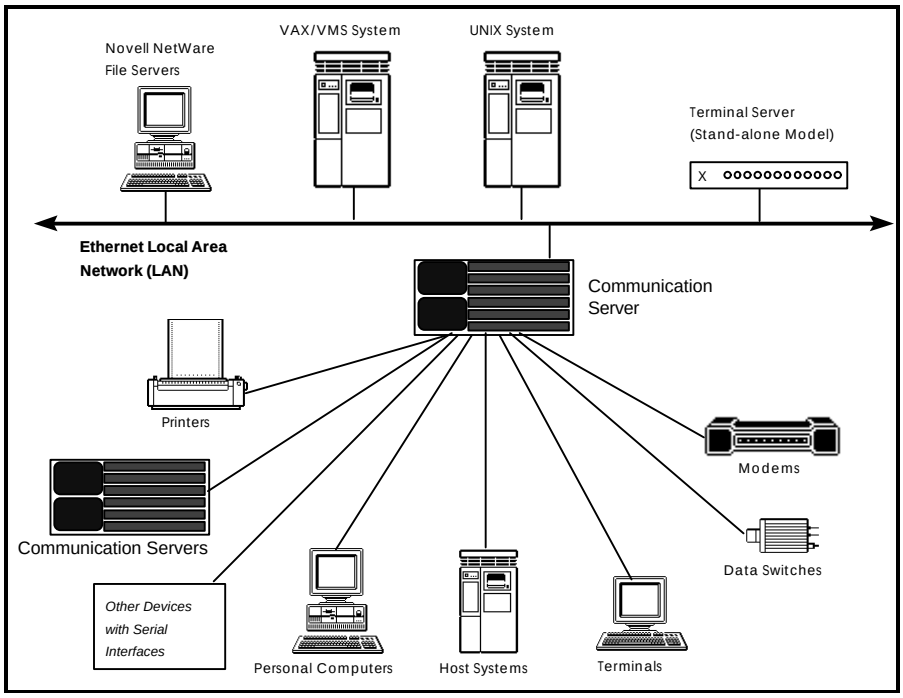


Figure 1. Network Configuration with Communication Servers

Figure 1 shows that several different types of devices can be connected to the serial ports of the communication server. Users at any of these devices can gain access to any resources on the network, such as host computers, workstations, etc, and resources available at other communication server ports. (System administrators can also limit user access to these resources, if desired.) Because the communication server software supports multiple communication protocols, these connections can be made regardless of the operating system running at the desired resource.

Compare this to operation without a communication server, where users would need to go to a terminal that is directly connected to a serial port on the host or node they want to use. With a communication server, users can perform work on any computer that is connected to the network that the communication server is on. Providing access from serial ports to host computer resources is referred to as "terminal serving."

Similarly, consider the example of a user who wants to print a job. Without a communication server, the user would need to print the job to a printer that is directly connected to a serial port on the host where the data is located. With a communication server, many users can have access to a shared printer resource, because the resource is located on the network. Providing shared printing resouces is also referred to as "printer serving."

For terminal serving and printer serving, the devices which provide services are connected to a network and the users of those services usually work at a location that is geographically local to the device offering the service. Serial ports at communication servers can also be connected to modems, switches and other devices to provide access to services that are available at remote locations or for users who are at remote locations. This is referred to as "access serving."

Access serving configurations include anything from simple dial-in and dial-out modems for low speed interactive traffic (terminal emulation, text editing, file transfers, electronic mail), to more sophisticated applications.

Printer sharing functions require cooperating processes in the host system and the server. This section provides an overview to the following printer serving features:

- Print serving features for TCP/IP networks and hosts.
- Print serving features for Novell NetWare (IPX) networks.
- Print serving features for LAT networks.
- The Connection Queue

Print Serving Features for TCP/IP Networks and Hosts

Xyplex supports two methods of printing for TCP/IP networks (typically used for UNIX hosts): lpd and csportd. You only need to use the csportd daemon to configure shared printing from UNIX if your UNIX host does not support the use of remote printers via lpd.

lpd

Standard UNIX operating systems (and also some PC remote access packages) typically provide a method for configuring remote printers through lpd. AT&T System V UNIX and BSD UNIX implementations use different lpd configuration procedures, and some UNIX implementations do not support the use of remote printers via lpd.

In addition to most UNIX implementations, lpd is supported by most PC and workstation TCP/IP implementations, including:

- Microsoft Windows NT
- Chameleon
- MultiNet (TGV) for VAX/VMS Hosts
- FTP Software Company's PC/TCP

If you are using another PC and workstation TCP/IP implementation, you should consult the user documentation supplied with your software to determine if you can use lpd for printer serving support.

csportd

The csportd daemon is a host-based daemon which provides a general-purpose tool for making connections to a port and "piping" data to or from that port. One could use this connection to send a file or user data to a port, for printing to PostScript® printers, or as a permanent connection between a host and a specific port. csportd is a Xyplex-proprietary daemon and is implemented as a utility at a UNIX host.

csportd gives users the ability to "pipe" data between a UNIX host and a communications server port. Data can be sent to the port from the host, or received from the port by the host. At the host, csportd accepts data from standard input (stdin), the standard UNIX pseudo-terminal (pty devices) mechanism, or from a FIFO (named pipe, which is a file to which you send data) and passes the data to the communication server port .

csportd comes with an installation script and a MAN page. The utility must be copied from a UNIX media kit, then installed using the installation script. csportd can be installed on any UNIX host running BSD and AT&T System V UNIX operating systems, and has also been tested on hosts running the AIX, MIPS, HP/UX, and ULTRIX operating systems.

Print Serving Features For Novell Netware Networks

Xyplex supplies a feature, XPRINTER, which provides IPX printing support so that the unit provide shared printer services on a Novell NetWare network. You can configure XPRINTER parameters either with standard Xyplex TCP/IP-LAT software commands or with the XPRINTER Setup Dialog (only on MAXserver 1400A and 1450 Printer Servers).

XPRINTER is available on the following unit types:

- MAXserver 1450 and 1400A Printer Servers
- Network 9000 Access Server 720
- MAXserver 800/1120/1520/1600/1620/1640/1820 Access Servers
- MAXserver 2120/2220 Access servers

For all units except for the MAXserver 1450 and 1400A Printer Servers, the unit needs at least 2 megabytes of memory. The XPRINTER Setup Dialog is only available on MAXserver 1450 and 1400A Printer Servers. You must use the commands described in the next section to configure XPRINTER features for all other unit types.

Figure 2 shows the differences between a Novell-only network printing environment, and one which uses a Xyplex access server or printer server, in this case a MAXserver 1450 Printer Server. You should not confuse a Xyplex Printer Server with a Novell "print server." In this application, you configure access server or printer server ports as one or more Novell remote printers, which are assigned to a new or existing Novell print server.

In the standard Novell-only network printing environment, the workstations send all print jobs to a queue on a NetWare File Server, which maintains the print queues for a NetWare Print Server. The NetWare print server resides either on a NetWare file server or on a dedicated print server workstation (PC). When a printer is ready to accept a job, the print server services each queue assigned to that printer and sends the first job in the queue to the printer. In the case of remote printing, the printer(s) would normally be connected to a PC somewhere on the network. (Printers connected directly to the file server are not treated as remote printers.)

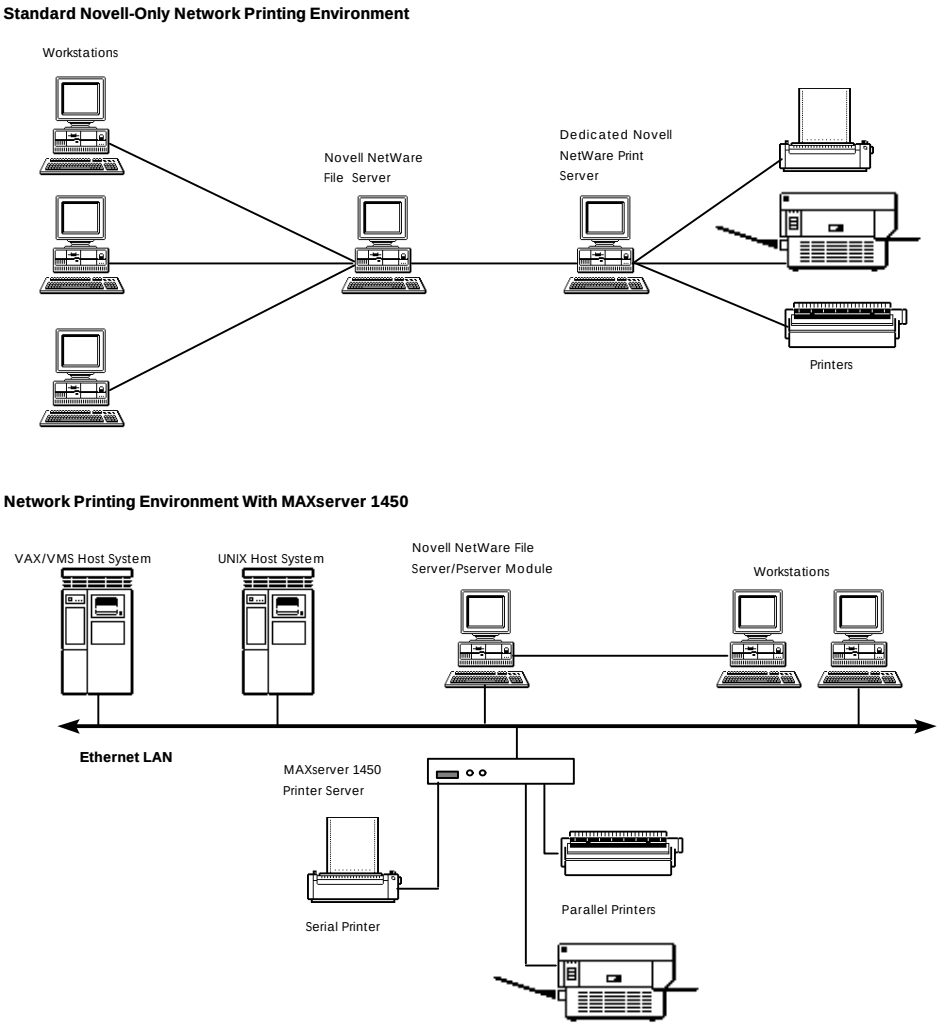


Figure 2. Network Printing Environments

As shown in Figure 2, there are two major differences between the Xyplex XPRINTER network printing environment and the standard Novell-only environment. First, the printers are physically connected to the Xyplex access server or printer server, rather than a PC. Second, users at VAX/VMS hosts and UNIX hosts also have access to those printers. In this network printing environment, you configure the Novell printing facilities at the Novell print server and file server in the same way as you would a Novell remote printer. To configure a remote printer, you use the Novell PCONSOLE utility. You must also set up the software on the Xyplex access server or printer server so that this unit communicates with the Novell file server. To do this, you can use the XPRINTER commands or the Setup Dialog described in "Configuring Print Services for Novell Users".

Print Serving Features For LAT Networks

DEC operating systems (VMS and Ultrix) provide LAT protocols which provide printer registration and connection protocols that support printer sharing. For VAX/VMS hosts, DEC provides a print symbiont (LATSYM) that interfaces with the VMS print spooling system and implements the shared printer protocols. For Ultrix hosts, there are TCP/IP-related keywords that you include in the printcap file. At the server, there is a process that listens to and responds to registration requests.

To make local services at the terminal/printer server available to users at hosts running DEC operating systems, you need to use DEC-supplied LAT control programs to create an application port. These programs are the LATCP program on VMS and the `/etc/lcp` program on Ultrix. You then map the application port to a physical terminal/printer server port. Users can gain access to the service with normal commands, such as PRINT commands. The connection queue, described in the next section, controls further activity between the host and the service offered at the access server port.

The Connection Queue

A printer server or access server contains a single queue, in which it stores requests for access to services offered by the printer server from devices on the network that support queuing (for example, VMS hosts). Queuing allows all devices to contend for access to printer services, and have the request placed into the connection queue whenever a requested service is busy or unavailable. Figure 3 depicts the types of print jobs that may be entered into the connection queue.

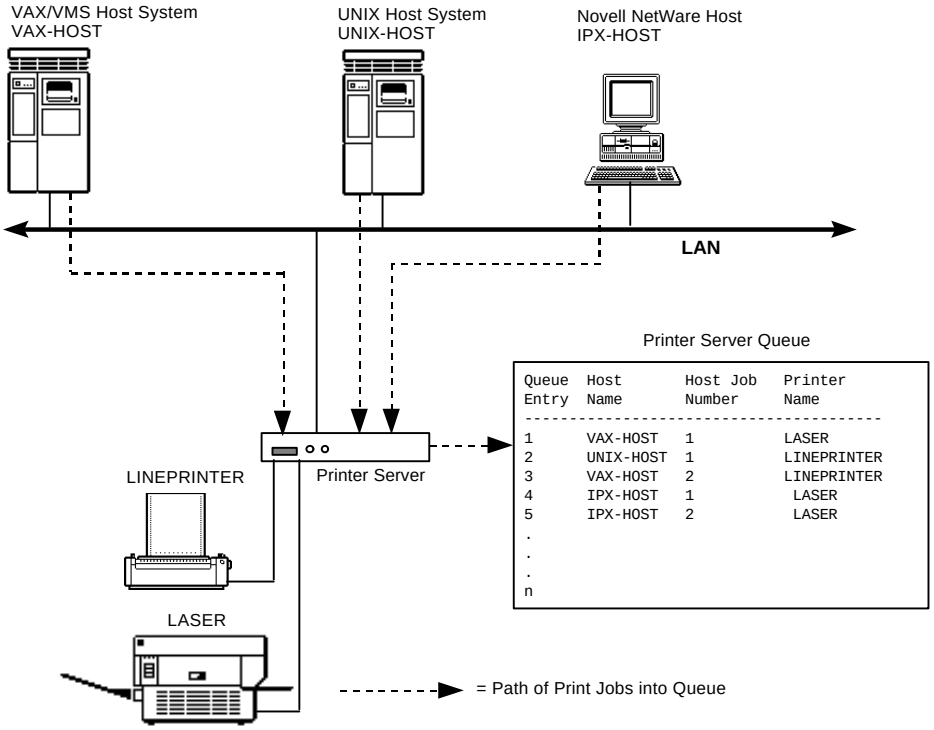
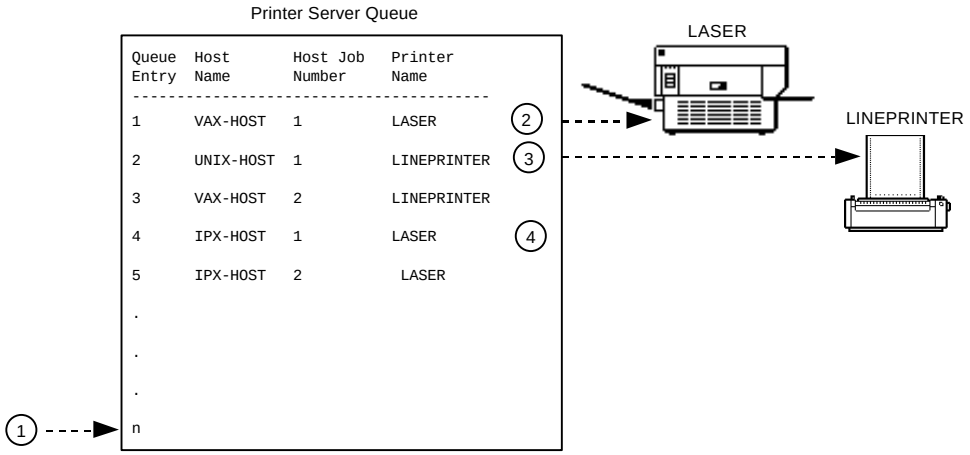


Figure 3. Print Jobs Entering the Queue

If queuing is not enabled for a printer service, when a device requests connection to the service that is busy or unavailable, the server notifies the device that the service is unavailable. The user must try to make the connection later. For example, a printer connected to a server may be busy printing a job from one host, when another host makes a connect request. If queuing is enabled for the service, in this example the printer, the server places the request in the connection queue and notifies the waiting host when the printer is available to print the job.

For LAT and TCP/IP connections, the service node scans the connect-back queue in first-in/first-out (FIFO) order in an attempt to locate a connection request which it can satisfy. Once a connection request is picked, the server attempts to form a connection to the destination specified in the registration request. Figure 4 depicts print job processing.



1 New job enters queue from network. Job is placed at end of queue.
2 First job in queue for each printer is processed (printed). When a job is done, entry removed from queue.
3 Jobs for different printers can be processed at the same time.
4 Next job for a printer is processed. Job(s) for printer LASER can be processed before jobs for printer LINEPRINTER, if LINEPRINTER is still busy.

Figure 4. Print Job Processing

The software provides support for queued connection requests. The following list summarizes the events that occur when a host initiates a connection request with a service offered at a server:

- For LAT connections, the host sends a multicast message asking all servers (service nodes in LAT terminology) which offer the particular service to respond. The host then waits for the servers offering the desired service to respond. The responses also indicate the Ethernet addresses of the servers.

- The host chooses one of the responding servers and sends a registration message to that server. This registration message informs the server which service is of interest and the destination the server should attempt to connect back to. The server can reject or accept the registration request. If the registration is accepted, the server places a connection request in a connect-back queue.

- The server will send status messages to each requestor in the connect-back queue on a periodic basis. These messages inform the requestor of the status of the connection request in the connect-back queue.

- For LAT local services, when more than one port offers the same local service, the server will choose the next-highest numbered available port in the *port-list* each time a connection is made, rather than continuously using the first available port in the *port-list*. (This continues in "round robin" fashion, i.e., when the highest-numbered port offering the service is reached, the server next chooses the lowest numbered port.) This has the effect of balancing the service load among all available ports where the local service is offered.

- For LAT and TCP/IP connections, the server provides support for the maintenance of the connect-back queue. This includes the removal of entries in response to commands issued locally on the server or in response to commands received from the network.

  Servers may also register with a LAT service node for connect-back. If a server attempts to connect to a service that is busy, it may take the same steps to register with the service node as described above. The service node must have QUEUING ENABLED for the specified service in order for it to accept registration requests. Print servers must have the QUEUING port characteristic ENABLED in order for it to attempt to register with a service node. The service node may reject a registration request if QUEUING has been DISABLED for the service specified or if the connect-back queue is full. When the service node dequeues a connect-back request, it attempts to form a connection to the destination specified in the registration request. If the connection attempt fails, the service node will discard the registration request. It is up to the registrant to re-register the connect-back request.

The following are additional considerations related to the connection queue:

- It is possible to issue connection requests faster than the server can satisfy these requests. Such requests are discarded. You can determine if connection requests are being discarded by viewing the SHOW SERVER COUNTERS display, and checking the "Solicitations Accepted" and "Solicitations Rejected" fields.

- If the size of the connection queue is reduced during server operation with the SET SERVER QUEUE LIMIT command, and the new queue size is less than the number of entries currently in the queue, no entries are deleted. However, the server will not accept new entries until the number of entries currently in the connection queue falls below the new queue size.

- Authorized group codes are not checked when a request is placed in the connection queue. If the requester is not authorized to access a particular local service, a rejection message is not returned until the connection is attempted.

- The connection queue is non-blocking. All entries in the queue are checked for servicing, even if the top entry cannot be serviced.

Basic Set-Up Activities for Printer Serving

There are many activities that you may need to perform before you configure any printer serving feature. This section covers these activities and includes the following information:

- An Overview to Setting Up the Printer Server.
- Selecting Protocols and Features.
- Configure Port Characteristics
- Setting Up Queues

Preliminary Activities

Certain basic server set-up activities are not covered in this guide. You must, however, perform these activities before you proceed to set-up printer serving features. These basic activities include:

1. **Install server hardware and connect devices to the ports**. The *MAXserver Hardware Installation and Maintenance Guides, Hardware Installation and Maintenance Notes, Network 9000 Getting Started Guide* or *Product Release Notes* supplied with server cards or stand-alone units cover various aspects of this activity.

2. **Install server software at a load server.** You can install the software on a VAX host, a UNIX host, or a Xyplex loader. The *Software Installation Guides* supplied with your software kit contains the procedures to do this. The *Software Kit Information* supplied with your software kit will contain a list of load images.

3. **Initialize the unit.** Press the Reset button on the communication server to initialize it with the load image. The *Getting Started Guide*, *Hardware Installation and Maintenance Guides*, *Hardware Installation and Maintenance Notes*, or *Product Release Notes* supplied with the hardware explains how to do this.

4. **Assign basic server Internet characteristics if you are using the Internet protocol.** Refer to the *Software Management Guide* for more information about these characteristics. LAT-only or IPX-only (XPRINTER) units do not need an Internet address. The Internet characteristics you need to specify include the following:

   - The Internet address and subnet mask for the communication server.
   - The characteristics associated with a Domain Name Server.
   - Other characteristics which allow the communication server to communicate through Internet gateways, if needed.

5. **Specify which protocols and features will be available.** Some protocols and features are not enabled by default, and you must enable them if you wish to use them. Also, some protocols require a password to enable.

6. **Initialize the communication server when you have enabled features and protocols** This allows all of the changes that you have made to take effect. Use the INITIALIZE command or press the reset switch again to do this.

7. **Configure specific printer serving features.** The remaining sections of this guide describe the detailed configuration activities for individual printer serving features.

Selecting Protocols and Features

The access server software offers many protocols and features. Which ones you use depend on the type of network you have and the amount of memory in the communication server. Most sites do not require all possible features and protocols. In general, if a protocol is not needed, you should disable it to make more memory available for other uses. The section on Managing Memory Resources in the *Software Management Guide*, explains more about selecting the appropriate features and protocols for your site.

Table 1 lists the printer serving software protocols that you can enable or disable, as well as the amount of memory that will be used or freed up. Table 1 only lists the printer serving protocols that one can enable or disable. A complete list of protocols and features can be found in Chapter 2 of the *Software Management Guide.*

Table 1. Memory Usage For Features and Protocols

Protocol/Feature Name	Memory Used in Kilobytes	Type	Default
XPRINTER	18.5, plus 2 additional per port	Protocol	Disabled, except on MAXserver 1400A/1450 units
LPD	16	Daemon	Disabled

To enable or disable the XPRINTER protocol, use the command:

```
Xyplex>> define server protocol xprinter enabled
```

The server will indicate how much memory remains available for other server uses with a message that is similar to the following:

-705- Change leaves approximately *nnnnn* bytes free.

It is strongly recommended that you leave a minimum of 180 kilobytes of memory after all desired features have been enabled. If the memory needed for the desired features exceeds the amount of memory available on the unit, the server will display a message similar to the following message, to indicate approximately how much memory you need to free up in order to enable the feature:

-708- Requires approximately *nnnnn* additional bytes; Change not done.

Initialize the server after you have made all changes. When a protocol is enabled, the software sets all server or port characteristics associated with that protocol, meaning those characteristics set with DEFINE/SET SERVER and DEFINE/SET PORT commands, to their default values. When a protocol is disabled, the software changes all server or port characteristics associated with that protocol to reflect this.

To enable the lpd daemon, use the following command:

```
Xyplex>> define server daemon lpd enabled
```

The server responds with a message similar to:

-705- Change leaves approximately *nnnnn* bytes free.

Initialize the access server after you issue this command, so that the change takes effect.

Configure PORT Characteristics

You must specify the type of access allowed to the port, and configure the server port so that its characteristics match those of the device (serial or parallel printer, etc) to which it is connected. Server port characteristics are set with SET/DEFINE PORT commands. For most devices, nearly all of the PORT characteristics can be left at their default settings, but the following paragraphs list the PORT characteristics that you may need to change.

The basic steps for setting up shared printer port characteristics include:

- Printers need to have ports configured with either REMOTE or DYNAMIC access. If you want the port to be able to accept connections (for example, a laser printer or a standard dot-matrix printer, etc) , but not originate them, use a command such as:

  ```
  DEFINE PORT port-list ACCESS REMOTE
  ```

  If you want the port to be able to both originate and accept connections (for example, for a hardcopy terminal that can act as both a printer and a terminal), use a command such as:

  ```
  DEFINE PORT port-list ACCESS DYNAMIC
  ```

- Ports configured with the PORT ACCESS characteristic set to REMOTE or DYNAMIC should also have the PORT AUTOBAUD characteristic set to DISABLED, and the SPEED, PARITY, and CHARACTER SIZE characteristics set appropriately for the device. If a local service is available at several ports (for example, a modem pool or more than one of the same model of printer), you must set the appropriate port characteristics for all the ports offering the local service. To set these characteristics, use commands similar to:

  ```
  DEFINE PORT port-list AUTOBAUD DISABLED
  DEFINE PORT port-list SPEED baud-rate
  DEFINE PORT port-list PARITY parity
  DEFINE PORT port-list CHARACTER SIZE character-size
  ```

Setting Up Queues

This section describes some basic considerations about queue setup.

- For LAT local services, you must use SET/DEFINE SERVICE commands to specify service characteristics, as well as the SET/DEFINE PORT commands to specify appropriate port characteristics. For example, to define a printer service named PRINT, at port 1 of the server, you would use a command such as:

  ```
  Xyplex>> define service print port 1 connections enabled
  ```

  You could also assign an identification message for server displays, using the IDENTIFICATION characteristic.

- Queuing is supported on all local services. Two commands affect queuing operations:

  DEFINE SERVICE *service-name* QUEUE ENABLED

  This command applies only to LAT local services, and enables or disables queuing for these services.

  DEFINE SERVER QUEUE LIMIT *queue-size*

  This command applies to LAT, lpd, XPRINTER, or other TCP/IP queued connections. This command sets the maximum number of entries for the entire server. Setting the *queue-size* to zero (0) essentially disables queuing.

  The only requirement that applies to queued remote access connections is that the service must not be password protected with the SERVICE PASSWORD characteristic. Note that while queuing is also supported for host requests made to *port-numbers* or *port-names*, rather than *service-names*, using *service-names* is generally more convenient and gives you greater control over access to the service. For example, if a service is password protected, the only way for a host to bypass the protection is to connect directly to the port.

- To define TCP/IP local services, you assign a Telnet remote port number which is only used at the ports which offer that service. For example, if two ports on the same server offer the same TCP/IP local service (such a two of the same printer model, or a bank of dial-out modems), you would assign the same Telnet remote port number at both ports. Users, including UNIX printer daemons, then connect to that service through the TCP/IP port which matches the Telnet remote port number. To assign a Telnet remote port number, use a command similar to:

  ```
  Xyplex>> define port 8 telnet remote port 3600
  ```

- There are a number of commands available for managing the connection queue. For example, you can obtain a list of current connection queue requests with a SHOW QUEUE command. The display can be further limited to connection requests made to a specific port or service, or requests made from a specific node.

  You can remove specific entries in the queue with the REMOVE QUEUE ENTRY command. Alternatively, you can disable the entire queue for a specific service can be using a command such as:

  SET SERVICE *service-name* QUEUE DISABLED

  Note that if the queue is disabled for a specific *service-name*, connection requests that are made to a *port-number*, rather than the *service-name*, are still placed in the connection queue.

The following are some additional considerations related to remote connections:

- Connections can be made by specifying a server *node-name*, *service-name*, or *port-name*, or all of these.

- Hosts cannot connect to services that are password protected. However, a host can connect directly to the *port-name*, which is never password protected.

- The *node-name* used in the remote connection request must match the server name specified by the DEFINE/SET SERVER NAME command. This name is not necessarily the same as the DECnet node name for the server.

Setting Up the Printers Using the lpd Daemon

Standard UNIX operating systems typically provide a method for configuring remote printers through lpd. AT&T System V UNIX and BSD UNIX implementations use different procedures, and some UNIX implementations do not support the use of remote printers. If your UNIX host does not support the use of remote printers, you will need to use the csportd daemon to configure shared printing from UNIX.

This section covers:

- Setting up lpd shared printers
- Operating and managing lpd printers and print queues

Setting Up lpd Shared Printers

For UNIX implementations which support the use of remote printers, the process of configuring an lpd printer at a terminal/printer server is fairly straight-forward. The basic steps for setting up lpd devices when using a remote printer (i.e., a printer connected to a terminal/printer server port) are:

1. Enable the lpd daemon. This is covered in “Basic Set-Up Activities for Printer Serving”.
2. Set port characteristics to support shared printer connections. This is covered in “Basic Set-Up Activities for Printer Serving”.
3. Set up server queues for lpd. This is covered in this section.
4. Configuring the lpd printer at the UNIX host. This is covered in this section.

You need to do this for each printer, and you can use this procedure to add printers at any time.

Setting Up Queues for lpd

This section describes some basic considerations about queue setup for lpd printing.

- Define an lpd queue at the server and assign it to one or more ports. The queue-name that you assign at the server is also the name of the remote printer at the UNIX host. For example, the following command to creates an lpd queue called "LinePrinter" and assigns it to ports 2 through 5:

  ```
  Xyplex>> DEFINE SERVER LPD QUEUE "LinePrinter" PORT 2-5
  ENABLED
  ```

  The lpd *queue-name* ("LinePrinter" in this example) is case sensitive. You can offer the same *queue-name* at more than one port. When the same *queue-name* is offered at more than one port, when lpd jobs are queued, they are serviced by the next available port on a first-in, first-out basis. You can also have one port service more than one lpd queue-name (as well as LAT, XPRINTER, or other TCP/IP queues).

- If it has not already been done, enable queuing for the server with a command such as:

  ```
  Xyplex>> DEFINE SERVER QUEUE LIMIT queue-size
  ```

  This command applies to LAT, lpd, XPRINTER, or other TCP/IP queued connections. This command sets the maximum number of entries for the entire server. Setting the *queue-size* to zero (0) effectively disables queuing.

Bypassing lpd Ports

You can also bypass lpd ports that are in the XOFF state. When you enable this option, all subsequent print jobs are sent to the next lpd port. Make sure you specify the same queue name in the command. You should only bypass lpd ports that use the same queue name and are operational.

To bypass a specific queue on an lpd port, use the following command:

`define lpd queue <queue-name> bypass enable`

Configuring the lpd Printer at the UNIX Host

In the procedures which follow, it is assumed that you are familiar with contents of the UNIX documentation for your UNIX host. For example, for BSD 4.3, you need to be familiar with the Line Printer Spooler Manual, including the organization of the printer definition file, /etc/printcap(5).

Setting Up Berkeley (BSD) UNIX lpd Printers

You must do a small amount of planning prior to setting up an lpd printer on a terminal or printer server. The main considerations are these: what will be the name by which users will know the printer, and whether or not each print job is to be processed through an output filter program (for example, to add a banner page or to do some other job processing which the terminal or printer server cannot process, since the server cannot process lpd control files associated with a print job).

Also, for Berkeley UNIX systems, the remote machine to which a print job is directed must be specified using a domain-name. The host must be able to obtain the internet-address which corresponds to the domain-name, either by looking in a local host table (/etc/hosts) or by using a Domain Name Server (NIS, DNS, etc). The server must also be configured with an internet-address (refer to Chapter 2 of the *Software Management Guide* for setting this up.)

When using NIS, or any other name server, you generally have one host configured to be the name server for the entire network. You add names only on that host. NIS has a set of utilities for updating its database. (Read the MAN page about your name server for more information.)

When using a local host table, the entry consists of the domain-name and matching internet-address. For example, if the remote machine is named "print-server" and has the internet-address of 192.12.119.18, the entry in the /etc/hosts file would look like:

```
192.12.119.18 print-server
```

In this example, "print-server" would be included in the `/etc/printcap` file as the name of the remote machine (the :rm= entry in the `/etc/printcap` file).

Checklist of Necessary Information

- the name of the printer for users
- the domain-name of the remote machine (i.e., the terminal or printer server)
- the remote printer-name (which is actually an lpd queue that you set up on the server)
- (optional) the name and contents of an output filter file

Setting Up a Basic Printer

To set up a basic printer which prints simple data files with no banner page or processing by an output filter:

Add an entry in the /etc/printcap file for each printer connected to a Xyplex terminal or printer server. All you need to specify is the printer device name (what the user will know the printer as), the remote machine name (domain-name of the terminal or printer server), a remote printer name, the spool directory and error log file.

For example, for an lpd printer on a terminal or printer server which the user knows by the name "line-printer," you could use your favorite text editor to add a simple printcap entry such as:

```
line-printer:Line Printer on Xyplex server:\
   :rm=printer-server:\
   :rp=print-queue1:\
   :sd=/usr/spool/printer:\
   :lf=/usr/adm/lpd-errs:\
```

In this example, "printer-server" is the domain-name by which the UNIX host knows the terminal or printer server and "print-queue1" is the name of an lpd queue on the terminal or printer server. (Creating the lpd queue is described in the "Setting up queues for lpd" section.) The remaining items in the printcap entry designate a spool directory and error log file. Be careful to observe the syntax rules for entries in the /etc/printcap file. Each line must end with :\. Each line, except the first must begin with a colon character (:).

This new printer will be available after you start the printer using the lpc command, as described in the "Operating and Managing lpd printer and print queue" section.

Setting Up A Printer Which Uses An Output Filter

To set up a printer which prints files after first processing them through an output filter, you must add two entries to the /etc/printcap file. The first entry is for a "pseudo-printer," which causes the UNIX host to process the print job according to whatever is required by the output filter, and then passes the processed print job to the lpd printer defined in the second entry, which contains information about the actual printer on the terminal or printer server.

To set up this type of printer at a BSD UNIX host:

a. Use a text editor to create a "pseudo-printer" entry in the /etc/printcap file for each printer connected to a Xyplex terminal or printer server. For this entry, you need to specify the printer device name (what users will know the printer as), a local printer name (which will always be /dev/null) the spool directory, error log file, and output filter file name.

   For example, for an lpd printer on a terminal or printer server which the user knows by the name "line-printer2," you would add a printcap entry such as:

```
line-printer2:Printer on Xyplex server:\
   :lp=/dev/null:\
   :sd=/usr/spool/printer:\
   :lf=/usr/adm/lpd-errs:\
   :of=/usr/adm/filter:
```

   In this example, "`/usr/adm/filter`" is the directory path and name of an output filter file. Be careful to observe the syntax rules for entries in the `/etc/printcap` file. Each line must end with `:\`. Each line, except the first must begin with a colon character (:).

b. Create another entry in the /etc/printcap file for each printer connected to a Xyplex terminal or printer server.

   For example, for an lpd printer on a terminal or printer server which the output filter knows by the name "remote-printer," you would add a printcap entry such as:

```
   remote-printer:Printer on Xyplex server:\
         :rm=printer-server:\
         :rp=print-queue2:\
         :sd=/usr/spool/printer:\
         :lf=/usr/adm/lpd-errs:
```

In this example, "printer-server" is the domain-name by which the UNIX host knows the terminal or printer server and "print-queue2" is the name of an lpd queue on the terminal or printer server. (Creating the lpd queue is described in the "Setting up queues for lpd" section.) The remaining items in the printcap entry designate a spool directory and error log file.

c. The output filter can be used to do whatever job processing is required by the system administrator. Typically, it is a simple shell script file which reads data from stdin, processes it appropriately, writes the processed data to a temporary file, passes the temporary file to lpd to be printed at the remote printer (the printer at the terminal or printer server), and then cleans up the temporary file.

   The following is an example of a basic output filter. In this case, it is a Bourne shell script which copies data to the printer (which gives you a banner page).

```
#! /bin/sh
cat - | lpr -Premote-printer
```

   This new printer will be available after you start the printer using the lpc command, as described in the "Operating and Managing lpd printer and print queue" section.

Setting up AT&T System V UNIX lpd printers

Not all AT&T System V UNIX hosts can use remote printing. You will need to refer to the documentation supplied with the operating system to determine if you can configure the host to use remote printing. You will also need to check the information about how to configure a remote printer, since the method differs for each variation of System V UNIX.

As with BSD UNIX operating systems, you must do a small amount of planning prior to setting up an lpd printer on a terminal or printer server. You will need to have the following information available to you when you configure the remote printer.

- The name of the printer for users.
- The domain-name of the remote terminal or printer server.
- The remote printer name, which is an lpd queue that you set up on the server.

The remainder of this section contains a brief example of how one configures a remote printer for the SunOS V5.1 (Solaris V2.1) version of the AT&T System V UNIX operating system:

Setting Up a SunOS V5.1 (Solaris V2.1) Remote Printer

To set up this type of printer:

a. Run the Administration Tool as superuser. Use the command:

```
# $admintool
```

b. Select, or click on, the "Printer Manager" icon.

c. From the menu bar, select the Edit menu. Choose the "Add Printer" sub-menu item. From this sub-menu, choose the "Add Access to Remote Printer..." item.

d. The Administration Tool gives you a form to complete. The form is similar to:

Printer Client:
Printer Name:
Printer Server:
Comment:
Printer Server OS:
System Default:

The items in the form describe the lpd printer. Specify the local lpd queue name for the "Printer Client:" item. This is the name by which users will know the printer. For the "Printer Name" item, specify the name of an lpd queue on the terminal or printer server. (Creating the lpd queue is described in the "Setting up queues for lpd" section). Specify the domain-name of the terminal or printer server for the "Printer Server:" item. You can include an optional comment if you want to. Type BSD for the "Printer Server OS:" item. If you want the printer to be the default printer for the host, type YES for the "System Default:" item, otherwise say NO. A completed form might look like:

Printer Client:	line-printer1
Printer Name:	print-queue1
Printer Server:	printer-server
Comment:	Printer on Xyplex server
Printer Server OS:	BSD
System Default:	NO

Exit from the Administration Tool.

Remote printer set-up is now complete.

Setting Up AIX lpd Printer

AIX provides two ways to configure remote lpd printers. One method is to edit an ASCII text file, similar to the `/etc/printcap` file for BSD UNIX. The other is to run the System Management Interface Tool (smit) and complete a form. For both methods, the planning considerations are similar to those for BSD UNIX. This section contains a brief example of how one configures a remote printer for the AIX operating system using smit. To set up this type of printer, do the following:

a. Run the System Management Interface Tool (as superuser). Use the command:

```
# $smit
```

b. Select (click on) the following buttons:

Devices
Printer/Plotter
Manage Remote Printer Subsystem
Client Services
Remote Printer Queues
Add a Remote Queue

c. The smit tool gives you a form to complete. The form is similar to:

```
*  NAME of queue to add
*  ACTIVATE the queue?
   Will this become the DEFAULT queue?
   Queueing DISCIPLINE
   ACCOUNTING FILE pathname
*  DESTINATION HOST for remote jobs
*  Pathname of the SHORT FORM FILTER for queue
     status output
*  Pathname of the LONG FORM FILTER for queue
     status output
*  Name of QUEUE on remote printer
*  NAME of device to add
*  BACKEND PROGRAM pathname
```

The items in the form describe the lpd printer. Specify the local lpd queue name for the "NAME of queue to add" item. This is the name by which users will know the printer. Specify the domain-name of the terminal or printer server for the "DESTINATION HOST for remote jobs" item. For the "Name of QUEUE on remote printer" item, specify the name of an lpd queue on the terminal or printer server. (Creating the lpd queue is described in the "Setting up queues for lpd" section). Fill out the remaining items with whatever values are appropriate to your AIX host.

A completed form might look like:

```
*  NAME of queue to add                          line-printer1
*  ACTIVATE the queue?                           yes
   Will this become the DEFAULT queue?           no
   Queueing DISCIPLINE                           first come first serve
   ACCOUNTING FILE pathname
*  DESTINATION HOST for remote jobs              printer-server
*  Pathname of the SHORT FORM FILTER for queue   /usr/lpd/aixshort
     status output
*  Pathname of the LONG FORM FILTER for queue    /usr/lpd/aixlong
     status output
*  Name of QUEUE on remote printer               print-queue-1
*  NAME of device to add                         print-device
*  BACKEND PROGRAM pathname                      /usr/lpd/rembak
```

Exit from the smit tool.

Remote printer set-up is now complete.

Operating and Managing lpd Printer and Print Queue

There are a number of commands available for managing lpd print jobs in the server connection queue from the host. For example, the Berkeley UNIX system uses lpr, lpc, lprm, and lpq commands to make print requests, queries or changes. The AT&T System V UNIX uses lpstat, enable, and disable commands for these functions. For a complete description, refer to the documentation supplied with your UNIX system. The examples shown below are specific to BSD 4.3.

At a UNIX host, use the lpc (8) command to enable printing and start a spooling daemon for the printer. For example to start a printer queue named "lp" use the command:

```
#lpc start lp
```

Use the lpr (1) command to request the lpd daemon to print the named file when the printer facilities become available. For example:

```
%lpr monthly.report
```

The UNIX like interface provides the lpc, lpq, and lprm commands to manage an lpd queue. There are also DECserver like commands which can be used to manage an lpd queue. The following table summarizes these ULI commands and their approximate DLI equivalents.

ULI command		**DLI Equivalent**
lpc	? help [*command*]	HELP [*command*]
	abort *printer*	CLEAR SERVICE *service-name*
	clean *printer*	REMOVE QUEUE SERVICE *service-name*
	create *printer* [-p *ports*][*args*]	DEFINE SERVICE *service-name* [*options*]
	delete *printer*	PURGE SERVICE *service-name*
	disable *printer*	DEFINE SERVER LPD *printer* DISABLED
	enable *printer*	DEFINE SERVER LPD *printer* ENABLED
	status *printer*	SHOW QUEUE or SHOW SERVICE LOCAL
lprm	[-P*printer*] [*job#*]	REMOVE QUEUE ENTRY *entry-number*
lpq	[-P*printer*] [*job#*]	SHOW QUEUE

Installing and Using the csportd Daemon

This section covers configuration of csportd, which is a host-based daemon. The csportd daemon comes with an installation script and a MAN page. The utility must be copied from a UNIX media kit, then installed using the installation script. csportd can be installed on any UNIX host running BSD and AT&T System V UNIX operating systems, and has also been tested on hosts running the AIX, MIPS, HP/UX, and ULTRIX operating systems.

This section covers:

- Running the installation script
- csportd options
- Communication server port setup considerations
- Example applications
- Example installation script

Throughout this section, it is assumed that you are familiar with the C compiler, libraries, and the general directory structure in use at your UNIX host.

Running the Installation Script

The installation script, MAN page, and C source code file for the csportd daemon are provided on the distribution media in a tar archive named host.tar. Use the following procedure to install these items on your UNIX System:

a. Log on to your UNIX host. You must log on as root in order to install the Host Utilities package contained in the host.tar archive (any user can build the utilities using the installation script).

b. Load the distribution tape or diskette into a drive, then copy the host.tar archive to the UNIX system. You can copy the archive to any directory that you want using a "tar" command of the form:

```
% tar xvf /dev/(your tape drive name) host.tar
```

NOTE: For nine-track tapes, make sure that you use the correct tape-drive-device-name to match the format (QIC11 or QIC24) of the tape.

For example, on Sun Workstations to extract the host.tar archive from a QIC24 tape, use the command:

```
% tar xvf /dev/rst8 host.tar
```

c. Unpack the host.tar archive, using a "tar" command of the form:

```
% tar xvf host.tar
```

You can delete the host.tar archive when you have completed extracting the files from it.

The tar utility automatically copies files and subdirectories from the host.tar archive into the appropriate directories. For example, the csportd C source file (csportd.c) and "make" file (Makefile) are copied into a subdirectory of src/ called src/csportd. MAN pages are installed in man/cat/ and man/src/ directories. (You will have an opportunity to change the location of these items later when you run the installation script.)

You should examine the text document "ReadMe" which contains some simple installation instructions, warnings, a list of known problems, information about new host types that may be supported, as well as other up-to-date information about the Install script or the csportd daemon.

d. Run the csportd installation script with the command:

```
% Install
```

The Install script is a Bourne shell script. For supported host types, the script automatically determines the host type, looks for libraries and installs software into default locations. An example of using the Install script is included at the end of this section. You should look at this example in order to understand the typical installation process, and to help you to prepare to answer questions asked by the script.

During script execution, you will be asked questions that allow you to optimize the installation or compilation of the source file. These questions vary depending on your actual UNIX implementation, the C compiler and libraries that you are using, and the directory structure that has been established on the host. However, each question will contain a default choice in brackets. To accept the default choice, simply press the RETURN key. To use a different choice, type in the choice and then press the RETURN key. For example, the first question you will usually be asked is:

```
Where do you want the executables installed (~name ok)?
[/usr/local/bin]
```

If you want the compiled csportd daemon to be installed in /usr/local/bin, simply press the RETURN key and the script will continue. If you want a different choice, specify your choice and press the RETURN key. For some of the questions (for example, the question shown above), you will be told that you can use the "~name" construct. This means that you can direct the script to use the default login directory belonging to the user specified by ~name. For example, if you specified ~gsmith, the executable image would be installed in the login directory belonging to user gsmith.

At any time during while running the installation script, if you are unable to answer a question, you can use a ! command to escape from the shell and execute a command or start a subshell. This could be used, for example, to obtain the names of libraries, or ascertain the correct directory where some item is located, or if necessary to edit the Install script or other files.

During script execution, you will also be shown informational messages about the installation process and asked:

```
[Type carriage return to continue]
```

This message typically follows some informational text. Read the text and press the RETURN key when you are ready to proceed.

e. You will see the message "Install Done," when the csportd installation script has completed. You should examine the output of the procedure contained in the file "Install.out," to make sure that the proper libraries and directories were used and that the installation was completed correctly, or to understand what errors occurred in the event that the installation was not completed correctly.

The output of the installation process is an executable csportd image.

csportd Command and Options

To use the csportd daemon, use a command in the form:

```
% csportd [options] address port-number
```

where:

options control the operation of the csportd daemon. A complete list of options is given in the UNIX MAN page supplied with csportd. All options begin with a dash character (-) and are case-sensitive.

address is the domain-name or internet-address of the access server or printer server to which the data will be sent or from which it will be received.

port-number is the physical number of the port with which the connection is made.

Table 2. csportd Options

Option	Description
-d debug-level	Specify a debug level, which controls which types of debug messages are displayed. Valid values are: 1 Display general information and system error messages. 2 Display general information, system error messages, and buffer processing information. 3 Display general information, system error messages, buffer processing information, and select() information.
-P pipe-name	Create a named "pipe" (FIFO) file specified by the *pipe-name*. Data written to the pipe-name (which is a file) are sent to the port. Data read from the port are sent to the file. The -P and -T options are mutually exclusive. The -D option is not valid with the -P option.
-T pty-name	Allocate a pseudo-terminal specified by the *pty-name*, and create a link to it. Data written to the pseudo-terminal are sent to the communication server port. Data read from the port are sent to the pseudo-terminal. The default range of pty types is p through s and the default numbers are 0 through f hexedecimal (i.e., the default pty devices allocated by csportd are ptyp0 through ptysf). The -T and -P options are mutually exclusive.

-c configuration-file	Allocate the pseudo-terminals listed in the *configuration-file* (described after this table), rather than use the default pty devices that are allocated by csportd. This option is useful when you want to restrict the pty devices that are used by csportd or when your host uses a particular pty naming convention. The -o option must follow a -T option.
-x	Convert line-feed (LF) characters into line-feed/carriage-return character sequences in data being sent to a port.
-t	Use limited Telnet mode. In this mode, the Telnet IAC character (FF) can be used as data or to control the connection, and all option negotiation requests are rejected (negatively acknowledged). When FF characters are to be used as data, two characters are sent to the port (i.e., FF FF is sent). The port converts this to a single FF characters. Similarly, duplicate FF characters received from the port are converted into a single FF character and then processed as data by the host. (Single IAC characters received are treated as the beginning of a control sequence. For example, FF followed by F2 is treated as an F2 or BREAK character.)
-g	Specify that the csportd daemon connection will be made via a TCP/IP-LAT gateway.
-w	Ignore data received from a communication server port. In effect, the connection becomes a "write-only" connection to the port.

-L remote-port-number	Specifies that the csportd daemon should make a connection to a logical *remote-port-number*, rather than the physical port number of the communication server port. You would use this option to configure multiple ports to offer the same type of service. In this case, you would change the PORT TELNET REMOTE PORT *remote-port-number* characteristic to be the same number for all ports which offer the type of service. The default value for the PORT TELNET REMOTE Port can be determined by the formula [2000 + (100 * *n*)], where *n* is a physical server port number.
-e	Add an EOR (End of Record) "handshake" to the end of the data. Using the -eor option, csportd will not close the connection until the handshaking is complete, thus guaranteeing that all data are delivered to or received from the port. To use this feature, the PORT TELNET EOR REFLECTION characteristic must also be set to ENABLED for the port. The -e option is not valid with the -P option.
-D	Disconnect the pseudo-terminal from the communication server port between jobs. The -D option must follow a -T option. The -D option is not valid with the -P and -o options.
-i	Initiate the connection with the communication server port, rather than wait for a user to initiate the connection by providing input to the daemon. This option causes the csportd daemon to establish the connection before data needs to be sent.

-s	Create a symbolic ("soft") link to an allocated user device specified by a *pty-name* (absence indicates that csportd should use a "hard" link which has the effect of restricting the daemon to selecting a user-device from /dev). You would use a symbolic link to go across device partitions. This option requires the -T option and cannot be used with the -P option.
-o	Change the processing performed by the pty slave. The action taken depends on the UNIX system: BSD: Configure the pty slave for "RAW" mode. System V: Configure the pty slave to process data using the "ptem" and "ldterm" terminal emulation modes. The -o option must follow a -T option. The -o option is not valid with the -P, -e, and -D options.

PTY Configuration File Format. The *configuration-file* is a simple ASCII file which specifies the pseudo-terminals that are allocated for use by csportd. The range of pty-types are a through z and range of numbers are 0 through f hexedecimal. You can use a pound-sign character (#) at the beginning of a line to denote a comment. A simple configuration file would be:

```
#  PTYs used by csportd
/dev/ptyq0
/dev/ptyq1
```

Communication Server Port Setup Considerations

Follow the steps listed in the "Configure PORT Characteristics" section in “Basic Set-Up Activities for Printer Serving” to specify the type of access allowed to the port, and configuring the port so that its characteristics match those of the device (terminal, serial or parallel printer, etc) to which it is connected.

Example Applications

This section will describe the following basic applications for csportd:

1. Send data from standard input (stdin) directly to the communication server port.

2. Process data through the UNIX pseudo-terminal (pty) mechanism.

3. Process data though a named pipe (FIFO).

Refer to the examples in the csportd MAN page supplied with for other examples of how one might use csportd and csportd options.

1. Send data from standard input (stdin) directly to the communication server port. In this application, you would use the cat utility to send a file to the csportd daemon. The csportd portion of the command would not use a -T or -P option. The basic command would be:

   % cat *file-name* | csportd [*options*] *address port-number*

   For example, use the following command to send a file named "report.txt" to port 5 of a communication server which has a *domain-name* "ts720.xyplex.com":

   ```
   % cat report.txt | csportd ts720.xyplex.com 5
   ```

   You could also use an *internet-address* instead of a *domain-name,* and you can use options, such as the -d, -e, -g, -w, -x, and -L options.

2. Process data through the UNIX pseudo-terminal (pty) mechanism. In this application, you would create a link to a PTY device using the csportd -T option. A user could then use the cat utility to send a file to the port using this device. The first step would be to create the pty device. For this you would use a csportd command of the form:

   % csportd -T*pty-device* [*options*] *address port-number*

   For example, use the following command to create a pty-device named "modem1" in the /dev directory which maps to port 15 of a communication server which has the internet address 140.179.151.221:

   ```
   % csportd -T/dev/modem1 140.179.151.221 15
   ```

   The csportd command automatically allocates either the default pty devices, or when the -c option is used the command allocates the pty devices you specify in the configuration file. You could also use a *domain-name* instead of an *internet-address*, and you can include options, which are described in the csportd MAN page.

   When users want to send files to this port, they can simply cat the file to /dev/modem1. For example, to send the file report.txt, the user would issue the command:

   ```
   % cat report.txt > /dev/modem1
   ```

3. Process data though a named pipe (FIFO). In this application, you would create a named pipe using the csportd -P option. A user could then use the cat utility to send a file to the pipe. The first step would be to create the named pipe. For this you would use a csportd command of the form:

   % csportd -P*pipe-name* [*options*] *address port-number*

   For example, use the following command to create a *pipe-name* named "/usr/spool/port15" which maps to port 15 of a communication server which has a *domain-name* "ts720.xyplex.com":

   ```
   % csportd -P/usr/spool/port15 ts720.xyplex.com 15
   ```

This command automatically creates the file /usr/spool/port15. You could also use a *domain-name* instead of an *internet-address*, and you can include options, such as the -d, -g, -t, -w, -x, and -L options.

When users want to send files to this port, they can simply cat the file to the pipe. For example, to send the file report.txt, the user would issue the command:

```
% cat report.txt > /usr/spool/port15
```

Example csportd Installation Script

The following four pages show the actual output of the Install script. The host system used was a BSD UNIX host. Your output will be different, and depends on the host system.

```
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Beginning of configuration questions for Host Utils kit.


Checking your sh to see if it knows about # comments...
Your sh handles # comments correctly.

Okay, let's see if #! works on this system...
It does.

Checking out how to guarantee sh startup...
Let's see if '#!/bin/sh' works...
Yup, it does.
Checking echo to see how to suppress newlines...
...using -n.
Type carriage return to continue.  Your cursor should be here-->
This installation shell script will examine your system and ask you questions
to determine how the Xyplex Host Utils package should be installed.
If you get stuck on a question, you may use a ! shell escape to start a
subshell or execute a command.  Many of the questions will have default answers
in square brackets--typing carriage return will give you the default.

On some of the questions which ask for file or directory names you are
allowed to use the ~name construct to specify the login directory belonging
to "name", even if you don't have a shell which knows about that.  Questions
where this is allowed will be marked "(~name ok)".

[Type carriage return to continue]

Much effort has been expended to ensure that this shell script will run on
many UNIX systems.  If your system proves to be an exception, you may have
to edit this script (Install) and/or edit  src/config.h, src/Makefile and/or
src/build.opts by hand.

This installation script will create 3 files, src/config.h, src/Makefile and
src/build.opts.  src/config.h is included by the 'C' programs and defines your
system's configuration.  src/Makefile and src/build.opts is used to build and
install the Xyplex Host Utils package.

You must be root in order to install the package, but any user can build it.

If you run into problems, you may wish to contact Xyplex for assistance.

[Type carriage return to continue]

I will now locate the programs I need to run this script.  If any of these
programs cannot be found you will probaly run into problems with this
installation script.  To remedy this situation, add the directory
containing the missing program(s) to your PATH and invoke Install.

[Type carriage return to continue]
awk is in /bin/awk.
cat is in /bin/cat.
cp is in /bin/cp.
echo is in /bin/echo.
expr is in /bin/expr.
```

```
grep is in /bin/grep.
ls is in /bin/ls.
mkdir is in /bin/mkdir.
mv is in /bin/mv.
rm is in /bin/rm.
sed is in /bin/sed.
sort is in /bin/sort.
tr is in /bin/tr.
uniq is in /bin/uniq.
nroff is in /bin/nroff.

Checking compatibility between /bin/echo and builtin echo (if any)...
They are compatible.  In fact, they may be identical.

Find where to put executables...

Where do you want the executables installed (~name ok)?
[/usr/local/bin]

Host Utils has manual pages available in source form.
If you don't want the manual sources installed, answer 'none'.

Where do the manual pages (source) go (~name ok)? [/usr/man/manl]

Where are the include files you want to use? [/usr/include]

Hmm...  Doesn't look like a MIPS system.
Looks kind of like a BSD system, but we'll see...
Congratulations.  You aren't running Eunice.
It's not Xenix...
It's not Venix...
It's not AIX...
Use which C compiler? [cc]

Some C compilers have problems with their optimizers, by default, Host Utils
compiles with the -O flag to use the optimizer.  Alternately, you might
want to use the symbolic debugger, which uses the -g flag (on traditional
Unix systems).  Either flag can be specified here.  To use neither flag,
specify the word "none".

What optimizer/debugger flag should be used? [-O]

Your C compiler may want other flags.  For this question you should
include -I/whatever and -DWHATEVER flags and any other flags used by
the C compiler, but you should NOT include libraries or ld flags like
-lwhatever.  For instance, this would be a good place to specify
-DDEBUGGING.  To use no flags, specify the word "none".

Any additional cc flags? [ -I/usr/include/sun -I/usr/ucbinclude]
(C preprocessor flags:  -I/usr/include/sun -I/usr/ucbinclude)

Checking for optional libraries...(Don't worry if some are missing.)
No -lc_s.
No -lnet_s.
No -lnet.
No -lsocket.
```

```
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No -lnsl_s.
No -lnsl.
No -lnm.
No -lndir.
No -ldir.
No -lndbm.
Found -ldbm.
No -lPW.
No -lmalloc.
No -lsun.
Found -lm.
No -lbsd.
No -lBSD.
No -lx.
Found -lposix.
No -lucb.
No -lpt.
No -lqb.
No -lelf.
No -li.
No -linet.

Some versions of Unix support shared libraries, which make
executables smaller but make load time slightly longer.

On some systems, mostly newer Unix System V's, the shared library
is included by putting the option "-lc_s" as the last thing on the
cc command line when linking.  Other systems use shared libraries
by default.  There may be other libraries needed to compile Host Utils
on your machine as well.  If your system needs the "-lc_s" option,
include it here.  Include any other special libraries here as well.
Say "none" for none.

Any additional libraries? [-ldbm -lm -lposix]

Your (shared) C library seems to be in /usr/lib/libc.so.1.8.


If the guess above is wrong (which it might be if you're using a strange
compiler, or your machine supports multiple models), you can override it here.
Your C library is where? [/usr/lib/libc.so.1.8]

Extracting names from the following files for later perusal:
        /usr/lib/libc.so.1.8
        /usr/lib/libdbm.a
        /usr/lib/libm.a
        /usr/lib/libposix.a
This may take a while...done

Any additional ld flags (NOT including libraries)? [ -L/usr/lib]

Saving src/config.h in src/config.h.old.
Saving src/Makefile in src/Makefile.old.
Saving src/build.opts in src/build.opts.old.

I think your system is a BSD style of UNIX.  I expect pseudo terminal
```

```
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entries to be in /dev and have the form "ptyXY" where X is typically a
letter from p -> s and Y is a hex digit from o -> f.

Checking your system for "BSD" pseudo terminal entries...

Pseudo terminal banks [rqp]:
Pseudo terminal units [fedcba9876543210]:

Checking for the functions I need...

bcopy() found
bzero() found
link() found
symlink() found
mknod() found
socket() found
setsockopt() found
accept() found
connect() found
bind() found
listen() found
getsockname() found
Creating ../src/config.h...
Creating ../src/build.opts...
Creating ../src/Makefile...

Configuration Complete.

Shall I compile Host Utils for you?[y]

Compiling Host Utils ...output saved in "make.out"


Shall I install Host Utils for you?[y]

Installing... output saved in "Install.out"


Install Done.
```

Configuring Print Servers for Novell Users

Printer servers maintain a database of permanent and operational (current) configuration data in local storage (non-volatile RAM). The configuration data include parameters, or characteristics, which allow the unit to communicate on a Novell NetWare network. You can configure these parameters either with standard Xyplex TCP/IP-LAT software commands or with the XPRINTER Setup Dialog (only on MAXserver 1400A and 1450 Printer Servers). This section describes how you configure Novell NetWare-related characteristics at the server, as well as at the Novell printer server.

- Using Commands to Configure Novell Printing
- Using the XPRINTER Setup Dialog to Configure Novell Printer Services
- Novell Server Configuration

After you have enabled the XPRINTER protocol, you must set up other XPRINTER related server and port characteristics. This can be done using the XPRINTER Setup Dialog (only on MAXserver 1400A and 1450 Printer Servers) or via commands. After you have completed these activities, you will need to perform configuration activities at the Novell printer servers. You will need to configure the RPRINTER utility so that the Novell printer servers communicate with the access server or printer server. The complete list of tasks to perform are the following:

Task	Procedure
Configure access server or printer server to support IPX printing. Configure Novell printer server to be able to communicate with the Xyplex unit	Use the XPRINTER SETUP Dialog (only on MAXserver 1400A and 1450 Printer Servers) or commands to create a local printer

XPRINTER is available on the following unit types:

- MAXserver 1450 and 1400A Printer Servers
- Network 9000 Access server 720
- MAXserver 1600/1620/1640
- MAXserver 1120/1520/1820
- MAXserver 800
- MAXserver 2120, 2220

For all unit types except MAXserver 1450 and 1400A Printer Servers, the unit needs at least 2 megabytes of memory. The XPRINTER Setup Dialog is only available on MAXserver 1450 and 1400A Printer Servers. You must use the commands described in the next section to configure XPRINTER features for all other unit types.

Using Commands to Configure Novell Printing

The access server software includes several commands which allow you to configure Novell support on a server port. The following is a list of these commands and their purpose. Some of the commands described in this section require you to be in "privileged mode."

Setting IPX Protocol Packet Type

```
DEFINE SERVER IPX PROTOCOL    ETHERNET
                              MAC
                              IEEE802_2
                              IEEESNAP
```

IPX is a protocol used by Novell NetWare. The Xyplex access server or printer server can accept any one of four packet types over an IPX Interface: Ethernet-type packets, IEEE802.2, IEEE 802.3 (MAC), or IEEE SNAP type packets. You can only use one of these types at a time on a server. Enabling one packet type will disable the other types. By factory default, the server is configured to use Ethernet-type packets for IPX. If you use the Setup Dialog, it will prompt you for this information, rather than require you to type in this command. You must make sure that the protocol type you set for the server matches the value set at your Novell file server. You must re-initialize the unit after making a change to the IPX packet type selection, for the change to take effect.

NOTE: The IEEE802_2 and IEEESNAP options are only available with V5.3.1 and later versions.

Configuring a Port to Support Novell Printing

`SET/DEFINE XPRINTER` *`printer-server printer-number`* `PORT` *`port-number`*

printer-server is the name of an Novell NetWare printer server, that you set up using the PCONSOLE utility.

printer-number is the number of a Novell NetWare printer that you set up at the Novell printer server (file server) using the Novell PCONSOLE utility. Novell NetWare allows you to specify up to 256 printers, numbered 0 through 255.

NOTE: Only V5.3.1 and later versions support 256 printers. For previous versions, the maximum number of printers is 16.

port-number is a access server or printer server port. Each port can be connected to only one Novell Printer Server.

Viewing Available Novell Printer Servers

```
SHOW XPRINTER
```

```
 Available Print Servers

ENGINEERING_PRINTER_SERVER
MANUFACTURING_PRINTER_SERVER
```

Figure 5. Example SHOW XPRINTER Display

Viewing Status of XPRINTER Ports

```
SHOW
LIST XPRINTER PORTS          [port-list]
                             [ALL]
```

where *port-list* represents the server ports which have local XPRINTER services assigned to them. If you want to view the status of more than one port, you can specify the individual port-numbers separated by commas or specify a range of port-numbers separated by a hyphen, or a combination of both (do not include spaces). For example, the *port-list*: 1,3-14 refers to the individual ports: 1, and 3 through 14. If you specify ALL, the display will show the status for all ports. Figure 6 is an example of what this display might look like, after a local XPRINTER service named "PRINTER" had been defined for port 3.

```
Port  Status        Print Server      Printer #
State

 1    IDLE
 2    IDLE
 3    CONNECTED     PRINTER                 3
 4    IDLE
```

Figure 6. Example SHOW/LIST XPRINTER PORTS Display

Terminating Xprinter Operation

```
CLEAR/PURGE XPRINTER PORTS [port-list][ALL]
```

where *port-list* represents the server ports which have local XPRINTER services assigned to them. This command disconnects the port in the *port-list* from the print servers to which they are connected. If you want to terminate Novell printing at more than one port, you can specify the individual port-numbers separated by commas or specify a range of port-numbers separated by a hyphen, or a combination of both (do not include spaces). For example, the *port-list*: 1,3-14 refers to the individual ports: 1, and 3 through 14. If you specify ALL, the server will terminate Novell client printing at all ports.

```
CLEAR/PURGE XPRINTER PSERVER printer-server
```

where *printer-server* represents the name of a Novell NetWare printer server that is serviced by the terminal or printer server. This command removes the print server from the list of active print servers that the server maintains. Note that once per minute, an active Novell print server broadcasts a message on to the network to indicate that it is "alive." This means that the server will re-learn the print server until you also unload it from the NetWare file server or print server workstation.

Viewing IPX Protocol Packet Type Setting

```
LIST
MONITOR
SHOW SERVER CHARACTERISTICS
```

Figure 7 shows the SERVER CHARACTERISTICS display. The field which is highlighted shows the current setting of the IPX packet type.

Clear a "Hung" Parallel Port

RESET PORT *port-list*

```
Xyplex> show server characteristics

MAXserver V5.3.1 Rom 410000 HW 00.00.00 Lat Protocol V5.1 Uptime:  0 01:30:25

Address:   08-00-87-00-85-D4   Name:   X0085D4                Number:     0

Identification:  Xyplex Access server
Welcome:         Welcome to the Xyplex Access server.

Circuit Timer:            80           Password Limit:            3
Console Port:              0           Queue Limit:              24
Inactivity Timer:         30           Retransmit Limit:          8
Keepalive Timer:          20           Session Limit:             8
Multicast Timer:          30           Software:        XPCS00S.SYS
Node Limit:              100           Identification Size:      63
Textpool Size:          8192           Timezone:              00:00
Accounting Entries:        0           Packet Count:            100
Nested Menu Size:          0           Menu Name:
Userdata Delay:           50           Xprinter Timeout:         80
IPX Protocol:  Ethernet
Service Groups:   0

Enabled Characteristics:

Announcements,  Broadcast,  Dump,  Lock,  Parameter Polling
```

Figure 7. Example LIST/MONITOR/SHOW SERVER CHARACTERISTICS Display

Using the XPRINTER Setup Dialog to Configure Novell Printer Services

The Setup Dialog provides a simple method of configuring all the relevant server and port parameters so that the unit can accept print jobs from the network. The Dialog asks you to provide relevant configuration information by answering a series of questions, rather than having you type in commands. The next page shows an example of a typical Dialog session. Following the example Dialog, you will find the detailed procedures for running the Dialog to set up the server so that it can be used for Novell printing.

NOTES: The Setup Dialog is only available on MAXserver 1450 and 1400A Printer Servers.

If you make a mistake in answering any prompt or question in the Dialog, the Dialog will give you an opportunity to correct your mistake. If you make the same mistake 3 times, the Dialog will terminate.

Where possible, the Dialog changes both the "permanent" parameters for the unit, as well as the current "operational" parameters.

Example Dialog

```
Xyplex> SETUP
Password> SYSTEM     (not displayed)
Use BREAK or Local Switch at any time to return to the Command
Line Prompt.
Press <RETURN> to Continue.

Assign an Internet Address to this unit? [Y]: Y


Note:
Please refer to the manual supplied with this unit for detailed
information regarding these parameters.

This unit's Internet Address [0.0.0.0]:
This unit's Subnet Mask [0.0.0.0]:
```

```
(Optional) Primary Gateway Address [0.0.0.0]:
IPX Protocol (Ethernet II, 802.2, SNAP, MAC (802.3 RAW))? [E]:
MAC


Save, Edit or Cancel [Cancel]: S

Add or Modify Local TCP/IP print capability? [Y]: N

Add or Modify a Local LAT Service? [Y]: N

Add or Modify Local XPRINTER print capability? [Y]: Y


Port  State        Print Server     Printer #      Status

 1    IDLE
 2    IDLE
 3    IDLE
 4    IDLE

Select a Port to be assigned to a print server:

Local Port to print to: 4
Print Server Name: PRINT
Xyplex -911- Warning: Print Server PRINT is not currently
available.

Print Server Printer Number: 4


Save, Edit or Cancel [Cancel]: S

Add or Modify Local XPRINTER print capability? [Y]: N

Setup Complete
```

Running the Setup Dialog

a. Log on to a port (serial port or the console port).

b. From the Xyplex prompt, type the following command:

```
Xyplex> SETUP
```

The Setup Dialog will respond with the privileged Password prompt. (You do not see this prompt if the port is already in privileged mode.)

```
Password>
```

Type the privileged password for the unit (if applicable; the factory default is the word SYSTEM), and press the RETURN (or ENTER) key. Note that the port does not display the password as you type it. The Dialog will display the following prompt:

```
Use BREAK or Local Switch at any time to return to
the Command Line Prompt.

Press <RETURN> to Continue
```

To continue with the procedure, press the RETURN (or ENTER) key. To leave the Setup Dialog, you can press the BREAK key on your keyboard (if your terminal has one). If you had defined a "local switch" character (using other commands), you can also use this character to leave the Setup Dialog. If you leave the Setup Dialog, the software returns you to the Xyplex prompt.

c. The Dialog begins this procedure by asking:

Assign an Internet Address to this unit? [Y]:

If you type N (No), and press the RETURN or ENTER key the Dialog will continue go to step g. Answer this question Y (Yes) and press the RETURN or ENTER key. The Dialog will continue by displaying the following note:

NOTE: Please refer to the manual supplied with this unit for detailed information regarding these parameters.

d. The Dialog asks:

```
This unit's Internet Address [0.0.0.0]:
```

Press the RETURN or ENTER key.

e. The Dialog asks:

```
This unit's Subnet Mask [255.255.0.0]:
```

Press the RETURN or ENTER key.

f. The Dialog asks:

```
(Optional) Primary Gateway Address [0.0.0.0]:
```

Press the RETURN or ENTER key.

g. The Dialog asks:

```
IPX Protocol (Ethernet II, 802.2, SNAP, MAC (802.3 RAW))?
[E]:
```

IPX is a protocol used by Novell NetWare. The MAXserver 1400A/1450 Printer Server can accept four packet types over an IPX Interface: Ethernet-type packets, IEEE 802.3 (MAC), IEEE 802.2, and IEEE SNAP type packets. You can only use one of these types on a given network. Enabling one protocol type disables the other three. By factory default, the MAXserver 1400A/1450 is configured to use Ethernet-type packets for IPX.

You will need to decide which packet type to use. Type the appropriate packet type and press the RETURN or ENTER key.

If you enable an additional protocol (using the DEFINE SERVER IPX PROTOCOL command), the MAXserver 1400A/1450 will use only Ethernet-type packets (IEEE 802.3).

h. The Dialog asks:

```
Save, Edit or Cancel [Cancel]:
```

If you are satisfied with the choices you have made for the Dialog questions and prompts, type S (Save) and press the RETURN or ENTER key. If you made a mistake, or you want to change your mind about something, type E (Edit) and press the RETURN or ENTER key. The Setup Dialog will repeat the questions in this procedure, allowing you to correct any mistakes. If you decide that you do not want to configure the basic Internet characteristics, type C (Cancel) and press the RETURN or ENTER key.

i. The Dialog asks (this question is only asked if you selected the Cancel option in the previous question):

```
Assign an Internet Address to this unit? [Y]:
```

If you type Y (Yes), and press the RETURN or ENTER key, the Dialog will repeat this procedure. If you type N (No), and press the RETURN or ENTER key the Dialog will continue with the next procedure.

j. The Dialog asks:

```
Add or Modify Local TCP/IP print capability? [Y]:
```

If you answer Yes, you will be asked a series of questions relating to adding or changing a TCP/IP print capability. (Refer to the documentation supplied with your MAXserver 1450 Printer Server for more information about this portion of the dialog.) To continue with the procedure to add an IPX print capability, answer this question N (No) and press the RETURN or ENTER key.

k. The Dialog asks:

```
Add or Modify a Local LAT Service? [Y]:
```

If you answer Yes, you will be asked a series of questions relating to adding or changing a LAT print capability. (Refer to the documentation supplied with your MAXserver 1450 Printer Server for more information about this portion of the dialog.) To continue with the procedure to add an IPX print capability, answer this question N (No) and press the RETURN or ENTER key.

l. The Dialog asks:

```
Add or Modify Local XPRINTER print capability? [Y]:
```

Answer this question Y (Yes) and press the RETURN or ENTER key. The Dialog will continue by displaying the following display:

```
Port  State         Print Server      Printer #
State

 1    IDLE
 2    IDLE
 3    IDLE
 4    IDLE
```

This display shows any existing local XPRINTER services. The first time you run the Dialog, no local XPRINTER services will be listed, as shown above. The following is an example of what this display might look like, after a local XPRINTER service named "PRINTER" had been defined for port 3.

```
Port  State         Print Server      Printer #
State

 1    IDLE
 2    IDLE
 3    CONNECTED     PRINTER                  3
 4    IDLE
```

m. The Dialog asks:

```
Select a Port to be assigned to a print server:
```

You can assign this XPRINTER print service to be available at any of the ports available on the MAXserver 1400A/1450 Printer Server. To answer this question, you must provide a *port-number*. Type the desired port number and press the RETURN or ENTER key. Each port of a MAXserver 1400A/1450 can be connected to only one Novell Printer Server. If you select a port that is already connected to a Novell NetWare printer server, the Setup Dialog will display the existing printer server information as the default answers to the remaining questions in this procedure.

n. The Dialog asks:

```
Print Server Name:
```

To answer this question, you must supply the name of an active Novell NetWare printer server. If the Novell NetWare printer server is not currently available, you may see a message similar to the following:

```
Xyplex -911- Warning: Print Server PRINT is not currently
   available.
```

o. The Dialog asks:

```
Print Server Printer Number:
```

To answer this question, you must supply the number of a Novell NetWare printer. Novell NetWare allows you to specify up to 256 printers, numbered 0 through 255.

p. The Dialog asks:

```
Save, Edit or Cancel [Cancel]:
```

If you are satisfied with the choices you have made for the Dialog questions and prompts, type S (Save) and press the RETURN or ENTER key. If you made a mistake, or you want to change your mind about something, type E (Edit) and press the RETURN or ENTER key. The Setup Dialog will repeat the questions in this procedure, allowing you to correct any mistakes. If you decide that you do not want to configure an XPRINTER print service, type C (Cancel) and press the RETURN or ENTER key.

q. The Dialog asks:

```
Add or Modify Local XPRINTER print capability? [Y]: n
```

If you type Y (Yes), and press the RETURN or ENTER key, the Dialog will repeat this procedure. You can repeat this procedure in order to create additional local XPRINTER (Novell) printer services. If you type N (No), and press the RETURN or ENTER key the Dialog will display the message:

```
Setup Complete
```

The Setup Dialog procedure is complete.

Novell Server Configuration

To configure a remote printer, you must use the Novell PCONSOLE utility. This section contains the following procedures, which are used to do this:

- Adding a New NetWare Print Server
- Changing an Existing NetWare Print Server

The Novell NetWare *Printer Server* guide contains all of the information that you need to configure Novell software and equipment to support remote printing. This section summarizes the information contained in the *Printer Server* guide. There are four basic steps for configuring remote printing from a Novell server:

1. Create and configure a print server and printers
2. Create a print queue
3. Assign logical connection between printer and queue
4. Load(unload) the print server software

Each of these steps is summarized below.

The following example is for Novell NetWare Version 3.11.

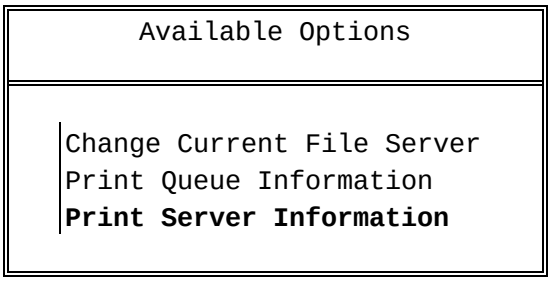
1. Create and configure a print server and printer.

Login to the Novell server from a Novell client. You must use the SUPERVISOR account and password.

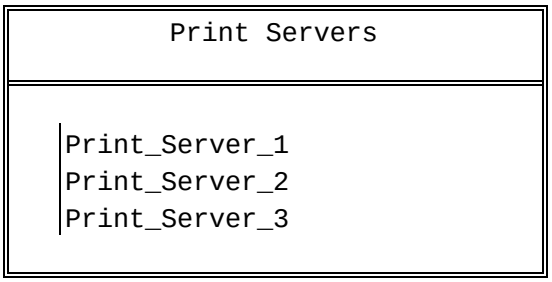
Once the you complete the login sequence you will be left on the default drive and directory configured for the user (usually C:\ or C:\SYSTEM.) Start the Novell utility that allows you to create and configure a print server and queue by typing:

```
C:\>PCONSOLE
```

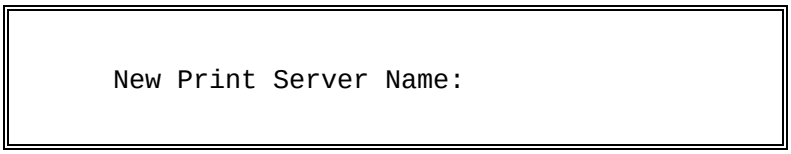
The PCONSOLE program will respond with the following menu:



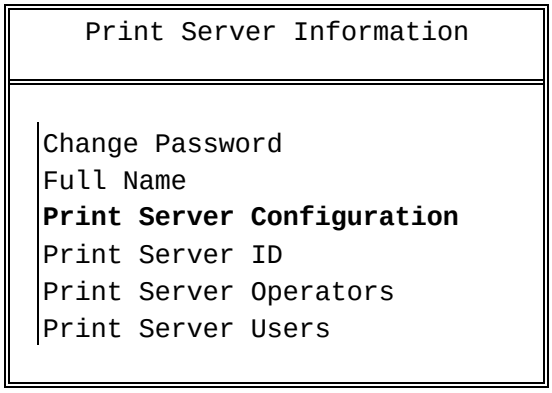
Use the arrow keys and select (highlight) the "Print Server Information" option (shown in highlights above) and press the RETURN or ENTER key. The Print Servers window appears. The next figure depicts this window. The display you see will list any print servers that actually exist for your network.



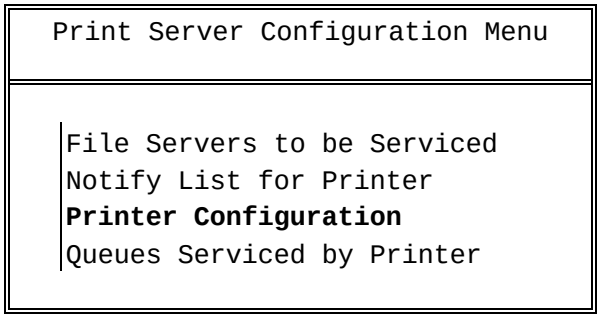
You can use the arrow keys to select an existing print server or press the INSERT (or INS) key to add a new print server. If you press the INSERT key to add a new print server, a New Print Server Name window appears:



Enter the name of the print server you wish to create and press the RETURN key. The PCONSOLE program will return you to the Print Servers window. The print server name you just created will appear in the Print Servers window and will now be highlighted. Press the RETURN key. The PCONSOLE program will display the Print Server Information window.



Use the arrow keys to select (highlight) the "Print Server Configuration" option (shown in highlights above) and press the RETURN or ENTER key. The PCONSOLE program will display the Print Server Configuration Menu.



Use the arrow keys to select (highlight) the "Printer Configuration" option (shown in highlights above) and press the RETURN or ENTER key. The PCONSOLE program will display the Configured Printers window.

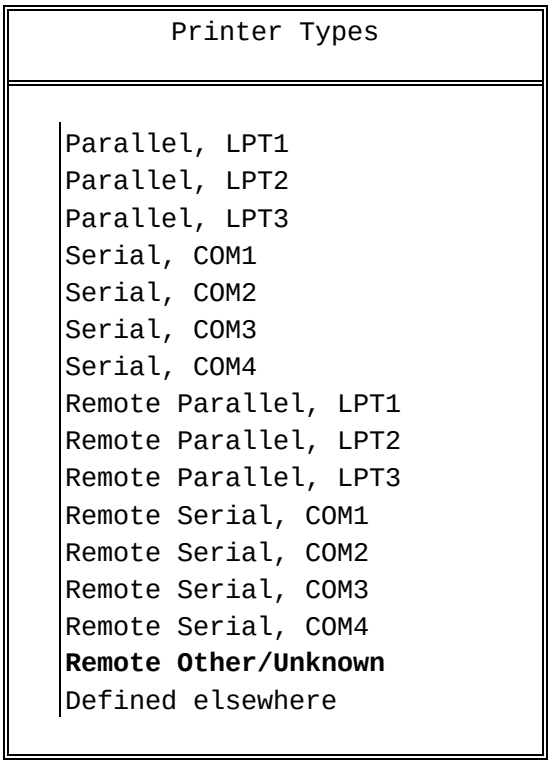
Configured Printers	
Not Installed	0
Not Installed	1
Not Installed	2
Not Installed	3
Not Installed	4
Not Installed	5
Not Installed	6
Not Installed	7
Not Installed	8
Not Installed	9
Not Installed	10
Not Installed	11
Not Installed	12
Not Installed	13
Not Installed	14
Not Installed	15

You can use the arrow keys and press the RETURN or ENTER key to select an existing printer or you can use the arrow keys to add a new printer. If you add a new printer, a New Printer Name window appears:

For a new printer, enter a descriptive name for the printer and press the RETURN key. Whether you created a new printer or selected an existing printer, the PCONSOLE program will display the following window:

```
                    Printer_0

     Name: Printer_0
     Type: Defined elsewhere

     Use Interrupts
     IRQ:

     Buffer Size in K:

     Starting Form:
     Queue Service Mode:

     Baud Rate:
     Data Bits
     Stop Bits
     Parity:
     Use X-ON/X-OFF:
```

The cursor will automatically be positioned on the "Type" field of this window, press the RETURN or ENTER key to view the Printer Types window.



This window shows a list of the possible printer types available. Using the arrow keys, position to the "Remote Other/Unknown" selection for printer type (shown in highlights above) and press the RETURN or ENTER key. The PCONSOLE program will return you to the previous window. Note that the Type field and the next five fields have been altered. The window now appears as follows:

```
                    Printer_0

   Name: Printer_0
   Type: Remote Other/Unknown

   Use Interrupts: Yes
   IRQ: 7

   Buffer Size in K: 3

   Starting Form: 0
   Queue Service Mode: Change forms as needed

   Baud Rate:
   Data Bits
   Stop Bits
   Parity:
   Use X-ON/X-OFF:
```

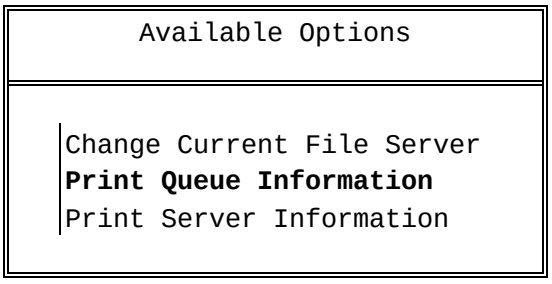
Press the ESCAPE key to complete this portion of the configuration. You will be asked if you wish to save the configuration changes with the following window.

```
  Save Changes

   No
   Yes
```

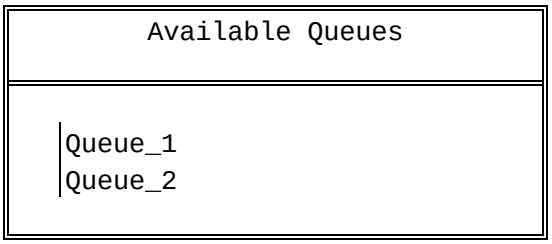
Use the arrow keys to select the "Yes" option (shown highlighted) and press the RETURN or ENTER key. Press the ESCAPE key a few times, until you return to the Available Options window.

2. Create a print queue.

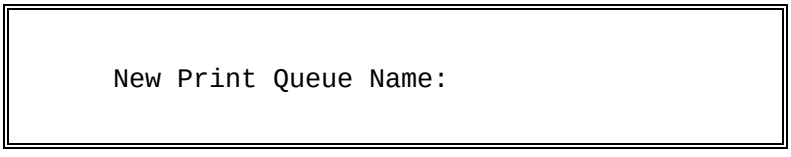
At the Available Options window, use the arrow keys to select the "Print Queue Information" option (shown highlighted in the next figure) and press the RETURN or ENTER key.



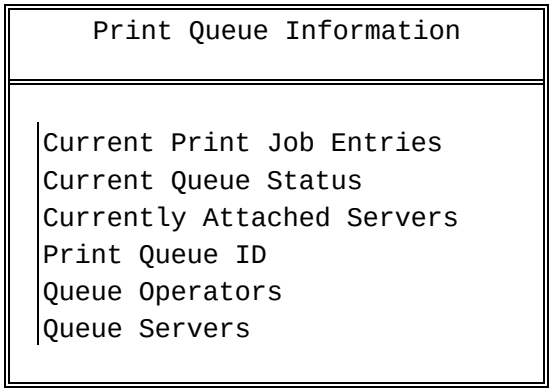
An Available Queues window, listing all existing queues will appear (the following is an example of this window; your window will be different).



Use the arrow keys and select (highlight) a queue. Press the INSERT (or INS) key to add a new queue. If you inserted a new queue, a New Print Queue Name window appears:

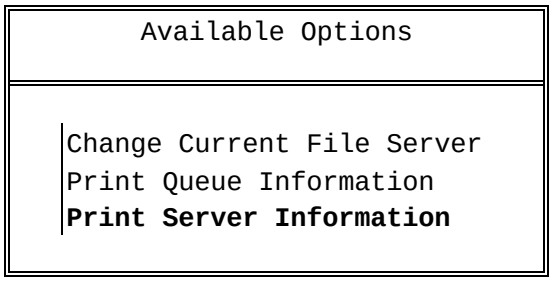


Enter a descriptive name for the queue name and press RETURN. After you specify a queue name the PCONSOLE program will display the Print Queue Information window.



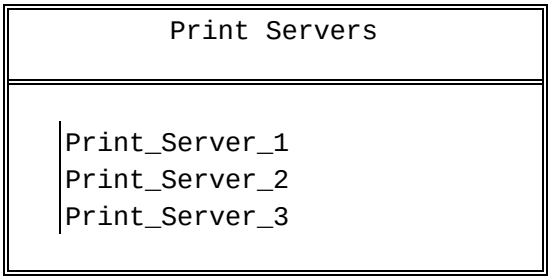
Make any desired queue changes and when you are done press the ESCAPE key a few times, until you return to the Available Options window.

3. Assign logical connection between printer and queue.

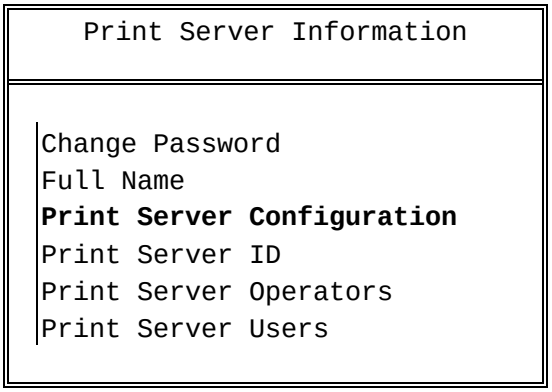


Use the arrow keys and select (highlight) the "Print Server Information" option (shown in highlights above) and press the RETURN or ENTER key. The Print Servers window appears. The next figure depicts this window.

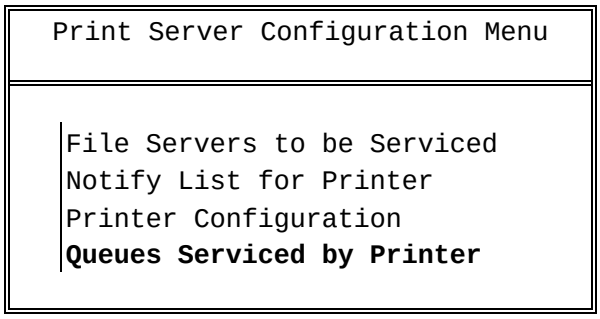
The display you see will list any print servers that actually exist for your network.



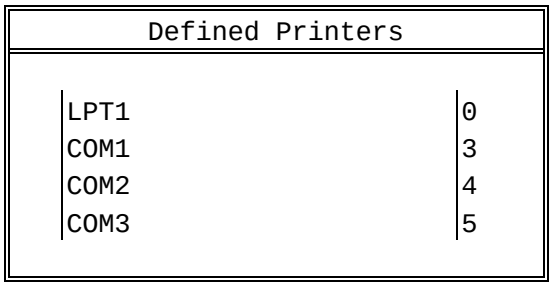
Select the print service you previously created and press the RETURN or ENTER key. The Print Server Information window appears.



Use the arrow keys to select (highlight) the "Print Server Configuration" option (shown in highlights above) and press the RETURN or ENTER key. The Print Server Configuration Menu appears.



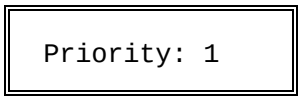
Use the arrow keys to select (highlight) the "Queues Serviced by Printer" option (shown in highlights above) and press the RETURN or ENTER key. The Defined Printers window appears (the following is an example of this window; your window will be different).



Use the arrow keys to select (highlight) the printer you just defined and press the RETURN or ENTER key. The following window appears (the following is an example of this window; your window will be different):

File Server	Queue	Priority
Server 1	Queue_1	1

Use the arrows keys select the queue you wish to associate with the printer and press the RETURN or ENTER key. The following window appears:



Press the RETURN or ENTER to select the default. Exit from the PCONSOLE program by pressing the ESCAPE key until the Exit PConsole window appears. Select the "Yes" option and press the RETURN or ENTER key. When the program exits, you will see the DOS prompt.

4. Load the print server software.

Proceed to the Novell server and bring up the system utility if it is not running. If the utility is running, press the ALT and ESCAPE keys simultaneously until you see the System Console display. The command prompt for this display is the colon character (:). At the command prompt, type the following Novell command:

LOAD PSERVER *printer-server-name*

where *printer-server-name* represents the printer server you created in step 1 of this procedure. You are now finished with the procedure.

Changing an Existing NetWare Print Server

The Novell NetWare *Printer Server* guide contains all of the information that you need to configure Netware software and equipment to support remote printing. This section summarizes the information contained in the *Printer Server* guide. There are three basic steps for changing an existing Netware Print Server so that it can be used on a access server or printer server.

1. Unload the print server software
2. Change the print server and printer PCONSOLE configuration
3. Load the print server software

Each of these steps is summarized below.

The following example is for Novell NetWare Version 3.11.

1. Unload the print server software.

You must unload a printer server before you make any changes to it. Netware will not save changes that are made to a printer server that is running. At the Netware server and bring up the system utility if it is not running. If the utility is running, press the ALT and ESCAPE keys simultaneously until you see the System Console display. The command prompt for this display is the colon character (:). At the command prompt, type the following Netware command:

`UNLOAD PSERVER` *`printer-server-name`*

where *printer-server-name* represents the printer server you wish to change.

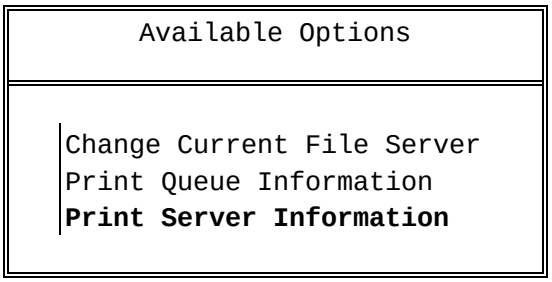
2. Change the print server and printer PCONSOLE configuration.

Login to the Netware server from a Netware client. You must use the SUPERVISOR account and password.

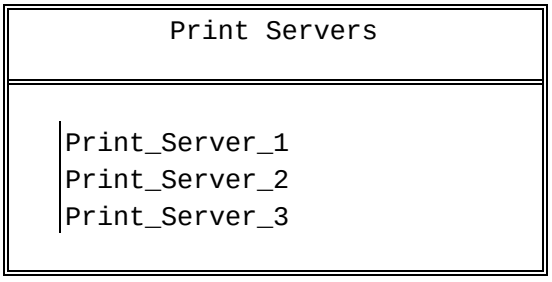
Once the you complete the login sequence you will be left on the default drive and directory configured for the user (usually C:\ or C:\SYSTEM.) Start the Netware utility that allows you to create and configure a print server and queue by typing:

```
C:\>PCONSOLE
```

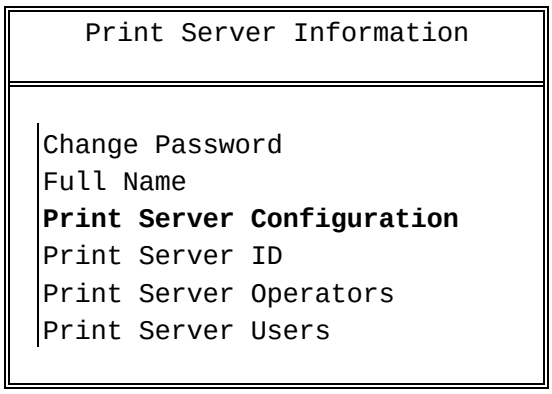
The PCONSOLE program will respond with the following menu:



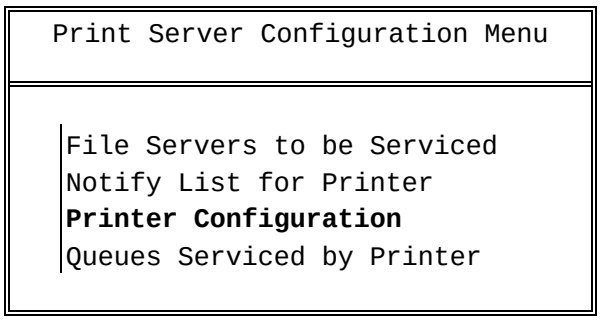
Use the arrow keys and select (highlight) the "Print Server Information" option (shown in highlights above) and press the RETURN or ENTER key. The Print Servers window appears. The next figure depicts this window. The display you see will list any print servers that actually exist for your network.



Use the arrow keys to select the existing print server to be changed. Press the RETURN or ENTER key. The PCONSOLE program will display the Print Server Information window.



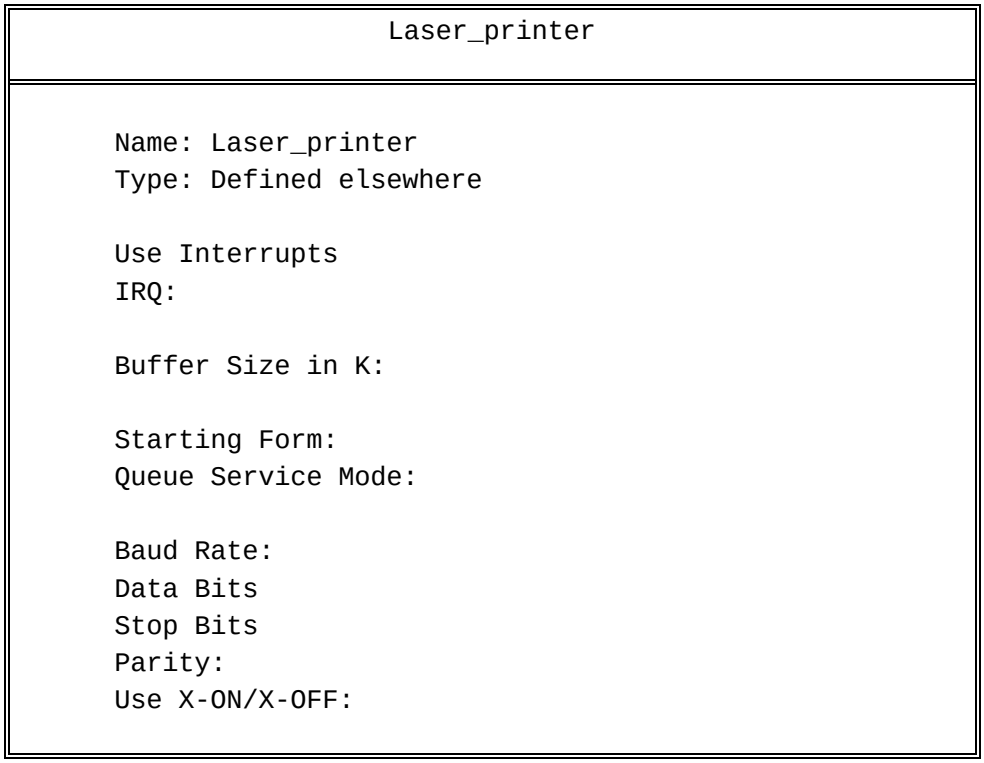
Use the arrow keys to select (highlight) the "Print Server Configuration" option (shown in highlights above) and press the RETURN or ENTER key. The PCONSOLE program will display the Print Server Configuration Menu.



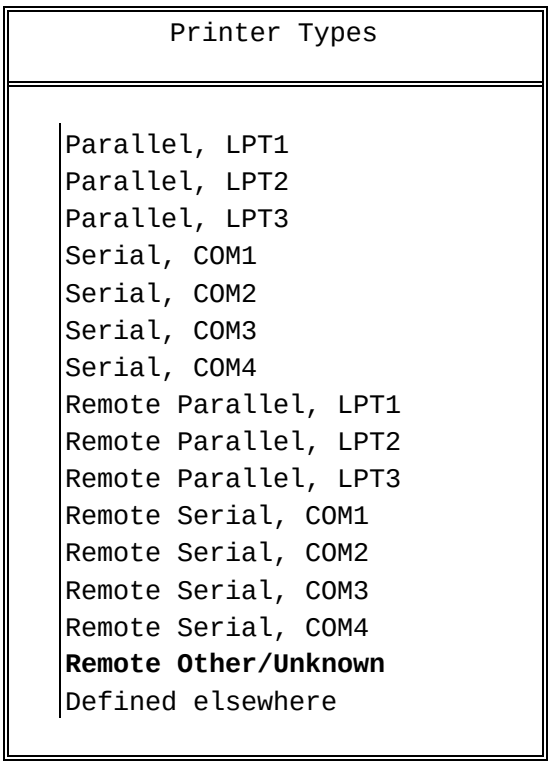
Use the arrow keys to select (highlight) the "Printer Configuration" option (shown in highlights above) and press the RETURN or ENTER key. The PCONSOLE program will display the Configured Printers window. For this example, assume that you wish to change a printer named Laser_printer

Configured Printers	
Laser_printer	**0**
Line_printer	1
Not Installed	2
Not Installed	3
Not Installed	4
Not Installed	5
Not Installed	6
Not Installed	7
Not Installed	8
Not Installed	9
Not Installed	10
Not Installed	11
Not Installed	12
Not Installed	13
Not Installed	14
Not Installed	15

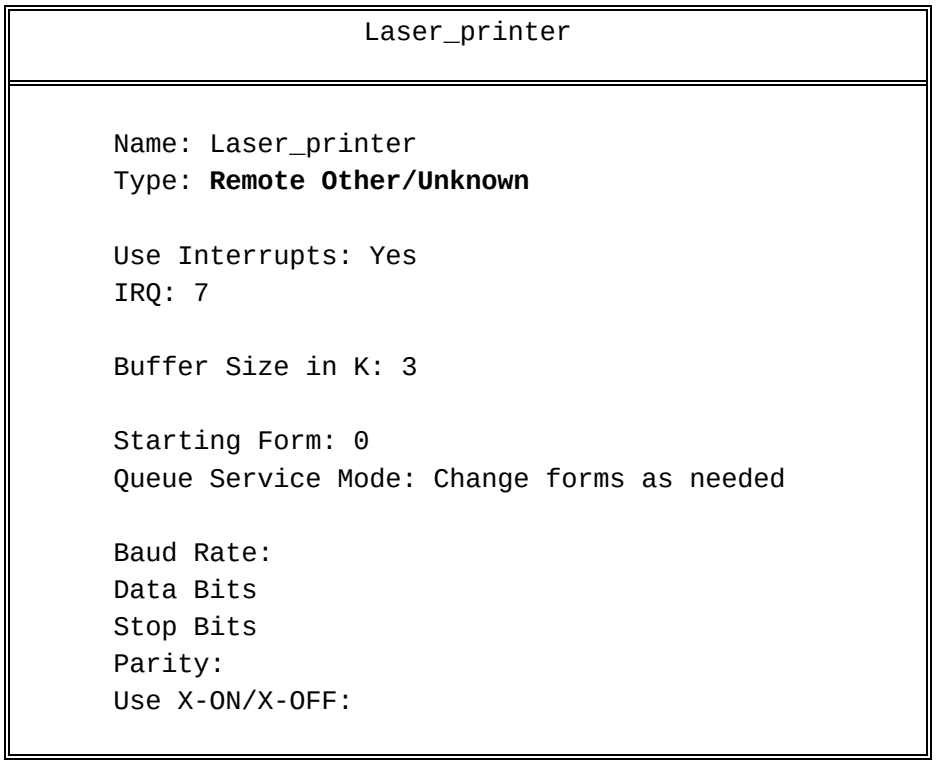
You can use the arrow keys and press the RETURN or ENTER key to select the existing printer. The PCONSOLE program will display the following window:



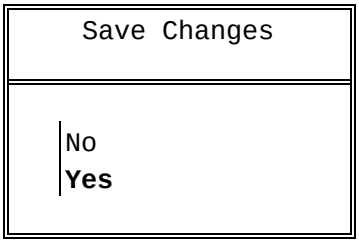
The cursor will automatically be positioned on the "Type" field of this window, press the RETURN or ENTER key to view the Printer Types window.



This window shows a list of the possible printer types available. Using the arrow keys, position to the "Remote Other/Unknown" selection for printer type (shown in highlights above) and press the RETURN or ENTER key. The PCONSOLE program will return you to the previous window. Note that the Type field and the next five fields have been altered. The window now appears as follows:



Press the ESCAPE key to complete this portion of the configuration. You will be asked if you wish to save the configuration changes with the following window.



Use the arrow keys to select the "Yes" option (shown highlighted) and press the RETURN or ENTER key. Press the ESCAPE key a few times, until you return to the Available Options window. You can exit from the program or go on to configure other printers or queues if you wish. Refer to the Novell NetWare *Printer Server* guide for information about other configuration activities.

3. Load the print server software.

Proceed to the Netware server and bring up the system utility if it is not running. If the utility is running, press the ALT and ESCAPE keys simultaneously until you see the System Console display. The command prompt for this display is the colon character (:). At the command prompt, type the following Netware command:

`LOAD PSERVER` *`printer-server-name`*

where *printer-server-name* represents the printer server you changed in this procedure. You are now finished with the procedure.

Setting Up VMS/Ultrix Printers

This section includes the following sections which describe how to set up shared printers on VAX/VMS hosts and Ultrix hosts:

- Setting Up a VMS Printer Service
- Setting Up an ULTRIX Printer Service

Setting Up a VMS Printer Service

For detailed information on setting up queues directed to services offered on the server, refer to the *LATplus/VMS Service Node Management Guide* or the *Guide to Maintaining a VMS System*, depending on the release of VMS software. The basic steps are as follows:

a. Start the LAT Control Program.

```
$ RUN SYS$SYSTEM:LATCP
```

LATCP will display the LCP> prompt.

b. Create a LAT application port.

```
LCP>CREATE PORT LTAnnn: /LOG
```

where LTA*nnn*: represents a device (*nnn* is a decimal number). If desired, you can use the /NOLOG qualifier.

c. Map the applications ports to specific ports on the server.

```
LCP>SET PORT LTAnnn: /APPLICATION /NODE=node-name -
      /SERVICE=service-name /PORT=port-name
```

where *node-name*, *service-name*, and *port-name* are on the server. You must include the *node-name* and either the *service-name* or the *port-name*.

d. Exit from LATCP.

```
LCP>EXIT
```

e. Set up the local characteristics for the application port. For example, for a remote printer, the format of the command would be similar to the following:

```
$ SET TERMINAL LTAnnn: /PERMANENT /DEVICE=device-type -
   /WIDTH=width /PAGE=page-size /LOWERCASE /NOBROADCAST
```

(*device-type* (for example, LA36, LQP02, LN03, etc), *width*, and *page-size* are standard VMS device characteristics).

f. Set the protection on the devices so that only system users (for example, the LAT symbiont) have access to them.

```
$ SET PROTECTION=(S:RWLP,O,G,W) /DEVICE LTAnnn:
```

g. Set up the devices to be spooled devices:

```
$ SET DEVICE LTAnnn: /SPOOLED=(VAX-queuename,
SYS$SYSDEVICE:)
```

where *VAX-queuename* represents the name of the VMS queue to which print jobs are submitted.

h. Optionally, you can define a form to use with remote printers.

```
$ DEFINE /FORM form form_number /WIDTH=width
/STOCK=DEFAULT /TRUNCATE
```

where *form* is a name users will specify in print commands, and *form_number* is an unused form number.

i. Make sure the VMS Queue Manager is started. Initialize the remote printer queue.

```
$ INITIALIZE /QUEUE /START /PROCESSOR=LATSYM /RETAIN=ERROR-
      /ON=LTAnnn: /DEFAULT=(NOBURST, FLAG=ONE, NOTRAILER) -
      /RECORD_BLOCKING VAX-queuename
```

Alternatively, you can place all of these commands into a command procedure file or the SYSTARTUP.COM file. Figure 8 shows an example VMS command file that sets up a printer queue directed to a port on the server.

```
$ RUN SYS$SYSTEM:LATCP
CREATE PORT LTAnnn: /LOG
SET PORT LTAnnn: /APPLICATION /NODE=node-name /SERVICE=service-name
/PORT=port-name
EXIT
$
$ SET TERMINAL LTAnnn: /PERMANENT /DEVICE=device-type /WIDTH=width
/PAGE=page-size -
            /LOWERCASE /NOBROADCAST
$ SET PROTECTION=(S:RWLP,O,G,W:RWLP) /DEVICE LTAnnn:
$ SET DEVICE LTAnnn: /SPOOLED=(VAX_queuename, SYS$SYSDEVICE:)
$ DEFINE /FORM form form_number /WIDTH=width /STOCK=DEFAULT /TRUNCATE
$ INITIALIZE /QUEUE /START /PROCESSOR=LATSYM /RETAIN=ERROR /ON=LTAnnn: -
/DEFAULT=(NOBURST, FLAG=ONE, NOTRAILER) /RECORD_BLOCKING VAX_queuename
```

Figure 8. Example VMS Print Queue Command File

Setting Up an Ultrix Printer Service

For Ultrix hosts, you use the Ultrix routines such as the LAT Control Program (lcp) and LAT pseudoterminal interface (lta). Users can then access the service with normal lpr commands. Further activity between the host and the service offered at the server port is governed by the connection queue, as described in the next section.

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