

Printing in a Network Station Environment



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Network Station is a convenient access client for your mission-critical application environment. It is essential that printing—both locally and remotely—be part of the overall consideration in your solution deployment. This article covers all aspects of printing technology in a Network Station business environment.

IBM Network Station™ provides total support for both locally attached or network-attached printers. Network Station printing can complement your RS/6000™ printing environment and can interoperate as a client to your RS/6000 print server or vice versa. When you are accessing an application on the server, client-side printing completes the total user experience in a production environment.

Local printers can have a serial or parallel interface attached directly to a Network Station. Remote printers can be attached directly to the network with an interface card, to another Network Station, or to a serving host system. The system administrator can use Network Station Manager software to centrally define and manage the capability of each printer attached to a Network Station. Network Station Manager Release 3 provides the following:

- ◆ Supports network printing through full implementation of Line Printer Requester (LPR)/Line Printer Daemon

(LPD) RFC1179 protocol for locally submitted print jobs to be sent to remote print servers as well as receiving print jobs from the remote client

- ◆ Supports a set of consistent dialog boxes for accessing printing resources with enhanced local applications, such as NC Navigator™ Browser, eSuite WorkPlace™, and terminal emulators
- ◆ Enables locally executed Java™ applications to have a full printing environment using the printing capability of Java Virtual Machine (JVM) 1.1.4
- ◆ Allows Double-Byte Character Set (DBCS) printing for both 3270 and 5250 application environments
- ◆ Supports both serial and parallel printer connections
- ◆ Supports both PostScript® and Printer Control Language (PCL) printer data stream

In general, printing technology is specific to platforms, operating systems, and applications. This fact, combined with the many different types and features of printers available today, results in complexity and difficulty in setup, migration, and support. Figure 1 shows the printing capability in a Network Station environment with heterogeneous systems.

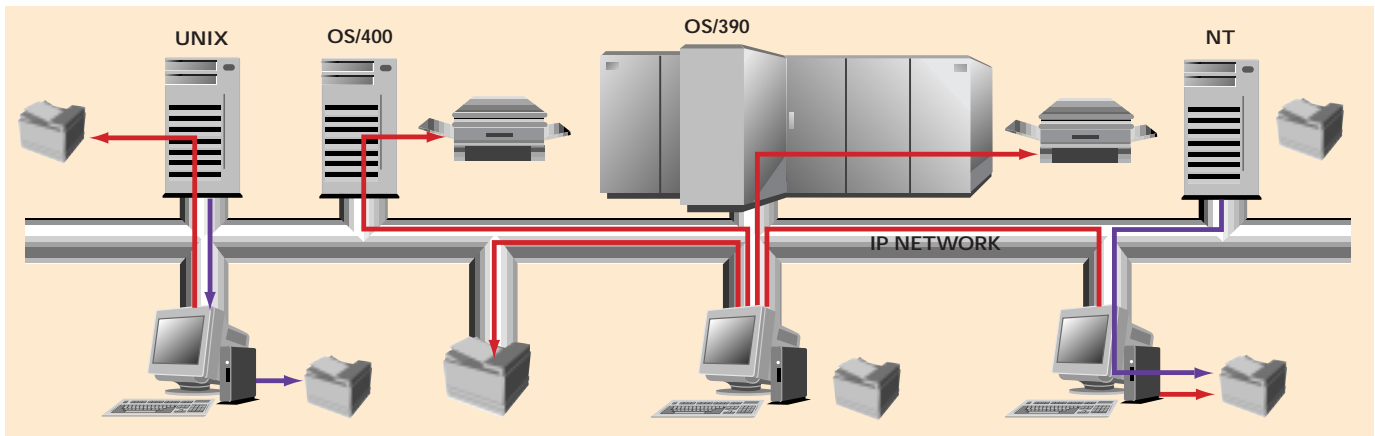


Figure 1. Typical business environment with printing support

Overview of the Print Subsystem

Network Station Release 3 technology focuses primarily on the printing function. It is structured and represents a service layer for all inbound and outbound print requests. Its major components include:

- ◆ Line Printer Requester Daemon (LPRD): A socket-based daemon that transmits outbound print jobs to remote print servers and routes data from the Print Service Module using LPR/LPD protocol
- ◆ Line Printer Daemon (LPD): A daemon for handling inbound print jobs and data routing to the Print Service Module
- ◆ Print Service Module: The core of print processing and routing, which handles all inbound and outbound print streams
- ◆ Serial Print Daemon (SERIALD): Socket-based daemon that supports data transmission from a client application, such as the Print Service Module, to a parallel or serial printer based on the socket port used
- ◆ Printer Selector: Provides the selection of preconfigured printers
- ◆ DBCS Converter: Converts internal character code to DBCS graphics

Figure 2 shows a high-level view of the overall inbound and outbound data flow of a print job stream. On the left side, the Network Station generates print requests to the external system-attached printer or network printers. The Printer Selector panel shows the choice of printers. The LPRD can support both streaming and non-streaming protocol. The protocol used is determined in real time by negotiating servers during session initialization.

Streaming protocol is more efficient and uses less memory because print data is sent in real time as it is generated. Only the RS/6000 with AIX® 4.3 and OS/400® support this mode.

The right side of the figure illustrates how print job streams originating from an application host are targeted to a Network Station-attached printer. The LPD daemon routes the incoming print data to the SERIALD daemon to print locally. The Network Station can handle concurrent local and remote printing.

The center of the figure shows a local application initiating a print request using the Print Service Module to send print data to a local or remote printer. The application prompts the user with a uniform Print Selector panel, which lists the preconfigured printers determined by the system administrator using the Network Station Manager.

After the user chooses the printer, the application uses the Print Service Module to send data either to SERIALD module for local printing or to the LPRD for remote printing. If the attached printer is

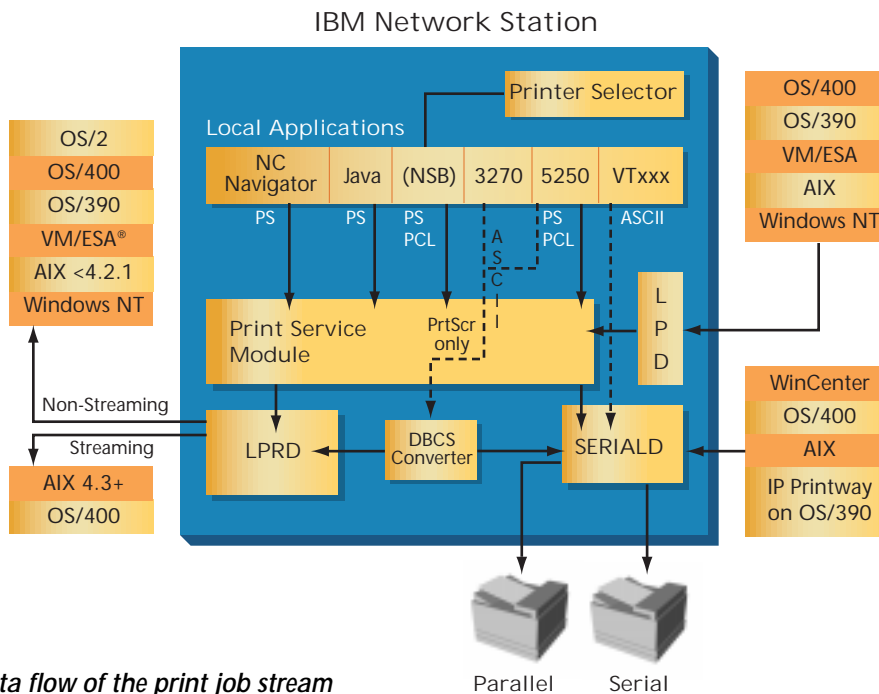


Figure 2. Data flow of the print job stream

disconnected or does not have the power on, an error dialog shows possible corrective action. Figure 3 illustrates this dataflow.

When a remote application host sends a print job to the Network Station, it uses the

LPR/LPD protocol to communicate to the LPD running on the Network Station. The LPD sends the incoming print data to the SERIALD daemon in the Print Service Module. If the local printer is not powered on, an error dialog displays for corrective action. Figure 4 summarizes the dataflow.

Printer Selector

The Printer Selector dialog box is used for locally initiated printing. When the end user generates a print request, a Printer

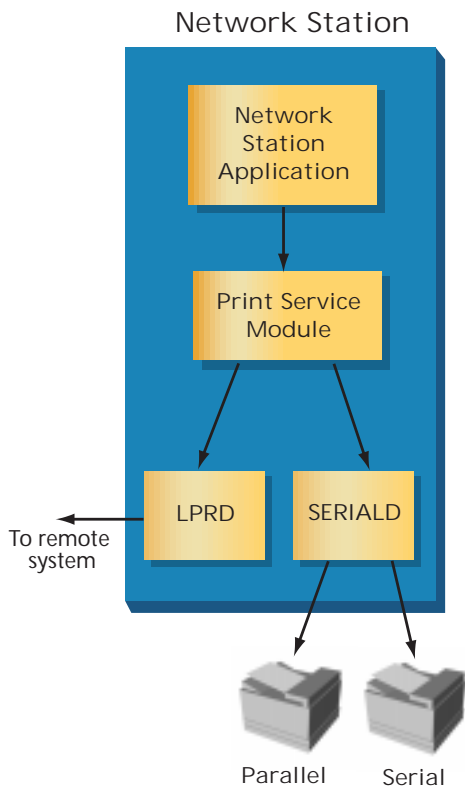


Figure 3. Dataflow to the Print Service Module

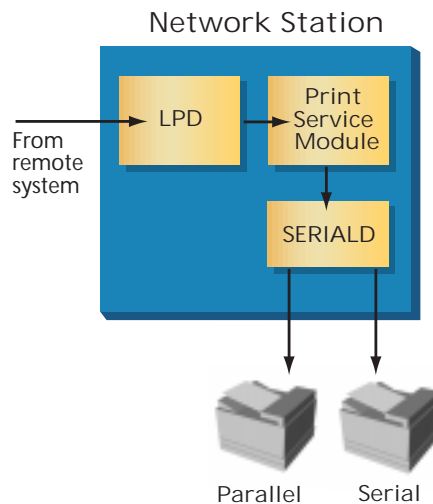


Figure 4. Dataflow to the Network Station

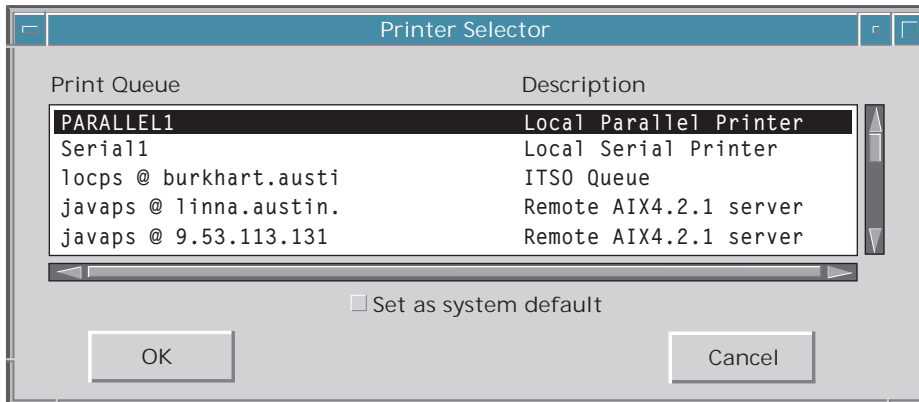


Figure 5. Dialog for printer selection

Selector dialog with a list of printers (local and remote) is displayed, as shown in Figure 5. A check box option allows users to designate a default printer. Once a default printer is set, all applications running under the same login context use this printer as the default, unless the dialog is used to reset it.

Printing Support for Applications

All Network Station applications support both local and remote printing capabilities. While all of these applications use the same Printer Selector dialog to choose printers, they use different first-level dialogs, depending on the application environment. This printer interface is provided for the following applications: 5250/3270 emulator, NC Navigator browser, and various Java applications.

Printing from the 5250 or 3270 emulator. Screen Print is triggered via the Print Screen option of the pull-down menu or using the

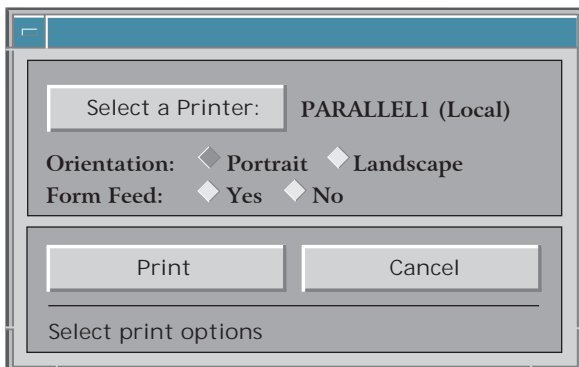


Figure 6. Select a Printer option

“Print Screen” key. The emulator, which supports both single and double character sets, can generate ASCII, PCL, or PostScript print streams based on the type of printer attached. The first-level print dialog for the 3270 applications is shown in Figure 6. The Select a Printer button triggers the Printer Selector dialog.

Another major 3270 print architecture is host-directed printing, represented by TN3270e architecture. This function is currently not supported, but it is being planned for the future. This type of printing allows the S/390® host to send Systems Network Architecture (SNA) LU1 and LU3 print streams directly to a printer attached to the Network Station.

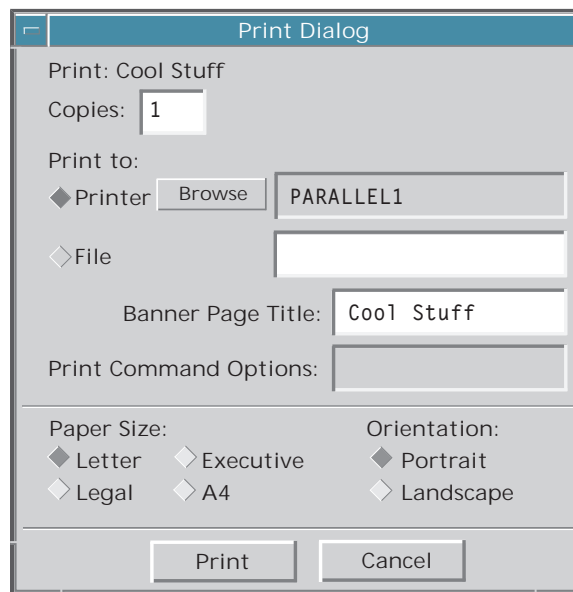


Figure 7. The Browse button

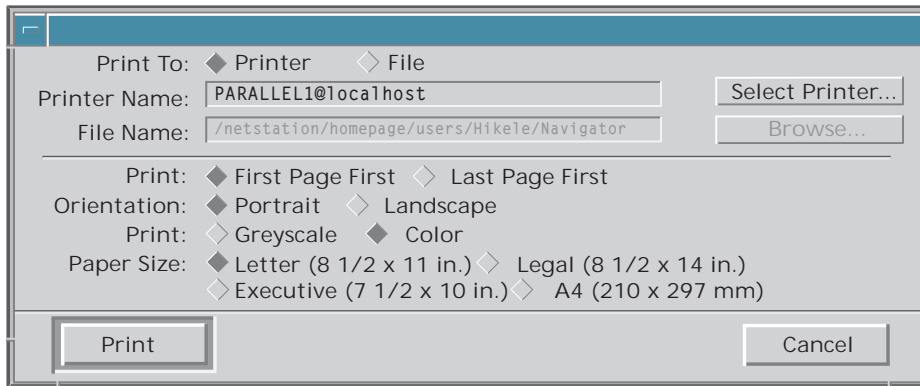


Figure 8. NC Navigator browser printing

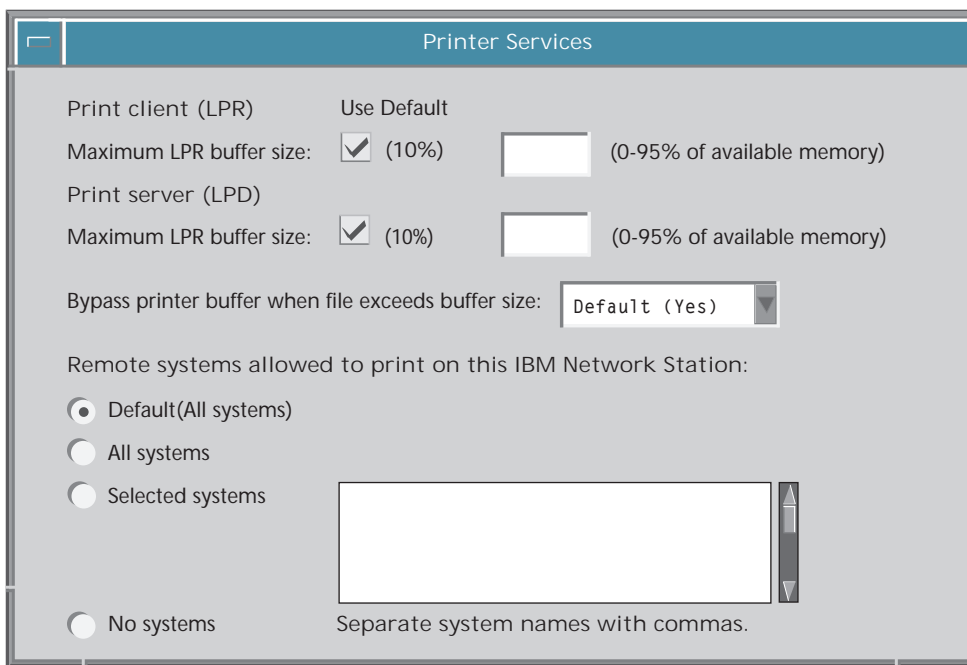


Figure 9. Caching limits for LPRD and LPD

Printing from Java applications. The Java 1.1.4 environment supports printing in PostScript format. Printing from Java applets, such as office productivity applets on the eSuite desktop, pops up the first-level print dialog (see Figure 7). Clicking the Browse button displays the Printer Selector dialog. Other print formats and orientation are available for selection.

Printing from the NC Navigator browser. The browser displays the first-level print dialog when the user selects Print from the pull-down menu File option (shown in Figure 8). This example shows a PostScript-

only print stream. In this dialog, the Select Printer button brings up the Printer Selector dialog for further selection.

Network Station Manager Printer Configuration

Network Station Manager controls all resources within the Network Station domain. Using the Network Station Manager, the desktop administrator manages and updates all end-user environments. The desktop administrator also manages access to the printer table, remote host access, and LPD/LPR caching limits for the LPRD and LPD for each user (see Figure 9).

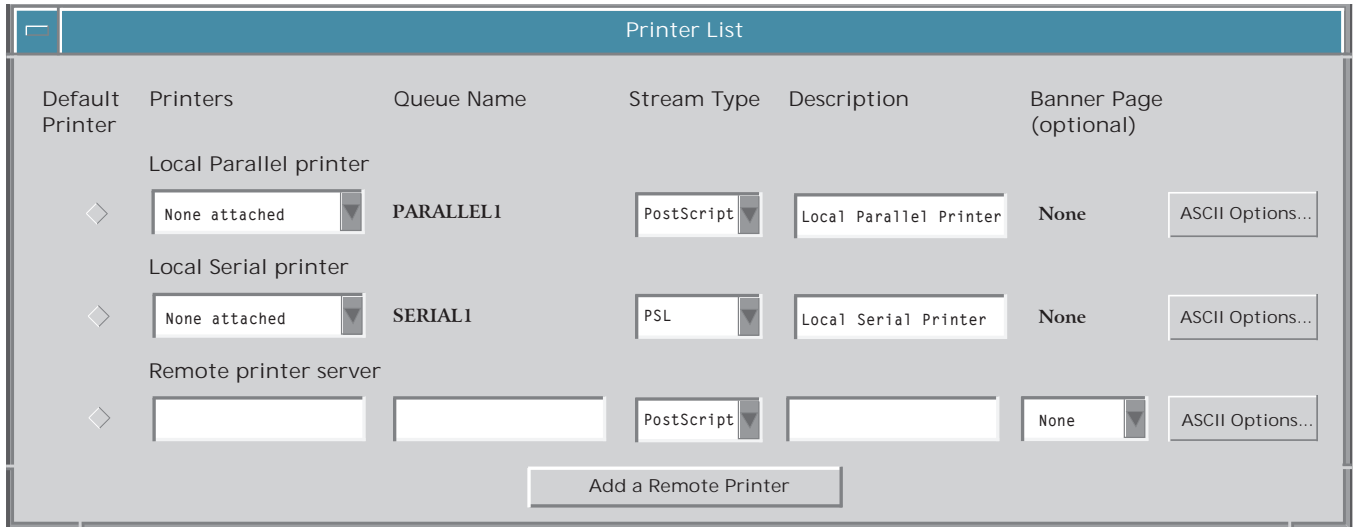


Figure 10. Printer list

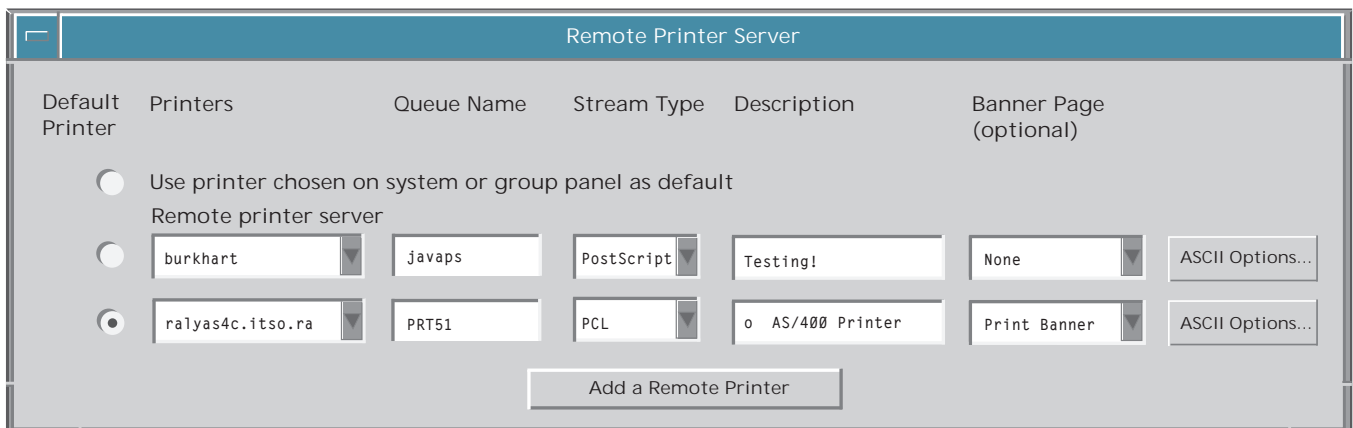


Figure 11. Remote printer server

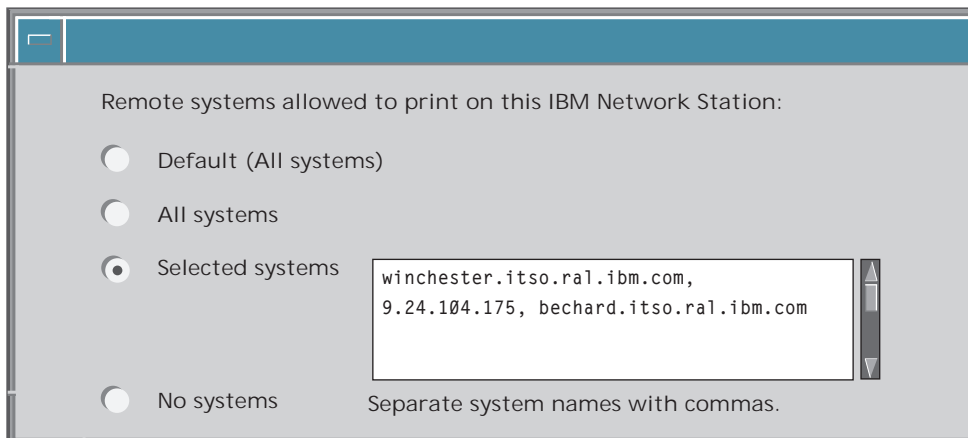


Figure 12. Print access to remote hosts

The Network Station Manager supports the printer list dialog, which contains entries for the available print queue—both local and remote. Two standard default print queues are PARALLEL1 and SERIAL1 for locally attached parallel and serial printers. It is possible to enable the local print queue and change characteristics as necessary. Figure 10 shows the printer list dialog.

The remote printer server dialog (see Figure 11) is used to make the Network Station aware of available remote printer queues. Simply complete the required fields and select the Add a Remote Printer button.

Network Station Manager also allows an administrator to control access to the local printer by remote hosts. Access may be granted or denied on a per-host or all-hosts basis (see Figure 12).

Finally, Network Station Manager is used to control cache/buffer sizes used by the LPRD and LPD daemons. In the Printer Services dialog (Figure 9), these values may be entered as a percentage of system memory. A minimum of 5 KB per daemon is recommended.

Conclusion

Network Station Release 3 provides full print capability, including locally generated print jobs or inbound print jobs from remote systems. This positions Network Station as a print-enabled network device

and provides a total solution in a business environment.



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