

VERSION 1.01

Peer-to-Peer Printing
in
Windows 95 and NT
with
AXIS Print Monitor

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1. Introduction

Peer-to-peer printing, or file server independent printing, is not a new invention. For some reasons it is not natively built in and supported in operating systems such as Windows and NetWare, both using the method to print through print queues on the file server or a PC with spooling capacities. However, there is a trend to invoke peer-to-peer printing due to increasing interest from the customers. Novell is e.g. including peer-to-peer printing in the new Novell Distributed Print Services (NDPS).

There are certain situations where the printing situation can be much easier for all involved by using peer-to-peer printing. Especially in small companies working in workgroups and the administration of the whole computer network is not a responsibility of a special department. By providing an easy method for setting up a direct link between the user and the printer there is no need for a special system administrator doing the job. It gives the user greater control over their printing and it also eliminates the need to set up print queues and printer objects and link them together.

Troubleshooting and handling the printing errors such as out-of-paper to off-line are easier due to that these messages are directly reported to the user and proper actions can be taken immediately. Because it simplifies the printing process for users, the number of printer-related calls to helpdesks could decrease dramatically.

Also in larger companies there are apparent advantages. If the LAN is divided into segments the printing can be carried out locally in that specific segment. It will reduce the network load between segments by sending the print job directly to the printer instead of first being spooled on a server.

Another direct application is when a company is working with several local branch offices without a file server, each with a local printer. The common connection between the branch offices and the main office is a ISDN link over the normal PSTN. In this scenario, the print job travels from the user over the remote connection to the server only to be spooled and then transferred back again over the remote connection to be printed. With peer-to-peer printing the traffic over the PSTN and the extra load on the file server to spool the jobs is saved.

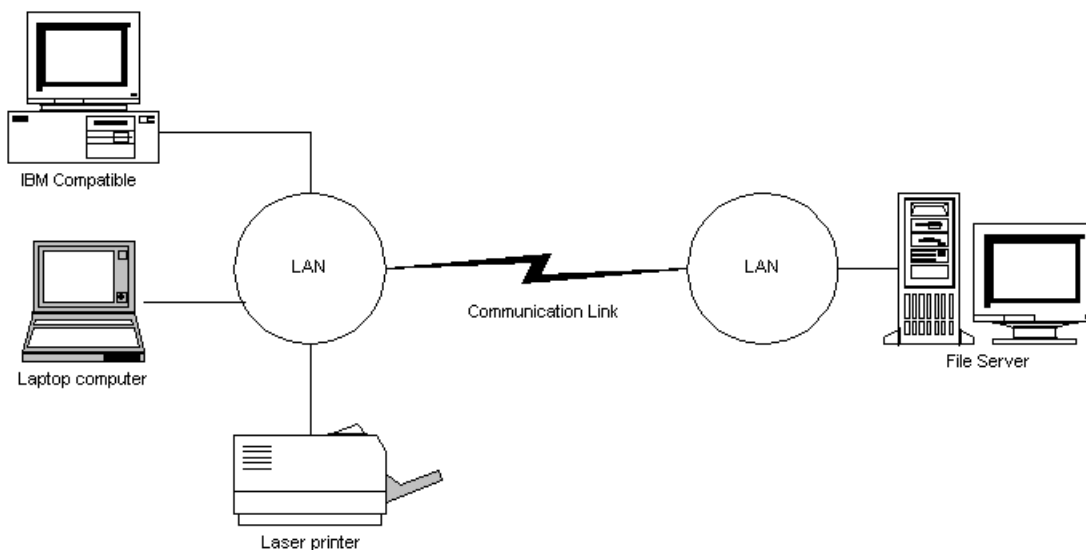


Figure 1. Printing from a client located in a branch office over a file server at the main office creates unnecessary traffic over the remote lines.

In figure 1 there is also a laptop attached to the network. For many employees with a job that incorporates a lot of traveling between several offices peer-to-peer printing is very advantageous. In order to print, the system administrator does not need to be involved to set up access rights to a printer and in case of a Windows network, no IP address has to be assigned. Just plug in the computer locate the nearest printer and connect to it.

So generally spoken, peer-to-peer printing will minimize network load by concentrating the communication over the network to departments or workgroup segments. It will also locate the administration of the printing issue nearer to the user.

To be fair it is wise to say something about the drawbacks as well. As a result from the decentralized approach there will be no centralized control of printing volume (accounting) etc. This can with some "customized programming" be handled. Let's talk about this more in detail later in section How to control the printing.

2. Axis Peer-to-Peer Solution in Windows

Axis provides a peer-to-peer solution in Windows for Workgroups through the "AXIS Print Utility for Windows" software and through the AXIS Print Monitor for Windows 95 and NT.

The AXIS Print Monitor is a Windows component software which runs as an integrated part of the operating system. It uses the standard Windows spooler and handles the communication with Axis print servers over the network.

To perform peer-to-peer printing the AXIS Print Monitor needs to be installed on each workstation. Once installed, the AXIS Print Monitor then allows access to all printers networked by an Axis print server, just as if they were connected directly to the workstation.

The AXIS Print Monitor is using the NetBIOS/NetBEUI protocol, which is the default network protocol in Windows. The NetBIOS/NetBEUI protocol is suitable for small companies or workgroups due to that it is non-routable protocol which means that data will not propagate through routers to other network segments.

A summary of the advantages with AXIS Print Monitor is:

- Peer-to-peer (file server independent) printing in Windows 95 and NT means direct control over the printer and high printing speed.
- User installable - ideal for small and remote networks
- Runs on a server as well, providing client-server installation
- Integrates with Windows printing services- runs as an integrated part of the operating system
- Uses the standard Windows printer object for printer status and job management (pause and purge print jobs).
- Easy installation with the standard Add Printer Wizard.
- Supports DOS printing in both Windows 95 and NT
- Provides more detailed printer status than using LPD in Windows NT
- Fast printing

2.1 How to Install the AXIS Port Monitor

The AXIS Print Monitor is easily installed from the Axis installation diskette or downloaded from Axis web site. It allows Axis print servers to be connected in the same simple fashion as a local printer port. Once installed, it is automatically initialized upon system startup. Please note that Microsoft Network (NetBIOS/NetBEUI) must be running.

Below is a list of the few steps involved for installation. Although the AXIS Print Monitor user dialog will vary slightly dependent upon which platform used, Windows 95 or Windows NT, the functionality of the two variants is exactly the same.

1. Start the Add Printer Wizard by selecting *Settings - Printers* from the Start Menu and double-click on the Add Printer icon.
2. After clicking Next> in the first dialog the Wizard then asks you to select between Local Printer/My Computer (Windows 95/ NT) and Network Printer. Select Local Printer/My Computer.
3. Choose an appropriate print driver for your printer from the manufacturer and model lists displayed. Click Next>.

4. Select an AXIS Printer Ports from Available Ports list. The ports appear as <name>.LP1, <name>.LP2, and <name>.CM1, where <name> is AX followed by last six digits of the Axis print server serial number, e.g. AX560B35.

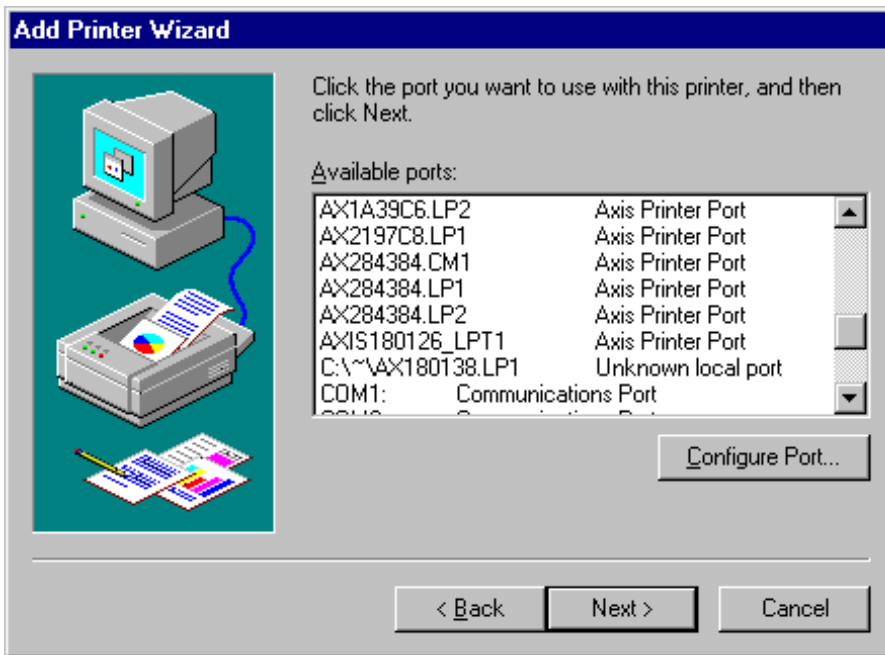


Figure 2. Axis printer ports appear as available ports in the Add Printer Wizard

Click the Configure Port button. Note that for NT platforms, it is necessary to select Add Port to install the desired port, if it is not displayed on the original list.

5. Choose when Status Pop-up messages are to be displayed from the Configure AXIS Printer Ports dialog.

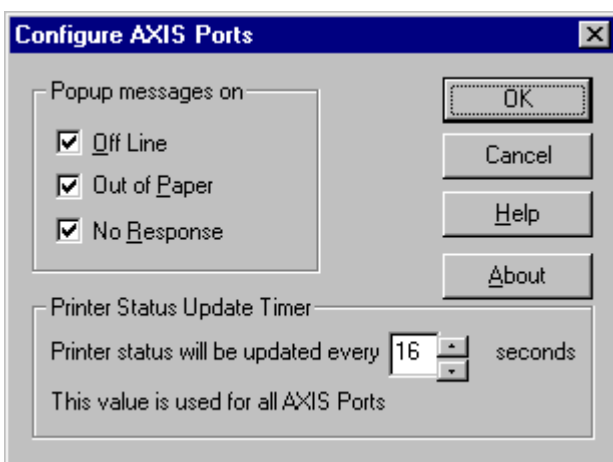


Figure 3. Settings for the selected Axis printer port

A Help facility is available should you require any additional information. Check the appropriate boxes and then click Next>.

6. Enter an appropriate name for your printer and click Next>

7. Choose whether you wish to produce a Test Page and then click Finish.

Now the installation is complete and the system is set up to print.

2.2 About the Printer Status

All status information is integrated in the standard Windows printer dialogues requiring no extra tools and visible applications. Figure 4 and 5 show spooled print jobs and in the head of the window also the status of the ongoing print job is displayed.

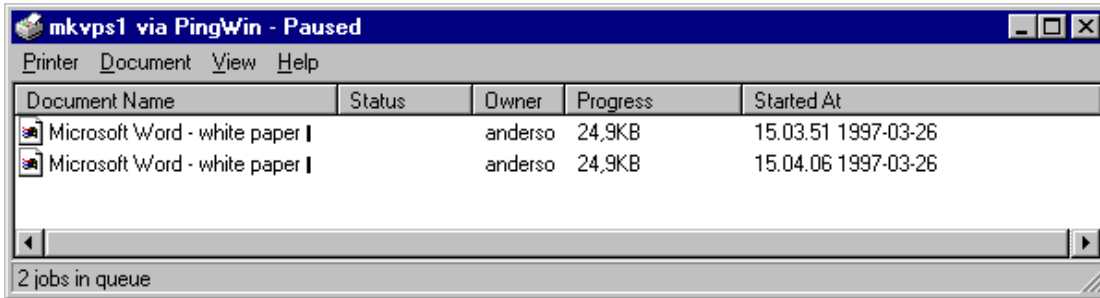


Figure 4. Paused printing with two pending jobs in the queue.

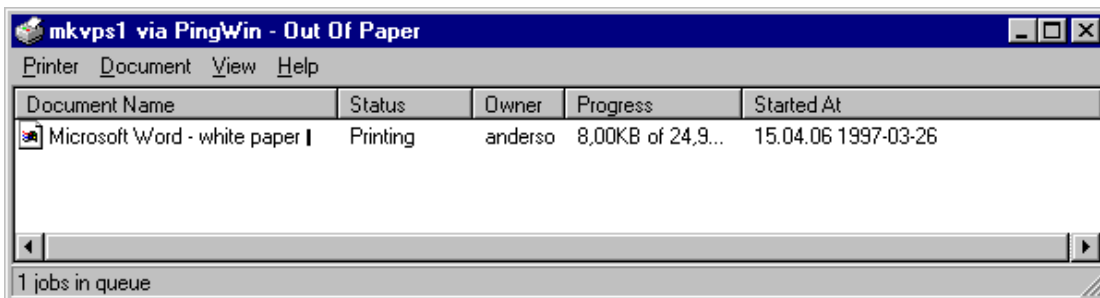


Figure 5. Out of paper is presented on the top of the printer dialogue.

Management of print jobs is done in a standard Windows way i.e. Purge and Pause printing is supported. Just use the Printer drop down menu.

Pop-up menus can be enabled to notify the user directly if printer problems occur (Figure 6).

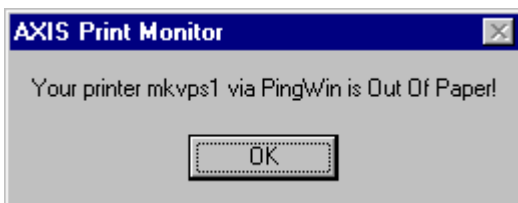


Figure 6. Pop-up message when out of paper.

2.3 How to control the printing

The central point to register the amount of printout is of course the via the print queues on the file server. Using peer-to-peer printing the central point for account functionality is the print server itself. Axis print servers provide an account function that registers the last 10 printed jobs together with information about the user that issued the job and the size of it. Figure 7 shows the account function in an AXIS 560 print server with Web management support viewed from a Netscape browser.

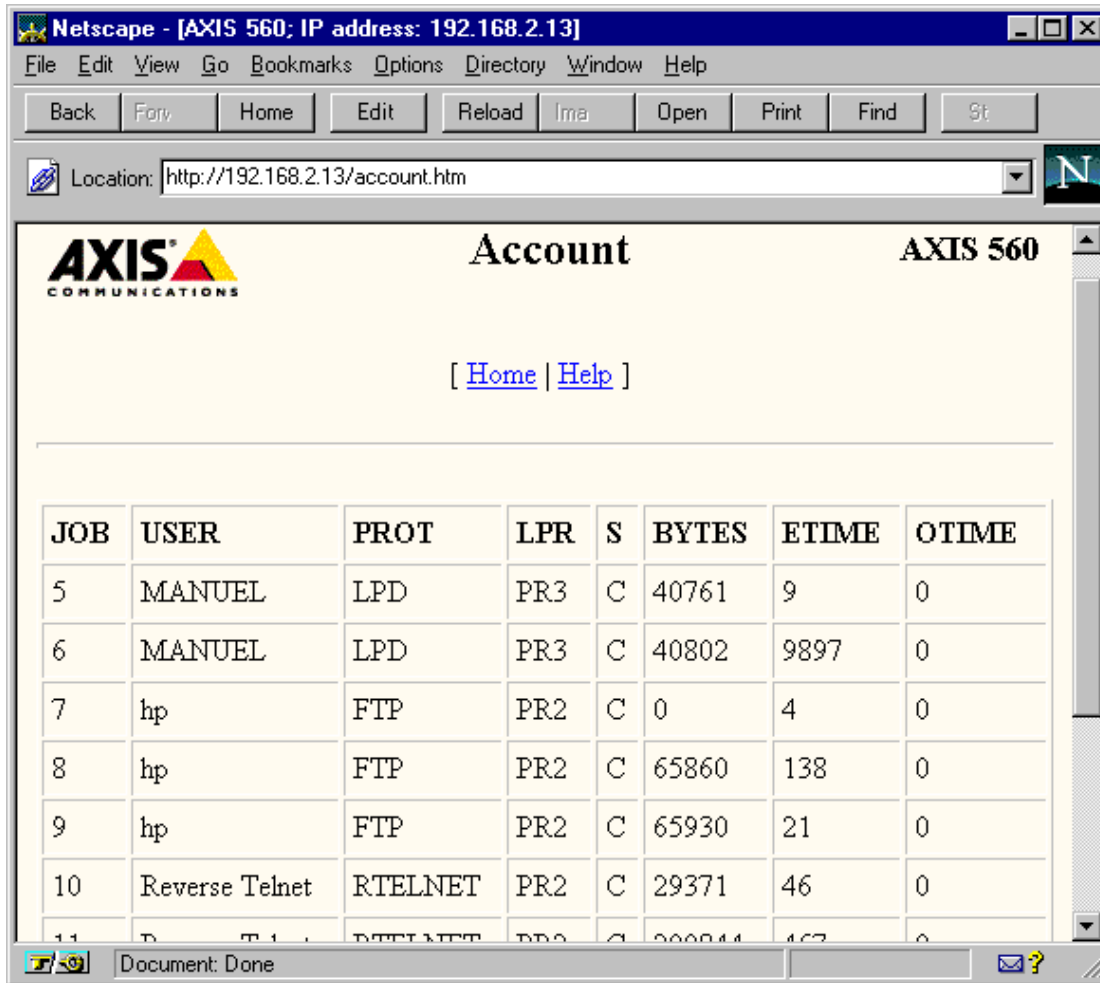


Figure 7. Account function in an AXIS 560 print server

In TCP/IP networks this information can be fetched from the print server by using the File Transfer Protocol (FTP) to transfer the information to a log file on a file server handling the account. FTP is available in both Windows 95 and NT but requires that the TCP/IP protocol to be enabled.

2.4 DOS Printing

The AXIS Print Monitor may be used for DOS printing when installed on Windows NT platforms. However, in Windows 95 this is only possible from a client workstation, in a client-server configuration (see section 2.5). The AXIS Print Utility for Windows which normally is used for peer-to-peer printing in Windows for Workgroups, could however be used if DOS peer-to-peer printing is necessary from a Windows 95 platform.

Only a few steps are necessary to enable printing from MS-DOS Command Window with the AXIS Print Monitor:

1. Create a printer using the AXIS Port you want to print through.
2. Share the printer
3. In a MS-DOS Command Window on a client:
type: net use lptx: \\computer\printer

where x = 1-9
computer = name of the computer sharing the resource
printer = the share name of the printer

2.5 Client-Server Printing

In addition to peer-to-peer printing both the AXIS Print Monitor and the AXIS Print Utility for Windows can be installed centrally on a server. By sharing the installed print server ports on the server, it is possible for clients to attach to the ports and print through the server as well.

In a Windows NT 4.0 with connected NT workstations the distribution of error messages works perfectly even in a client-server installation. If using Windows 95 clients this will however not work due to limitations in the Windows 95 operating system.

Pop-up messages are only issued on the server and must be acknowledged before a print job can be released.

3. Future Possibilities

3.1 More Printer Status

Improvements for Axis peer-to-peer solution are to provide more status information for the user about the printer and what the problem is if printing stops. Axis is working closely with different printer manufacturers to obtain extended status from the printer. Following messages are today available in Windows 95 and NT 4 and could be considered for use.

BUSY	OFFLINE	PENDING DELETION
DOOR OPEN	OUT OF MEMORY	PRINTING
ERROR	OUTPUT BIN FULL	PROCESSING
INITIALIZING	PAGE PUNT	TONER LOW
IO ACTIVE	PAPER JAM	UNAVAILABLE
MANUAL FEED	PAPER OUT	USER INTERVENTION
NO TONER	PAPER PROBLEM	STATUS WAITING
NOT AVAILABLE	PAUSED	WARMING UP

Table 1. Available status messages supported in Windows 95 and NT.

The printer status will probably be integrated in the Windows printer dialogues in the same manner as today.

3.2 Automatic Assignment of Printer Drivers

As the communication between the print server and the printer is enlarged, possibilities will open-up to provide automatic printer recognition and as a result automatic assignment of printer drivers. The Microsoft Windows plug-and-play features which today only are available for locally attached devices will then be offered for networked printers attached by Axis external print servers as well.

3.3 Internet Printing

Extending the AXIS Print Monitor with "multi-protocol" functionality enabling printing not only via NetBIOS/NetBEUI but also over TCP/IP is a natural improvement. In Windows 95 this is a great improvement because there is no native support for printing over TCP/IP. Today users must use a third party solution adding the functionality of an "LPR spooler".

There are a lot of companies standardizing their Windows NT network to use TCP/IP only, and in addition to the normal LPD printing they want to have more printer status.

An AXIS Print Monitor using TCP/IP could also in the future provide a method of printing over the Internet to a remote print server with an unique Universal Resource Location (URL). This would be enabled by the embedded Web server implementation in found in all Axis print servers today supporting the TCP/IP protocol.