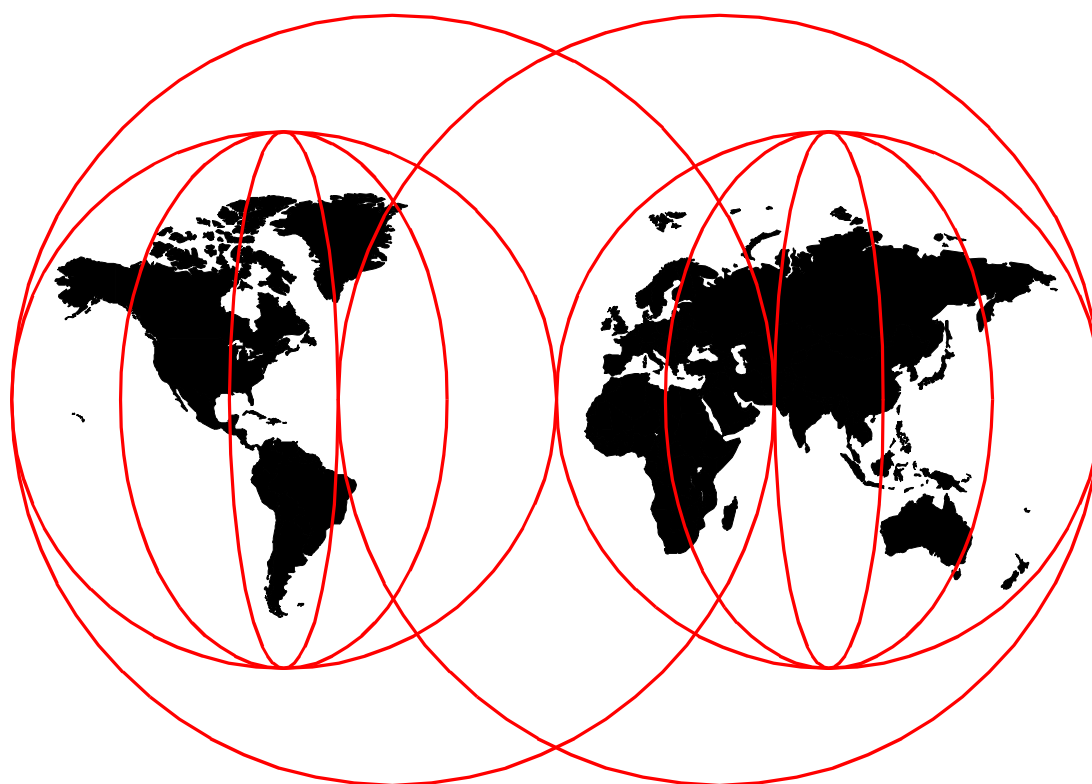


# The AS/400 NetServer Advantage

*Justine Middleton, Tony Barker, Torsten Hartig, Jim Scott*



**International Technical Support Organization**

[www.redbooks.ibm.com](http://www.redbooks.ibm.com)





International Technical Support Organization

SG24-5196-00

## **The AS/400 NetServer Advantage**

December 1999

**Take Note!**

Before using this information and the product it supports, be sure to read the general information in Appendix D, "Special notices" on page 147.

**First Edition (December 1999)**

This edition applies to Version 4 Release 4 of the Operating System/400.

Comments may be addressed to:  
IBM Corporation, International Technical Support Organization  
Dept. JLU Building 107-2  
3605 Highway 52N  
Rochester, Minnesota 55901-7829

When you send information to IBM, you grant IBM a non-exclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

**© Copyright International Business Machines Corporation 1999. All rights reserved.**

Note to U.S Government Users - Documentation related to restricted rights - Use, duplication or disclosure is subject to restrictions set forth in GSA ADP Schedule Contract with IBM Corp.

---

# Contents

<b>Figures</b> .....	vii
<b>Tables</b> .....	ix
<b>Preface</b> .....	xi
The team that wrote this redbook .....	xi
Comments welcome .....	xii
<hr/>	
<b>Part 1. Configuring and using AS/400 NetServer</b> .....	1
<b>Chapter 1. Introduction</b> .....	3
1.1 Application and file serving .....	3
1.2 Benefits of AS/400 NetServer .....	4
1.3 Networking concepts .....	4
1.4 Broadcasts .....	5
1.5 Name resolution .....	6
1.6 AS/400 NetServer versus Client Access for Windows 95/NT .....	7
1.7 AS/400 NetServer positioning .....	8
<b>Chapter 2. Getting started with AS/400 NetServer</b> .....	11
2.1 Configuring AS/400 NetServer .....	12
2.1.1 Starting AS/400 NetServer .....	12
2.1.2 Working with AS/400 NetServer properties .....	14
2.2 Changing the AS/400 NetServer name .....	17
2.3 Configuring your network clients .....	18
2.3.1 Domain Name Service .....	19
2.3.2 Windows Internet Name Service .....	19
2.3.3 LMHOSTS file .....	20
2.4 Configuring the guest user profile .....	20
2.5 Finding AS/400 NetServer on the network .....	21
2.6 Starting AS/400 NetServer at IPL .....	23
2.6.1 Special AS/400 NetServer considerations for V4R2 and V4R3 .....	23
<b>Chapter 3. Using AS/400 NetServer</b> .....	25
3.1 AS/400 NetServer file shares .....	26
3.1.1 File text conversion .....	29
3.2 Mapping network drives .....	31
3.3 AS/400 NetServer print shares .....	34
3.3.1 Authority considerations .....	35
3.4 Installing a network printer .....	36
3.4.1 Using an IBM AFP or SCS printer .....	36
3.5 Using your Windows clients to access print shares .....	39
3.6 PC5250 printer emulation session .....	41
3.7 Using AS/400 NetServer from a DOS window .....	42
3.8 AS/400 NetServer session properties .....	42
3.8.1 Multiple user support .....	44
3.9 Monitoring AS/400 NetServer .....	45
3.9.1 Viewing AS/400 NetServer status .....	45
3.9.2 Displaying server jobs .....	46
3.9.3 Viewing shared object status .....	46
3.9.4 Viewing session status .....	47

3.10	Backup and recovery of configuration and share information . . . . .	48
3.11	AS/400 NetServer administration using AS/400 APIs . . . . .	49
3.12	Exit programs . . . . .	49
<b>Chapter 4. AS/400 NetServer security . . . . .</b>		<b>51</b>
4.1	AS/400 NetServer user profile authority requirements . . . . .	51
4.1.1	Considerations for using the guest user profile . . . . .	51
4.1.2	Understanding user names and passwords . . . . .	52
4.2	Hiding AS/400 NetServer. . . . .	54
4.2.1	Hiding shared resources . . . . .	54
<b>Chapter 5. Troubleshooting AS/400 NetServer . . . . .</b>		<b>55</b>
5.1	Troubleshooting AS/400 NetServer user profile connections . . . . .	55
5.2	Troubleshooting the AS/400 NetServer location on the network. . . . .	56
5.2.1	Creating an LMHOSTS file. . . . .	58
5.2.2	Early versions of Windows 95 and 3.11 . . . . .	59
5.3	File and print share problems . . . . .	60
5.3.1	File shares. . . . .	60
5.3.2	Print shares . . . . .	61
5.3.3	Guest user print problems . . . . .	62
5.4	AS/400 NetServer properties causes an illegal operation error . . . . .	62
5.5	File name case sensitivity . . . . .	63
5.6	File name length considerations . . . . .	63
5.7	Unreadable text when printing . . . . .	64
5.8	Incorrect disk space shown for a file share . . . . .	64

---

<b>Part 2. Migrating to AS/400 NetServer . . . . .</b>	<b>65</b>
Why migration to AS/400 NetServer should be considered . . . . .	65
Benefits of migrating to AS/400 NetServer . . . . .	65
<b>Chapter 6. Migration from Warp Server . . . . .</b>	
6.1	Migration from Warp Server to AS/400 NetServer . . . . .
6.1.1	File migration . . . . .
6.1.2	Printer migration . . . . .
6.1.3	Client migration . . . . .
6.1.4	User migration . . . . .
6.1.5	Cleaning up the AS/400 system . . . . .
6.1.6	Backup considerations. . . . .
6.2	Example scenario: Warp Server to AS/400 NetServer . . . . .
6.2.1	Introduction . . . . .
<b>Chapter 7. Migration from Novell NetWare . . . . .</b>	
7.1	Migration from Novell NetWare to AS/400 NetServer . . . . .
7.1.1	File migration . . . . .
7.1.2	Printer migration . . . . .
7.1.3	Client migration . . . . .
7.1.4	User migration . . . . .
7.1.5	Cleaning up the AS/400 system . . . . .
7.1.6	Backup considerations. . . . .
7.2	Example scenario: Novell NetWare to AS/400 NetServer . . . . .
7.2.1	Introduction . . . . .

<b>Part 3. AS/400 NetServer and Network Stations</b> . . . . .	111
<b>Chapter 8. AS/400 NetServer and Network Stations</b> . . . . .	113
8.1 Benefits of using Network Stations with AS/400 NetServer . . . . .	113
8.2 Getting started . . . . .	113
8.2.1 Prerequisites . . . . .	113
8.2.2 Required skills . . . . .	114
8.3 Windows NT server, Terminal Server Edition . . . . .	114
8.3.1 Applications and Windows NT server, Terminal Server Edition . . . . .	114
8.3.2 Considerations for domain users . . . . .	117
8.3.3 Setting up WINS Server . . . . .	119
8.4 Citrix Metaframe and Network Station Manager . . . . .	120
8.5 Using Network Stations with AS/400 NetServer . . . . .	122
8.5.1 Multiple session support . . . . .	122
8.5.2 File shares with Network Stations . . . . .	123
8.5.3 Print shares with Network Stations . . . . .	124
8.6 Windows NT Terminal Server Edition on external or internal servers . . . . .	125
8.6.1 External servers . . . . .	125
8.6.2 Integrated Netfinity Servers . . . . .	126
8.7 Practical example . . . . .	127
<b>Part 4. Appendixes</b> . . . . .	131
<b>Appendix A. Setting up AS/400 NetServer without Operations Navigator</b>	133
<b>Appendix B. Using applications with AS/400 NetServer</b> . . . . .	135
B.1 Preparation . . . . .	135
B.1.1 Creating file shares . . . . .	135
B.1.2 User directory considerations . . . . .	135
B.2 Installing the applications . . . . .	136
B.2.1 Lotus SmartSuite . . . . .	136
B.2.2 Microsoft Office . . . . .	138
B.3 Using the applications . . . . .	140
B.3.1 Lotus SmartSuite . . . . .	140
B.3.2 Microsoft Office . . . . .	141
B.4 Performance considerations . . . . .	143
<b>Appendix C. Exit program</b> . . . . .	145
<b>Appendix D. Special notices</b> . . . . .	147
<b>Appendix E. Related publications</b> . . . . .	149
E.1 International Technical Support Organization publications . . . . .	149
E.2 Redbooks on CD-ROM . . . . .	149
E.3 Other publications . . . . .	149
E.4 Resources on the Web . . . . .	150
<b>How to get ITSO Redbooks</b> . . . . .	151
IBM Redbook fax order form . . . . .	152
<b>Index</b> . . . . .	153
<b>ITSO Redbook evaluation</b> . . . . .	155





---

## Figures

1. NetBIOS over TCP/IP	6
2. Starting AS/400 NetServer	13
3. AS/400 NetServer general properties	14
4. AS/400 NetServer Advanced Properties	15
5. AS/400 NetServer WINS configuration properties	17
6. Specifying the guest user profile	21
7. Find: Computer with correct AS/400 NetServer domain and description	22
8. AS/400 shared objects	25
9. Create a new file share	26
10. Browsing the integrated file system	27
11. Folder permissions	28
12. File text conversion	29
13. QSTRUP program	30
14. File share	31
15. Notepad view of file member	31
16. Map a network drive	33
17. Copying the test.txt file to the Test folder	34
18. Create a print share	35
19. Available AS/400 NetServer shares	37
20. Installing a printer driver	37
21. Add Printer Wizard	37
22. Add Printer Wizard	38
23. PC5250 printer emulation	41
24. AS/400 NetServer sessions	43
25. AS/400 NetServer session properties	43
26. Multiple session support	44
27. AS/400 NetServer status	45
28. Shared object status	47
29. Session status	48
30. Create User Profile	51
31. Guest user authority	52
32. Enable LMHOSTS	58
33. Creating an LMHOSTS file	59
34. Displaying server jobs	61
35. CRTDIR command	68
36. CPY Object command for a single file	70
37. CPY command method for multiple files	71
38. MOV command for a single object	71
39. MOV command for multiple objects	72
40. Warp Server and AS/400 NetServer shares on one PC (Windows 95)	73
41. Work with Authority (WRKAUT) display	75
42. WRKAUT for the ACCOUNTS.TXT file	75
43. WRKAUT for a copied file using the CPY command	76
44. WRKAUT on a file moved using the MOV command	77
45. Work with Authority	78
46. WRKAUT for Warp Server directory	78
47. WRKAUT after migration from Warp Server to AS/400 NetServer	79
48. Example scenario - Setup	84
49. File migration proposal	85
50. CRTDIR command	90

51. CPY Object command for a single file . . . . .	92
52. CPY command method for multiple files . . . . .	93
53. MOV command for a single object . . . . .	94
54. MOV command for multiple objects . . . . .	94
55. NetWare drives and AS/400 NetServer shares on one PC (Windows 95) . . . .	96
56. Work with Authority (WRKAUT) display . . . . .	97
57. WRKAUT for the ARTHURM.TXT file . . . . .	98
58. WRKAUT for a copied file using the CPY command . . . . .	98
59. WRKAUT on a file moved using the MOV command . . . . .	99
60. Work with Authority . . . . .	100
61. WRKAUT for NetWare directory . . . . .	100
62. WRKAUT after migration from NetWare user directory to AS/400 NetServer	101
63. Example Scenario - Setup . . . . .	106
64. File migration proposal . . . . .	107
65. Installation Mode . . . . .	115
66. Execute Mode . . . . .	115
67. Run Installation Program . . . . .	116
68. Change User Option . . . . .	116
69. After Installation . . . . .	117
70. Finish Admin Install . . . . .	117
71. User Rights Policy . . . . .	118
72. Add Users and Groups . . . . .	118
73. Select Network Service . . . . .	119
74. Network . . . . .	120
75. IBM Network Station Manager . . . . .	121
76. Multiple session support . . . . .	123
77. Operations Navigator - Multiple session support . . . . .	123
78. Directory permissions when using guest profile . . . . .	126
79. Directory permissions without using guest profile . . . . .	127
80. Example company without using AS/400 NetServer . . . . .	128
81. Example company with AS/400 NetServer . . . . .	129
82. Lotus SmartSuite installation . . . . .	136
83. Lotus file server installation . . . . .	137
84. Network Server Confirmation screen . . . . .	138
85. Microsoft Office setup . . . . .	139
86. Setup from Network Server . . . . .	140
87. WordPro file locations . . . . .	141
88. Word default file locations . . . . .	142

---

## Tables

1. Find: Computer results . . . . .	22
2. AS/400 NetServer logon scenarios . . . . .	52
3. NBTSTAT parameters . . . . .	57
4. Multiple user session PTFs . . . . .	122



---

## Preface

Gain the AS/400 NetServer advantage. AS/400 NetServer is an OS/400 function introduced in Version 4 Release 2, which enables Windows clients to connect to AS/400 shared directory paths and shared output queues using TCP/IP. It enables an AS/400 system to provide file and print serving in a Windows network without needing to install additional hardware or software on the AS/400 system. This redbook is designed with the needs of all AS/400 system implementors in mind and offers you various ways to enhance your environment with AS/400 NetServer.

If you are using Client Access Express, you will discover how to give your clients access to AS/400 disk space and printers. If you are using Client Access for Windows 95/NT, after reading this book, you may decide to use AS/400 NetServer support rather than the support provided in Client Access for file and print serving. The reason is that AS/400 NetServer does not require additional software and is part of the OS/400 operating system. If you are currently using IBM Warp Server/400 or Novell NetWare on an Integrated Nefinity Server, you can use the information provided to help you migrate to AS/400 NetServer for file and print serving. If you are interested in using Network Stations with Windows NT server 4.0, Terminal Server Edition, you can enhance your users' environment by taking advantage of AS/400 NetServer.

This book is divided into three parts:

- Part 1 describes how to configure and use AS/400 NetServer shares and printers.
- Part 2 describes considerations for moving file and print serving from an Integrated Netfinity Server using Warp Server/400 or Novell NetWare to AS/400 NetServer. We include some scenarios to help you apply what we describe to your own situation.
- If your installation has Network Stations, you may want to consider file sharing using AS/400 NetServer. In Part 3, you learn how to use AS/400 NetServer, as well as Windows NT server, Terminal Server Edition, to provide file and print sharing for your users.

---

## The team that wrote this redbook

This redbook was produced by a team of specialists from around the world working at the International Technical Support Organization Rochester Center.

**Justine Middleton** is a Senior AS/400 Specialist at the International Technical Support Organization, Rochester Center. She writes extensively and teaches IBM classes worldwide on Domino for AS/400 and Client Access/400. Before joining the ITSO in 1998, Justine worked for IBM Australia as a Senior IT Specialist in the Business Server team. Justine holds an MBA from the University of Western Australia and is a Certified Lotus Professional Notes Principal System Administrator.

**Tony Barker** is a Systems Management IT Specialist in Portsmouth, England. He has been working at IBM for three years. He holds an HNC in Electrical and Electronic Engineering together with an industry approved Engineering Apprenticeship and is an IBM Certified AS/400 Professional System Operator.

His areas of expertise include Client Access, PC connectivity, and the Integrated Netfinity Server-based products Lotus Notes, Novell NetWare, Warp Server/400, and Windows NT Server.

**Torsten Hartig** is a Software Engineer from Hamburg, Germany. He has worked at IBM for four years. Torsten holds a technical information studies degree from a technical college of Flensburg, Germany. His areas of expertise include firewall, Windows NT and Windows NT Server with Terminal Server Edition running on the Integrated Netfinity Server, Client Access, Network Stations, and PC connectivity.

**Jim Scott** is a Software Engineer in User Technologies at IBM Rochester. Jim holds a Bachelor of Arts degree from Memorial University of Newfoundland and has written extensively on AS/400 NetServer, the Integrated Netfinity Server, APPC, APPN, and OptiConnect on the OS/400.

Thanks to the following people for their invaluable contributions to this project:

Aco Vidovic  
ITSO, Rochester Center

Barbara Armbruster  
Barbara Foss  
Thomas Haze  
Bridget Meyer  
Mark Smith  
IBM Programming Laboratory, Rochester

Jose Luis Fuerte  
Jose Marcos Zaragoza Garcia  
Pedro Iniguez Huerta  
Juan Jose Lomeli  
IBM Programming Laboratory, Guadalajara

Bob Schuster  
AS/400 Advanced Technical Support, IBM Rochester

Phil Ainsworth  
IBM Australia

Harald Uebele  
IBM Germany

---

## Comments welcome

### Your comments are important to us!

We want our redbooks to be as helpful as possible. Please send us your comments about this or other redbooks in one of the following ways:

- Fax the evaluation form found in "ITSO Redbook evaluation" on page 155 to the fax number shown on the form.
- Use the online evaluation form found at <http://www.redbooks.ibm.com/>
- Send your comments in an Internet note to [redbook@us.ibm.com](mailto:redbook@us.ibm.com)

---

## Part 1. Configuring and using AS/400 NetServer

The first part of this book covers the following topics:

- An overview of the communication that supports AS/400 NetServer and the positioning of AS/400 NetServer in the file sharing world
- Configuring AS/400 NetServer and defining file and print shares
- Administering and using AS/400 NetServer
- Troubleshooting when something goes wrong
- Security considerations with AS/400 NetServer

**Note**

An Integrated Netfinity Server is an Intel processor, memory, and one or more LAN cards packaged on adapters that fit inside the AS/400 system. Throughout this redbook, when we refer to an Integrated Netfinity Server, we may also be referring to the first model (known as File Server Input Output Processor (FSIOP)), the second model (called Integrated PC Server (IPCS)), as well as the current Integrated Netfinity Server.





---

## Chapter 1. Introduction

This redbook is about a function called *AS/400 Support for Windows Network Neighborhood*, which is more commonly referred to as *AS/400 NetServer*. AS/400 NetServer has been available since Version 4 Release 2 of OS/400. It is integrated into the base of OS/400 and is not a part of Client Access. It is not a separately installable option or product.

Windows PCs on the network use the file and print sharing capabilities that are built into their operating systems to access AS/400 NetServer resources on the AS/400 system. For example, you can use Network Neighborhood on a Windows 95 PC to access file and print resources on an AS/400 system without loading any additional software on the PC.

AS/400 NetServer uses NetBIOS over TCP/IP to communicate with its clients. Therefore, TCP/IP must be configured on those AS/400 systems and PCs that use AS/400 NetServer. The TCP/IP configuration on the AS/400 system does not require any specific changes to support AS/400 NetServer, although TCP/IP must be active.

In this chapter, we describe the Networking concepts that support AS/400 NetServer. This will help you better understand the environment. We list for you the benefits of AS/400 NetServer. Plus, we explain the advantages that AS/400 NetServer has over file and print serving using Client Access for Windows 95/NT. Then, we position AS/400 NetServer in the world of file serving to help you decide how you can best deploy AS/400 NetServer in your organization.

---

### 1.1 Application and file serving

Before proceeding, we need to understand the terms *application serving* and *file serving*.

Application serving involves running a process on the server. For example, if you submit a batch command to run on another computer, that computer would be application serving. A Domino server is an application server. A Microsoft SQL Server and IBM DB2 UDB for Windows NT are also application servers.

Windows NT on the Integrated Netfinity Server can act as both a file server and an application server. When Windows NT Server 4.0, Terminal Server Edition runs on the Integrated Netfinity Server, providing the support necessary for Network Stations to operate, it is acting as an application server.

When users store and retrieve data from a mapped drive on the Integrated Netfinity Server, or even if they load their word processing code from the Integrated Netfinity Server, it is acting as a file server. The reason is that the only processing required on the CPU of the Integrated Netfinity Server is the downloading of the application, not the execution of the application. The application is actually running on the client.

AS/400 NetServer provides file serving capabilities using the disk storage of the AS/400 system. A PC program cannot be run on the AS/400 system directly using the processor of the AS/400 system.

---

## 1.2 Benefits of AS/400 NetServer

Here are some benefits of AS/400 NetServer that you can consider when planning your file and print serving strategy:

- AS/400 NetServer eliminates the cost of administering multiple servers in your network because the AS/400 system becomes a single point for software maintenance.
- AS/400 NetServer reduces the cost of PC software and maintenance because there is no additional software needed on client PCs and no retraining is required because it uses standard Windows interfaces.
- No special hardware is needed since AS/400 NetServer uses the AS/400 processor, disk, and LAN adapters. Using AS/400 NetServer as a network print server takes advantage of AS/400 disk space to spool print jobs to a shared output queue configured for a network attached printer.
- Because AS/400 NetServer is managed with AS/400 Operations Navigator, there is a simple, graphical way to administer AS/400 file and print shares.
- AS/400 NetServer simplifies network backup and recovery procedures, because all save and restore is done on the AS/400 system. There is no need to back up individual PCs in the network.
- AS/400 NetServer uses AS/400 user profiles and security. There is no need to learn an additional operating system to take advantage of native file and print serving capabilities on the AS/400 system.
- AS/400 NetServer supports clients that use different language code pages, but need to share the same text file. In V4R4 and later, AS/400 NetServer allows you to perform file data text conversion on the fly.

Details about the features that provide these benefits are the subject of the remainder of the first part of this redbook.

---

## 1.3 Networking concepts

AS/400 NetServer enables an AS/400 system to provide file and print serving in a Windows network without needing to install additional hardware or software on the AS/400 system. AS/400 NetServer uses the Server Message Block (SMB) protocol to communicate with the network. SMB is an industry standard protocol for file and print sharing that allows computers to access network resources as if they were local. It was originally written using the NetBIOS API running over the NetBEUI communications protocol, but can now also use different protocols, for example NetBIOS over TCP/IP, and IPX/SPX. Because NetBEUI has not been implemented on the AS/400 system, AS/400 NetServer uses NetBIOS over TCP/IP as its networking protocol.

AS/400 NetServer officially supports Windows for Workgroups (Windows 3.11), Windows 95, Windows 98, Windows NT 3.51, Windows NT 4.0, Windows 2000, and Terminal Server Edition. OS/2 Warp Connect, although it is an SMB client, is not supported with AS/400 NetServer and will not work.

The directories that are shared by AS/400 NetServer reside in the integrated file system on the AS/400 system. They are protected by AS/400 security. They can

be saved with standard AS/400 methods during normal AS/400 save operations. There is no need for additional backup programs or backup strategies.

Client Access Express is not necessary for the use of AS/400 NetServer. However, you may want to use Client Access Express to provide 5250 emulation, file transfer, and other functions for your users. You will use Operations Navigator to configure AS/400 NetServer, but you do not have to purchase a license to use Operations Navigator.

Client Access Express for Windows, unlike the other Client Access clients, does not provide the functions of Network Drives and Network Printing. It relies on AS/400 NetServer for these functions. That is one of the reasons why Client Access Express for Windows does not support OS/400 releases prior to Version 4 Release 2. Client Access for Windows 95/NT Network Drives and Network Printers use background jobs on the PC to make their functions available to the Windows desktop. AS/400 NetServer does not need background jobs on the PC. This results in less overhead on the CPU of the PC and less memory and disk space used. A comparison of features with Client Access for Windows 95/NT is in 1.6, "AS/400 NetServer versus Client Access for Windows 95/NT" on page 7.

---

## 1.4 Broadcasts

AS/400 NetServer uses the SMB protocol to advertise its resources in the network. Clients use the SMB protocol to find the AS/400 NetServer and its shared resources.

One of the simplest PC network configurations is a NetBEUI network. All versions of Microsoft Windows, as well as OS/2 and clients from other software manufacturers, support NetBEUI. In a NetBEUI network, a computer is addressed by its computer name. You can find the computer name in the Windows Network properties of a Windows client PC. When a Windows client PC is set up to use NetBEUI as the network protocol, SMB uses broadcasts to find other computers in the network and to share information with each other.

A *broadcast* is a message that is sent out to many computers on the network, not to a specific computer. Broadcasts add a load to a network. They are normally no problem in smaller networks that contain only a few systems and are contained within one physical network segment, for example, one physical Token-Ring. Large NetBEUI-based networks fit into this definition when broadcasts are forwarded across bridges and routers, which make these large networks appear as a single physical network. Larger communication networks based on TCP/IP intranets or the Internet are made up of many physical network segments (TCP/IP subnets) that are connected through routers or gateways. They do not fit this same model. Often these physical networks are not at the same location but are connected with telephone or leased lines. The routers that connect TCP/IP physical networks are typically configured to not route broadcasts in order to reduce network traffic.

## 1.5 Name resolution

Due to their increasing size, PC networks more often are using TCP/IP instead of NetBEUI as their network protocol. In a TCP/IP network, a computer is addressed by its computer name, which is resolved to an IP address. TCP/IP networks are often implemented with name servers to resolve a computer name to an IP address.

SMB in a TCP/IP network uses an intermediate network layer of NetBIOS over TCP/IP (NBT) on top of TCP/IP as shown in Figure 1.

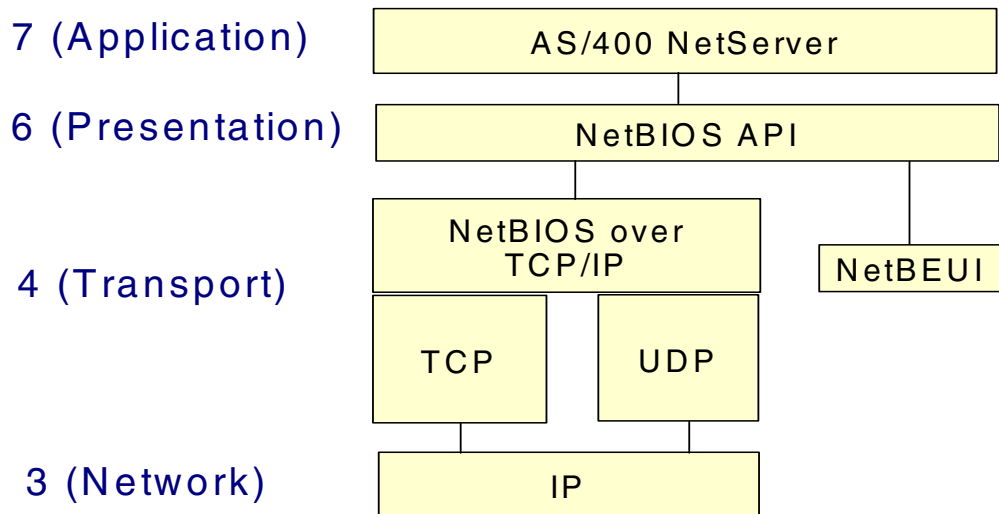


Figure 1. NetBIOS over TCP/IP

Windows client PCs that are set up to use NetBIOS over TCP/IP take advantage of configured name services to resolve a computer name to an IP address before defaulting to broadcasts on the network. The Windows client PC first sends a directed datagram to a name service, for example a WINS Server or a DNS (discussed later in 2.3, “Configuring your network clients” on page 18), to resolve the server name into a TCP/IP address. Then, the client uses that TCP/IP address to directly communicate with the server. Using a directed datagram creates minimal network traffic. If no name server is available or if the name is not found in a name server, the Windows client sends the SMB request as a User Datagram Protocol (UDP) broadcast. In a typical TCP/IP network, the UDP broadcasts are contained within a subnet. The TCP/IP routers do not send them out into the rest of the network to keep the network traffic low. If no server responds to the UDP broadcasts, the Windows client searches the LMHOSTS file on the PC. If the server name is not in the LMHOSTS file, an error message stating that the network path was not found is sent to the user.

**Note:** The order in which a server name is resolved to a TCP/IP address may vary depending on the client software and the service pack level of the Windows client software. Microsoft may change this order.

There is no NetBEUI implementation on the AS/400 system. AS/400 NetServer uses NetBIOS over TCP/IP, which today is commonly used by SMB implementations. Request for Comment 1001 (RFC 1001) and RFC 1002 contain information about the NetBIOS over TCP/IP protocol. While using TCP/IP helps

minimize network traffic and saves expensive network bandwidth, Windows Network Neighborhood was not designed with TCP/IP in mind. Therefore, it lacks some of the features that seem to happen automatically when pure NetBEUI is involved. These automatic functions (for example, the domains and the computers within domains that are displayed in Windows Network Neighborhood) are only available because the noisier NetBEUI network protocol, which increases network traffic, is used.

The ideal situation is when the AS/400 NetServer and the client PCs are in the same domain or workgroup and also in the same physical network or TCP/IP subnet. Since UDP broadcasts can flow freely within a subnet, AS/400 NetServer automatically shows up in the client's Network Neighborhood.

Unfortunately networks are not always this simple. There are some options that can be used to help resolve a computer name to an IP address. You may have to use one or more of them depending on your specific network situation. These options include:

- Domain Name Service (DNS)
- WINS server
- LMHOSTS file

For more information on these alternatives, see 2.3, "Configuring your network clients" on page 18.

---

## 1.6 AS/400 NetServer versus Client Access for Windows 95/NT

Both AS/400 NetServer and Client Access for Windows 95/NT provide file and print services. Client Access Express does not provide these functions. It relies on AS/400 NetServer to provide these capabilities, so this comparison does not include this member of the Client Access Family. The following list highlights the differences between the network drive and printer support provided by AS/400 NetServer and Client Access for Windows 95/NT:

- AS/400 NetServer does not require any additional software installed on the client. It uses the native file and print sharing capabilities found in the Windows operating system.
- Client Access exposes the entire integrated file system (IFS), while only those directories and output queues shared by the administrator can be accessed using AS/400 NetServer.
- You can share any directory in the IFS, even a directory that is nested several subdirectories below the root, using AS/400 NetServer. With Client Access, there is no concept of shares. You can only map drives to the root and first-level directories and must work with nested subdirectories from that mapped drive on the client. The AS/400 NetServer capability enhances AS/400 security.
- Using AS/400 NetServer, you can share an IFS directory with read-only access, which provides additional security on top of the IFS directory permissions, to ensure that users cannot corrupt the contents of that directory. Client Access relies solely on the IFS directory permissions of the AS/400 system.
- You can hide AS/400 NetServer shares from the network by ending them with a \$ (dollar sign). These shares are still accessible from the network when

accessed directly by name, but will not show up in Network Neighborhood. The process for doing this is described in 4.2.1, "Hiding shared resources" on page 54.

- You can hide AS/400 NetServer from the network by setting the AS/400 NetServer browsing announcement interval property value to zero.
- Client Access provides ASCII to EBCDIC translation on the fly. AS/400 NetServer provides this function in V4R4 and later. An example is given in 3.1.1, "File text conversion" on page 29.
- AS/400 NetServer allows network clients to access AS/400 shared IFS directories and output queues using guest support, so an AS/400 user profile is not needed for simple file and print services. An AS/400 user profile must be configured for every Client Access user that accesses the AS/400 system.
- Client Access has richer support for clients using different code pages in V4R3 and V4R2. AS/400 NetServer provides this support in V4R4 or later.
- Client Access has richer functions not available in Windows or provided by AS/400 NetServer including 5250 terminal emulation, ODBC, data transfer, and so on. Therefore, you may wish to use AS/400 NetServer for file and print serving and Client Access for these other functions.

Information about Client Access for Windows 95/NT can be found in *Inside Client Access for Windows 95/NT*, SG24-4748. Information about Client Access Express for Windows can be found in *AS/400 Client Access Express for Windows: Implementing V4R4M0*, SG24-5191.

---

## 1.7 AS/400 NetServer positioning

Now that we have told you a little about AS/400 NetServer, you may wonder how you decide if AS/400 NetServer is right for you. Consider the following cases:

- If you want to consolidate a number of Windows NT servers onto a single AS/400 system, you can use Windows NT on the Integrated Netfinity Server, or more likely, several Integrated Netfinity Servers. Windows NT on the Integrated Netfinity Server is optimized for file sharing. You can read more about Windows NT on the Integrated Netfinity Server in *AS/400 - Implementing Windows NT on the Integrated Netfinity Server*, SG24-2164.
- For optimal file sharing performance with a large number of users, you should consider Windows NT on the Integrated Netfinity Server.
- If you are migrating from OS/2 Warp Server for AS/400 or Novell NetWare on the older models of the Integrated Netfinity Server (known as IPCS or FSIOP), then AS/400 NetServer may be a good option. We tell you how to plan for and perform the migration in Part 2, "Migrating to AS/400 NetServer" on page 65.
- If you have a smaller number of users, or your users' file serving capabilities are light, AS/400 NetServer may be right for you. Even though Windows NT on the Integrated Netfinity Server provides easier administration than Windows NT on a standalone PC, it is even easier to administer all your file sharing requirements from the Operations Navigator interface, which is used for administering AS/400 NetServer. The remainder of this part of the redbook shows you how to do this.
- If you have an AS/400 system that has spare CPU capacity, then AS/400 NetServer may suit your requirements. Many customers have AS/400 systems

sized for overnight batch runs and find they have spare capacity during the day. This provides an ideal opportunity for AS/400 NetServer.

- If you want file and print serving without the need to learn another operating system, then AS/400 NetServer is a good choice.
- If you have clients that use different language code pages, but need to share the same text file, AS/400 NetServer will meet your needs. In V4R4, AS/400 NetServer allows you to do file data text conversion on the fly. Using multiple file shares for the same AS/400 integrated file system directory allows you to specify different code page text conversion options for files in the same AS/400 integrated file system directory.

Our advice is that, unless you clearly fall into one of the Integrated Netfinity Server suggested scenarios in the previous list, you should try AS/400 NetServer. There is no cost to you for trying it because AS/400 NetServer is integrated right into the base of OS/400. There are clear advantages in the integration with AS/400 data and backup operations.

There is nothing to stop you from having a mixture of Integrated Netfinity Server and AS/400 NetServer file serving. You can put your application serving on an Integrated Netfinity Server and take advantage of the tight integration with OS/400 and use AS/400 NetServer for your file serving.

If you have Network Stations in your installation, or are considering their introduction, you may want to use an Integrated Netfinity Server to provide the Windows NT server 4.0, Terminal Server Edition capabilities. You can use AS/400 NetServer for the file serving to again integrate data. You can read more about this in Chapter 8, "AS/400 NetServer and Network Stations" on page 113.





---

## Chapter 2. Getting started with AS/400 NetServer

AS/400 Support for Windows Network Neighborhood (AS/400 NetServer) is an IBM Operating System/400 (OS/400) function that enables Windows clients to access AS/400 shared directories and output queues. PC clients on a network simply use the file and print sharing functions that are included in their operating systems. Therefore, you do not need to install any additional software on your PC to use AS/400 NetServer.

To function properly on an AS/400 system and with clients, AS/400 NetServer requires:

- An AS/400 system properly connected with Version 4 Release 2 (V4R2) OS/400, or later, configured and properly connected to a TCP/IP network.
- An AS/400 NetServer name that does not conflict with the AS/400 TCP/IP name that Client Access for Windows 95/NT uses.
- An up and running Network Print Server so that you can use AS/400 NetServer print sharing capabilities.
- You need to have one of the following operating system components installed on the client PC depending on your operating system:
  - Client for Microsoft Networks for Windows 95/98
  - Workstation for Windows NT
  - Microsoft File and Print Client for Windows for Workgroups

Once this is installed and configured, you will have access to the integrated file system directories and the AS/400 output queues that have been shared with the network.

- An AS/400 NetServer server name and Internet protocol (IP) address resolution strategy, for example, Domain Name Service (DNS), Windows Internet Naming Service (WINS), or LMHOSTS file.
- Refer to the following Informational APARs for the AS/400 PTF requirements so that AS/400 NetServer functions properly:
  - II12091 for V4R4M0
  - II11752 for V4R3M0
  - II11081 for V4R2M0

Informational APARS can be found at <http://as400service.ibm.com> under **Tech Info** and **Databases**.

### Supported clients

AS/400 NetServer officially supports Windows for Workgroups (Windows 3.11), Windows 95, Windows 98, Windows 2000, Windows NT 3.51, Windows NT 4.0, and Windows NT server, Terminal Server Edition.

---

## 2.1 Configuring AS/400 NetServer

**Note:** This book assumes that the Client Access Express client is used for the Operations Navigator interface.

For AS/400 NetServer to operate and perform correctly, it must be configured and started on the AS/400 system. Both TCP/IP and the QSERVER subsystem must be active so that AS/400 NetServer starts correctly. To verify that the QSERVER subsystem is active, enter `WRKSBS` on a command line. If QSERVER is listed, then it has already been started. If not, use the following command to start QSERVER:

```
STRSBS SBS(D(QSERVER))
```

To verify that TCP/IP is started, enter `CFGTCP` on a command line. Select option **1**, and then select **F11** (Display interface status). If information on the interface status is available, then TCP/IP is active. Ensure that the specific TCP/IP interface that you are using has a status of *Active*.

Once this is done, you can immediately begin to share data and printers with your PC clients.

### Notes

If you do not know how to configure and start TCP/IP on the AS/400 system, refer to the TCP/IP articles in the AS/400e Information Center, which is located at: <http://www.as400.ibm.com/infocenter>

For a list of necessary PTFs, check the AS/400 NetServer home page, which is located at: <http://www.as400.ibm.com/netserver>

### 2.1.1 Starting AS/400 NetServer

You can start AS/400 NetServer using Operations Navigator by following these steps:

1. Open a connection to your AS/400 using Operations Navigator.
2. Expand **Network**.
3. Expand **Servers**.
4. Select **TCP/IP**.
5. Right-click **AS/400 NetServer**, as shown in Figure 2 on page 13, and select **Start**.

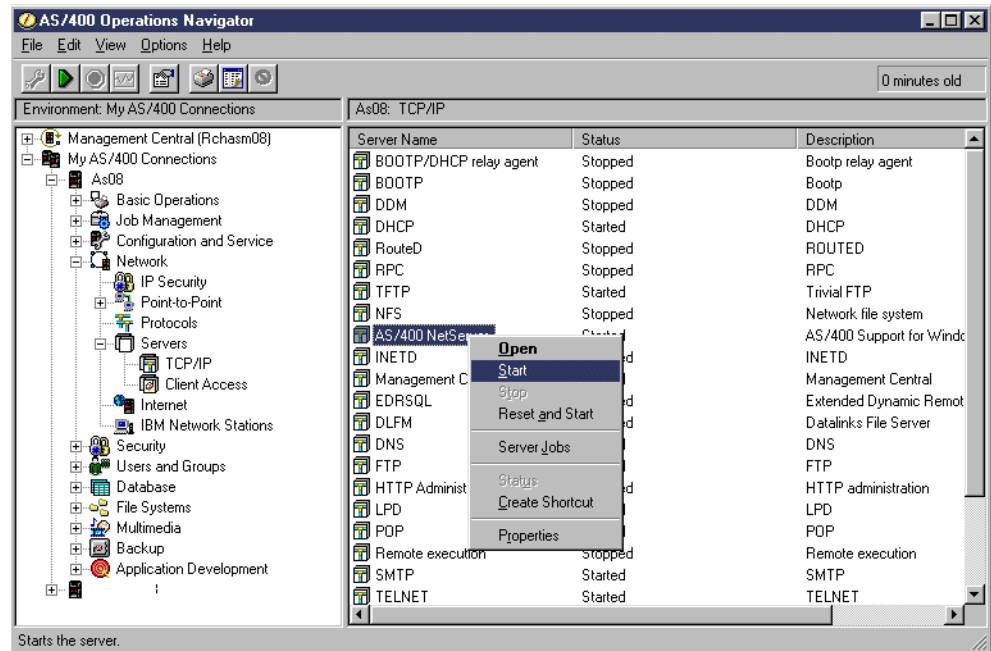


Figure 2. Starting AS/400 NetServer

Express clients provide additional ways to access AS/400 NetServer using Operations Navigator. Double-click on **AS/400 NetServer** in step 5 to open AS/400 NetServer. Alternatively, you can expand **File Systems** from Operations Navigator, right-click on **File Shares**, and select **Open AS/400 NetServer**. In both cases, you then use the menu bar, tool bar, or right-click on **AS/400 NetServer** and select **Start**.

If you do not have Operations Navigator installed, use the following command to start AS/400 NetServer:

- For V4R4 and later, use:

```
STRTCPSVR *NETSVR
```

- For V4R2 and V4R3, use:

```
CALL PGM(QZLSSTRS) PARM('0' X'0000000')
```

If you have trouble starting AS/400 NetServer, see 5.3, “File and print share problems” on page 60.

### Tip

If you do not want to start Operations Navigator each time you access AS/400 NetServer, you can create a shortcut on your Windows desktop. To create a shortcut, follow these steps:

1. Open a connection to Operations Navigator on your AS/400 system.
2. Expand **Network**.
3. Expand **Servers**.
4. Select **TCP/IP**.
5. Right-click **AS/400 NetServer**, and select **Create Shortcut**.

You can start and stop AS/400 NetServer from here.

## 2.1.2 Working with AS/400 NetServer properties

You can begin to work with AS/400 NetServer by using the pop-up menu that appears when you right-click on AS/400 NetServer in Operations Navigator. Or, you can use the functions that are provided on the menu bar and tool bar within Operations Navigator. When you right-click on AS/400 NetServer and select **Properties**, the window shown in Figure 3 appears.

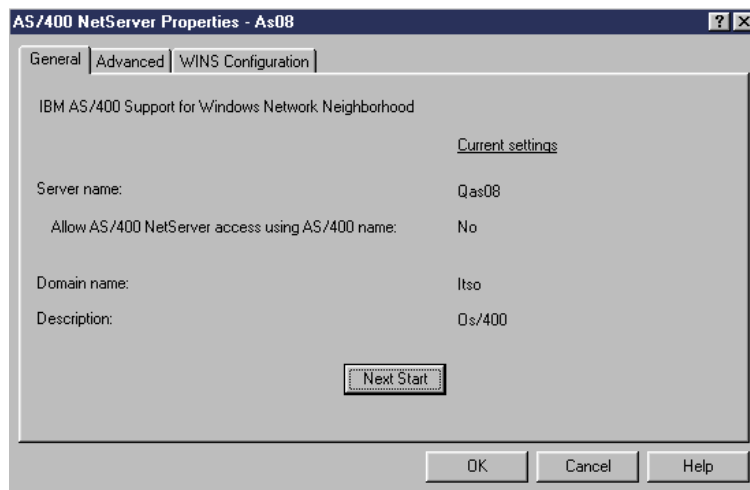


Figure 3. AS/400 NetServer general properties

The AS/400 NetServer Properties window shows the current configuration as well as Advanced properties and WINS Configuration. To change any of the properties on any of the three pages, click the **Next Start** button. Click **OK** to accept any changes that you have made. Otherwise, click **Reset to Current** to undo any changes.

The General page displays the following properties:

- **Server name:** Specifies the current server name. If you decide to change the AS/400 NetServer name, review 2.2, “Changing the AS/400 NetServer name” on page 17, before doing so.
- **Allow AS/400 NetServer access using AS/400 name:** If this property is set to Yes, you can access your AS/400 NetServer by using the AS/400 system

name. If you decide to change the AS/400 NetServer name, review 2.2, “Changing the AS/400 NetServer name” on page 17, before doing so.

- **Domain name:** Specifies the current domain name or workgroup where the server is a member. The AS/400 NetServer domain name should match the domain of those Windows clients that want to access AS/400 NetServer. AS/400 NetServer access works best when your clients reside in the same domain as your AS/400 NetServer and both are on the same subnet.

**Note**

If you want to access Windows NT Server shared directories through the AS/400 QNTC file system, AS/400 NetServer must be in the same domain as the Windows NT Servers you want to access.

If you are running Windows NT Server on an Integrated Netfinity Server, we recommend that the Windows NT Server domain and the AS/400 NetServer domain match.

- **Description:** Specifies the current server description.

In V4R4, AS/400 NetServer automatically starts when TCP/IP is started. Uncheck the **Start when TCP/IP is started** box if you do not want AS/400 NetServer started automatically with TCP/IP. You will see this check box when you select Next Start.

When you select the **Advanced** tab, the window shown in Figure 4 appears.

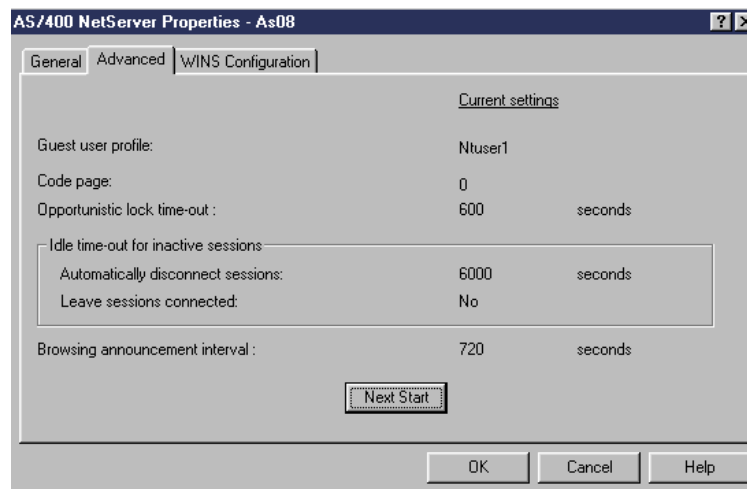


Figure 4. AS/400 NetServer Advanced Properties

The AS/400 NetServer Advanced includes the following properties:

- **Guest user profile:** Specifies the guest user profile used when someone without an AS/400 user profile attempts to access shared resources on the server. For more information on creating a guest user profile, refer to 2.4, “Configuring the guest user profile” on page 20.
- **Code page:** Specifies the current code page that is used by all clients connected to the server. The server converts the code page to the associated AS/400 coded character set identifier (CCSID) for processing. A value of zero specifies that the default ASCII CCSID of the current job used to change the

AS/400 NetServer properties will be used to set the value of the AS/400 NetServer code page.

- **V4R2 and V4R3:** When a PC client stores a file in an AS/400 shared directory, the file name is sent in ASCII from the PC to the AS/400 system. When the file is stored in the IFS, it has to be converted to UNICODE by AS/400 NetServer so that it is readable on the AS/400 system.
- **V4R4 and later:** The PC will usually convert the file name from ASCII to UNICODE and then send the UNICODE file name to the AS/400 for storage in the integrated file system.

**Note**

Under some circumstances, particularly on non-US AS/400 systems, a code page value of **0** causes AS/400 NetServer to send invalid datagrams to the network browser service. The following problem has been encountered:

Due to invalid datagrams, AS/400 NetServer does not register correctly with the browser service and, as a result, will not show up in Windows Network Neighborhood. To solve this problem, enter an appropriate code page ID. For most western European countries, an ID of 850 will work.

- **Opportunistic lock time-out:** Is not currently supported on the AS/400 system.
- **Idle time out:** Specifies whether a connection remains open even if activity on that connection has stopped.
- **Browsing announcement interval:** Windows networks use a browser service function to provide a list of available servers. When a computer wants to make itself known on the network, it sends out announcements at various intervals. However, frequent browse announcements result in increased network traffic and, therefore, a decrease in network performance.

Finally, the WINS Configuration page that is shown in Figure 5 on page 17, contains information pertaining to properties of the Windows Internet Name Service (WINS). WINS is a dynamic naming service that resolves NetBIOS computer names to IP addresses. Although the AS/400 system cannot act as a WINS server, it can act as a WINS proxy. This enables non-WINS clients to obtain name resolution from WINS. A WINS proxy receives broadcasted name requests from non-WINS clients and resolves them by directing queries to a WINS server. If you are using WINS, specify a primary server IP address. If you have a secondary WINS server, you can also specify an IP address in the appropriate field.

### Note

There may be additional traffic related to NetBIOS over TCP name resolution on your network as a result of having AS/400 NetServer configured as a WINS proxy. By default, AS/400 NetServer in V4R2, V4R3, and V4R4 acts as a WINS Proxy when the Primary or Secondary WINS server is specified. Unless you depend on WINS Proxy support, IBM strongly recommends that you disable this support. To disable WINS, follow these steps:

1. Click **Next Start** on the WINS Configuration page.
2. Type the @ symbol in the first space of the **Scope ID** field.

This disables the WINS proxy support the next time that the server is started. When there is an @ symbol in the first space of the Scope ID, AS/400 NetServer will be configured with a Scope ID starting with the first character following the @ symbol.

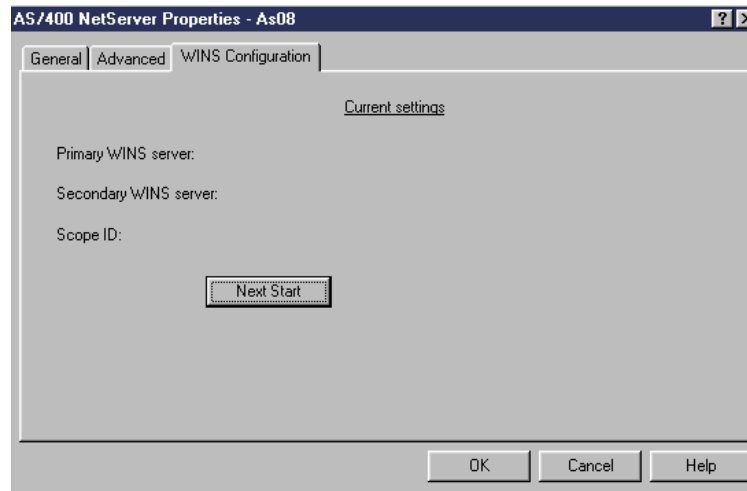


Figure 5. AS/400 NetServer WINS configuration properties

The following explanation of *Scope ID* is offered by the Microsoft Windows NT Server Resource Kit:

*“NetBIOS Scope, also known as TCP/IP Scope, provides a method for adding a second element to the single-elemented NetBIOS computer name. [...] By installation default, the NetBIOS Scope value is NULL. [...] The effect of using a NetBIOS Scope ID, other than the default NULL value, is to isolate a group of computers on the network that can communicate only with other computers that are configured with the identical NetBIOS Scope ID. [...] **Note:** Using NetBIOS Scope is strongly discouraged if you are not already using it, or if you use Domain Name System (DNS) on your network.”*

## 2.2 Changing the AS/400 NetServer name

If you are not yet using AS/400 NetServer, you need to consider what to call it. Depending on when and how your AS/400 system was installed, you may find that the name is set to the AS/400 system name, the serial number of your AS/400 system with a Q in front of it, or something else. If you are currently using

AS/400 NetServer, you can change the name, but you need to consider the existing clients who will have to change their drive mappings.

You can change the AS/400 NetServer name by following these guidelines:

- If you do not have Client Access for Windows 95/NT clients who have network drives and printers mapped to AS/400 NetServer shared resources, then the AS/400 NetServer server name should be the same as your AS/400 system name.
- If you intend to use the Express client, have AS/400 NetServer users with mapped drives, but no Client Access for Windows 95/NT clients, do not change the AS/400 NetServer name. Select **Allow AS/400 NetServer access by using AS/400 name** on the AS/400 NetServer General Next Start dialog after you install the Express client.
- If you are migrating an entire network from the Client Access for Windows 95/NT client to Express client, migrate *all* Windows desktops to the Express client. Then, select **Allow AS/400 NetServer access using AS/400 name** on the AS/400 NetServer General Next Start dialog. After the AS/400 NetServer Properties have been changed, use the AS/400 system name when configuring additional Express clients and AS/400 NetServer users.
- If you have a mixed environment with both Client Access for Windows 95/NT and Express clients, the AS/400 NetServer name and the AS/400 system name need to be different.

Take care when configuring the AS/400 NetServer server name. Allowing users to access your AS/400 NetServer by using the AS/400 system name may cause conflicts if you still have Client Access for Windows 95/NT clients in your network. That is, when Client Access family members (other than the Express client) and AS/400 NetServer use the same server name, server jobs for both recognize the name. The first one to satisfy the client's request takes control and produces inconsistent results for the client. It is important that you follow the above recommendations when enabling AS/400 NetServer and Express client support in your network.

---

## 2.3 Configuring your network clients

Setting up a Windows client to use AS/400 NetServer allows you to easily access shared resources. However, you must ensure that clients can locate AS/400 NetServer in the network. If AS/400 NetServer and your Windows PC are in the same workgroup (domain) and in the same subnet (network segment), no additional configuration is required.

In many TCP/IP networks, routers in the network filter out User Datagram Protocol (UDP) broadcast frames. Routers in the network filter out UDP broadcast frames when your AS/400 and PC clients are not in the same subnet. A client on one side of a router cannot find AS/400 NetServer because the UDP broadcasts cannot cross the router.



Administrators of networks that are set up to filter UDP broadcasts should consider using one of the following options:

- Domain Name Service
- Windows Internet Name Service (WINS)
- LMHOSTS file

Each of these options is described in more detail in the following sections.

### 2.3.1 Domain Name Service

Make an entry for AS/400 NetServer in the network Domain Name Service (DNS) database. TCP/IP networks can use DNS to map server names to IP addresses. In a DNS network, an entry tells clients in the network how to map the name of the server to its proper TCP/IP address.

Configuring DNS entries, or aliases, for both Client Access and AS/400 NetServer allows PC clients to address Client Access as SYSTEMA, while addressing AS/400 NetServer as QSYSTEMA, even though both use the same IP address. This step avoids any potential conflicts in the client operating system.

We recommend that you use DNS since it is the easiest way to locate and connect to AS/400 NetServer.

### 2.3.2 Windows Internet Name Service

The Windows Internet Name Service (WINS) is an industry de facto standard defined by Microsoft, and has no relationship to the Internet at all. WINS is used by network clients to register and resolve NetBIOS names (both computer and application names) to IP addresses. You can think of WINS as a specialized DNS for the Windows Network Neighborhood.

Implementing WINS in a network has two advantages:

- Traffic on the network is minimized because name resolution requests are sent directly to the WINS server.
- If a Windows NT domain is made up of several subnets that are connected via routers, WINS easily enables computers across subnets to share resources.

You can use a WINS server with AS/400 NetServer in the following ways:

- Configure PC clients with the WINS server IP address. Proper configuration allows clients to send all WINS requests directly to the network WINS server. This is the best solution for WINS clients that are in the same workgroup (domain) as AS/400 NetServer, when you do not configure AS/400 NetServer as a WINS proxy.
- Place PC clients in the same subnet (network segment) as the WINS server. The WINS server automatically handles name resolution requests with no additional PC client configuration. This is the best solution for WINS clients that are in the same subnet as the WINS server, and when you configure AS/400 NetServer as a WINS client, but not as a WINS Proxy.
- Place PC clients in the same subnet as the AS/400 system with AS/400 NetServer configured with a WINS server IP address. In this case, clients connect to the AS/400 system as a WINS proxy server. AS/400 NetServer routes all WINS requests to the WINS server. Using AS/400 NetServer as a WINS proxy is the best solution for WINS clients that are in the same subnet

as AS/400 NetServer, but a different subnet than the WINS server. In this scenario, PC clients do not require any additional configuration to use WINS.

You can specify an address for a network WINS server on the AS/400 NetServer WINS Configuration, Next Start tab dialog in Operations Navigator. You can then configure clients to connect to AS/400 NetServer by using the WINS server.

**Note**

If you want to use both DNS and WINS on a Windows NT client for computer name to IP address resolution, configure the DNS page of the TCP/IP properties found in the Windows NT Network properties. Then, enable DNS for Windows resolutions on the WINS configuration page of the TCP/IP properties.

### 2.3.3 LMHOSTS file

Create entries for AS/400 NetServer in the PC clients static configuration files (such as LMHOSTS). PC client operating systems can provide static configuration files that map server names to TCP/IP addresses. These files are typically more difficult to manage than a solution that involves more centralized control (for example, a DNS or WINS server). This difficulty results because your network administrator must configure each PC client individually. Static configuration files are useful, however, in large, distributed networks. In this environment, clients and servers exist in different subnets (network segments) and possibly different workgroups (domains). Static configuration files help clients locate servers.

All PC clients supported by AS/400 NetServer can use an LMHOSTS file that maps AS/400 NetServer names to IP addresses. Mapping the IP address for AS/400 NetServer allows clients to find AS/400 NetServer in a large, distributed network environment.

You may also add an entry into the LMHOSTS file that points to an LMHOSTS file that is administered centrally on the AS/400 system. By pointing all clients to the central file on the AS/400 system, you need maintain only one LMHOSTS file for the network. For information on creating a LMHOSTS file, see 5.2.1, "Creating an LMHOSTS file" on page 58.

---

## 2.4 Configuring the guest user profile

A guest user profile provides a base level of access for clients who do not have a valid AS/400 user profile. AS/400 NetServer does not automatically configure guest support. Therefore, users without valid AS/400 user profiles will not be able to access integrated file system directories and output queues using AS/400 NetServer. To allow guests to have access to AS/400 shared resources, you must configure the AS/400 NetServer Advanced Next Start properties with a user profile for guest, or anonymous, users.

To configure a guest user profile, follow these steps:

1. Open a connection to Operations Navigator on your AS/400 system.
2. Expand **Network**.

3. Expand **Servers**.
4. Click **TCP/IP** to retrieve a list of TCP/IP servers available.
5. Right-click **AS/400 NetServer**, and select **Properties**. The window shown in Figure 6 appears.

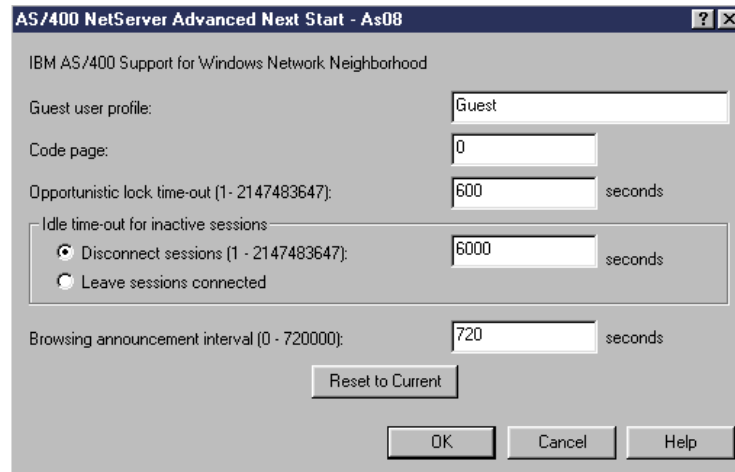


Figure 6. Specifying the guest user profile

6. Go to the **Advanced** dialog, and click **Next Start**.
7. In the **Guest User Profile** field, enter the AS/400 user profile that you want guests to use.

**Note**

You must have \*IOSYSCFG and \*SECADM special authority to change the guest user profile. Changes will take effect the next time AS/400 NetServer is started.

There are security implications involved with creating a guest user profile. For more information, see 4.1.1, “Considerations for using the guest user profile” on page 51.

## 2.5 Finding AS/400 NetServer on the network

To use AS/400 NetServer, you must be able to find it in your Windows Network Neighborhood. If AS/400 NetServer and your PC client are in the same workgroup (domain) and in the same subnet, follow these steps:

1. Open Windows Network Neighborhood.
2. Select **AS/400NetServerName** (where AS/400NetServerName is the name of the AS/400 NetServer on the AS/400 system).

Another method is described here:

1. Open the Windows **Start** menu.
2. Select **Find-> Computer**.

3. In the **Find: Computer** dialog, enter the server name of AS/400 NetServer on the AS/400 system.
4. Click **OK**.

The possible results are displayed in Table 1.

Table 1. Find: Computer results

Location	Comment	Result
Network Neighborhood	No Comment	You have connected using Client Access/400 <sup>1</sup> .
Unknown	No Comment	You are not authenticated. Your Windows password and your AS/400 password <i>do not match</i> .
AS/400 NetServer domain <sup>2</sup>	AS/400 NetServer description <sup>3</sup>	You have successfully connected to AS/400 NetServer and are authenticated. Your Windows and AS/400 passwords <i>match</i> .

**Notes:**

1. A description is not required for AS/400 NetServer, so there may not be a comment. In addition, Windows clients sometimes show Network Neighborhood in the location when the PC and AS/400 NetServer domains match.
2. The AS/400 NetServer domain is the *actual* domain of which your AS/400 NetServer is a member.
3. The AS/400 NetServer description is the *actual* description that was specified when AS/400 NetServer was configured.

Figure 7 shows an example of AS/400 NetServer and its proper domain and description. If you experience problems finding AS/400 NetServer, refer to 5.2, “Troubleshooting the AS/400 NetServer location on the network” on page 56.

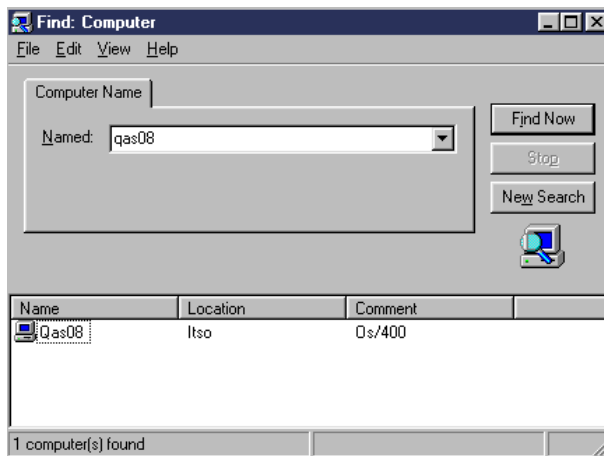


Figure 7. Find: Computer with correct AS/400 NetServer domain and description

---

## 2.6 Starting AS/400 NetServer at IPL

In V4R4, AS/400 support for Windows Network Neighborhood (AS/400 NetServer) requires that TCP/IP be active. As a result, AS/400 NetServer is now automatically started and ended as a TCP server when the Start TCP/IP (`STRTCP`) or End TCP/IP (`ENDTCP`) commands are evoked. Additionally, AS/400 NetServer can be started and ended as an individual TCP/IP server with the use of the Start TCP/IP Server (`STRTCP SVR SERVER(*NETSVR)`) and End TCP/IP Server (`ENDTCP SVR SERVER(*NETSVR)`) commands.

You can specify whether AS/400 NetServer starts automatically when TCP/IP is started by selecting the **Start when TCP/IP is started** check box on the AS/400 NetServer General Next Start dialog. This value affects TCP/IP start behavior. It is not an AS/400 NetServer property so the changes will take effect immediately. When using AS/400 Operations Navigator in the Client Access Express for Windows client (Express client), you can find this dialog by following these steps:

1. Follow the path **Network-> Servers-> TCP/IP-> AS/400 NetServer**.
2. Right-click on the **AS/400 NetServer** icon.
3. Select **Properties**.
4. Select the **General** tab.
5. Click the **Next Start** button.

### Note

The AS/400 NetServer job (QZLSSERVER) runs in the QSERVER subsystem. In addition, the Start Server (QZSLSTRS) and End Server (QZLSEND) APIs still start and end the server. Because of this, no changes are needed in your start-up program (from V4R2 and later) if the QSERVER subsystem is started before TCP/IP is started.

### 2.6.1 Special AS/400 NetServer considerations for V4R2 and V4R3

AS/400 NetServer runs under the QSERVER subsystem, uses TCP/IP, and has some unique startup considerations that vary depending upon which release of OS/400 you are using. At release level V4R2M0 or V4R3M0, the QSERVER subsystem is shipped with an autostart job entry to start AS/400 NetServer. However, for AS/400 NetServer to start up, it requires that TCP/IP be started first.

When the AS/400 initial program loads (IPLs), a Control Language startup program (by default, QSYS/QSTRUP) is executed. This starts the QSERVER subsystem, and therefore, starts QZLSSERVER (AS/400 NetServer).

QZLSSERVER will log error messages in QSYSOPR, or will not fully initialize, if TCP/IP is not started when QZLSSERVER is started. To avoid this situation, you can modify the startup program defined in the system value QSTRUPPGM. The autostart job in the controlling subsystem transfers control to the program specified in the system value QSTRUPPGM during an IPL.

You can create your own program and change the QSTRUPPGM system value to that program name. You can also use the shipped program QSTRUP in QSYS as a base to create your own program. To do this, follow these steps:

1. Retrieve the source of the shipped program using the RTVCLSRC command, for example:

```
RTVCLSRC PGM(QSYS/QSTRUP) SRCFILE(YOURLIB/YOURFILE)
```

You may want to use QGPL/QCLSRC for YOURLIB/YOURFILE because this file already exists.

2. Change the program as described here:
  - a. Add a statement to start TCP/IP (`STRTCP`) after QSYS/QSTRUP has completed.
  - b. Add a call to start QZLSSERVER after starting TCP/IP (`CALL QZLSSTRS PARM('0' X'00000000')`).
3. Create the program using the Create CL Program (`CRTCLPGM`) command, and place it into your own library or QGPL.
4. Remove the Autostart Job Entry for QZLSSERVER from the QSERVER subsystem description.
5. Test the program to ensure that it works.
6. Change the system value QSTRUPPGM to the program name and library you specified on the `CRTCLPGM` command.

More information about the system value QSTRUPPGM can be found in *Work Management*, SC41-5306.

## Chapter 3. Using AS/400 NetServer

Using AS/400 NetServer, you have the ability to access AS/400 shared resources using the native file and print serving services of the Windows operating system. Appendix B, “Using applications with AS/400 NetServer” on page 135, contains an example of installing and using some common applications with AS/400 NetServer.

Integrated file system resources with AS/400 NetServer must be shared or they will not be visible or available on the network.

There are two types of shared objects:

**File shares** Shared integrated file system directories on the AS/400 system  
**Print shares** Shared AS/400 output queues

### Note

You must have \*IOSYSCFG special authority to add or change the AS/400 NetServer file or print share configuration, or own the directory or output queue in V4R4 and later.

You can click **Shared Objects** to view all directories and output queues that are currently shared. If you have never used AS/400 NetServer before, you may see some objects that already exist. The list may include QCA400 and QIBM, which contain files that are associated with Client Access. An example of a list of shared objects is shown in Figure 8.

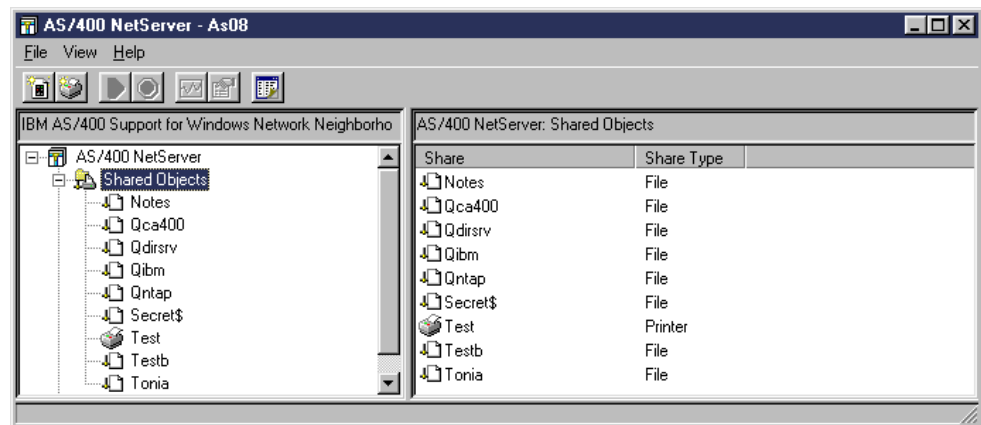


Figure 8. AS/400 shared objects

You can view a list of shared objects by performing the following steps:

1. Open a connection to Operations Navigator on your AS/400 system.
2. Expand **Network**.
3. Expand **Servers**.
4. Click **TCP/IP** to view a list of TCP/IP servers available.
5. Right-click **AS/400 NetServer**, and select **Open**.
6. Expand **Shared Objects** to display a list of currently shared objects.

### 3.1 AS/400 NetServer file shares

An AS/400 NetServer file share is a directory path that AS/400 NetServer shares with PC clients on the network. A file share can be configured for any integrated file system directory on the AS/400 system. You can create, display, configure, and end AS/400 NetServer file shares.

#### Note

Unlike Client Access, AS/400 NetServer does not share the entire integrated file system with the network by default. The directories that are automatically shared with the network are `QCA400` (by AS/400 NetServer) and `QIBM` (by Client Access Express for Windows).

To create a new file share by using Operations Navigator, follow these steps:

1. Open a connection to Operations Navigator on your AS/400 system.
2. Expand **Network**.
3. Expand **Servers**.
4. Click **TCP/IP** to retrieve a list of TCP/IP servers available.
5. Right-click **AS/400 NetServer**, and select **Open**.
6. Right-click **Shared Objects**, and select **New-> File**.
7. Use the **General Properties** page, as shown in Figure 9, to configure the new file share with a name, description, access, maximum number of users, and directory path name.

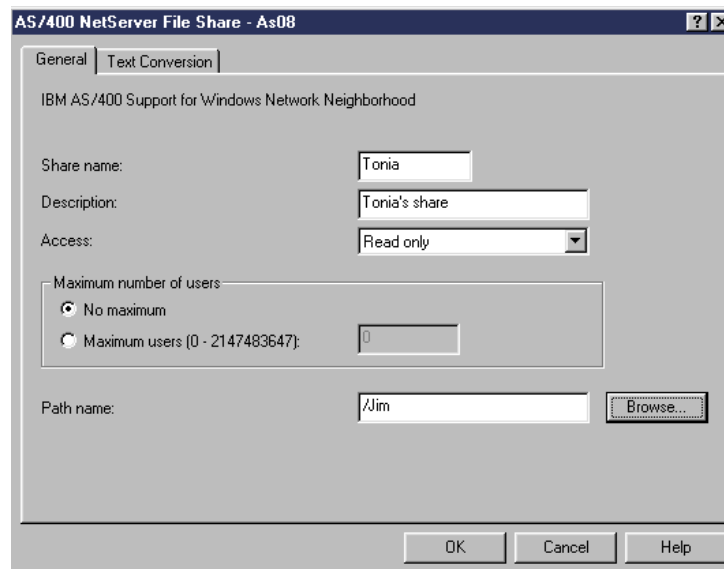


Figure 9. Create a new file share

If you do not know the directory path, you can click on the **Browse** button to get a list of the integrated file system. An example is shown in Figure 10 on page 27.



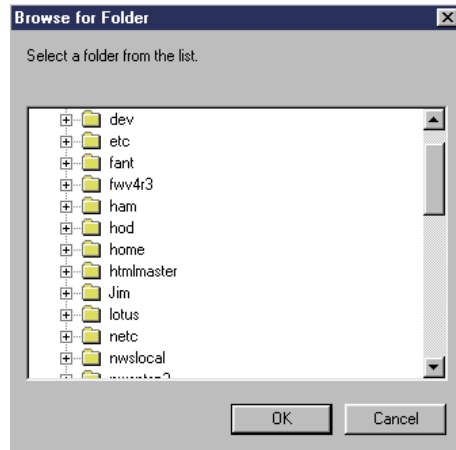


Figure 10. Browsing the integrated file system

You have to explicitly share a directory or library on the AS/400 system to make it available through AS/400 NetServer. Unlike the Network Drive of Client Access for Windows clients, the entire integrated file system including QSYS.LIB is not visible to all clients, only those objects that are shared.

8. Use the Text Conversion page to identify which file types will have their contents converted from the AS/400 file code page to the code page you specify for the share. For more information, see 3.1.1, “File text conversion” on page 29.

To create a new folder in the AS/400 integrated file system, using Operations Navigator, follow these steps:

1. Expand **File Systems**.
2. Expand **Integrated File System**.
3. Right-click **Root**, and select **New Folder**.
4. Enter the name for the new object. This new folder now displays when you browse to the location of where you want to place your new file share.

**Tip**

You can also create a share on an existing integrated file system directory from within Operations Navigator if you right-click on the directory, and select **Sharing-> New Share**.

You can stop the sharing of an integrated file system directory by right-clicking on the shared resource and selecting **Stop Sharing**. However, a file share that is stopped is still available to clients that are already using the share. A file share that has been ended is not available for any new client requests. Any attempts to create a new connection to this share will fail. In addition, once you have selected to stop sharing a resource, the share is removed entirely, but the directory is not removed.

To remove the directory, follow these steps:

1. Expand **File Systems**.
2. Expand **Integrated File System**.

3. Select **Root**.
4. Find the directory that you want to remove, right-click, and select **Delete**.

At this point, keep in mind that when you create a new folder in the integrated file system, by default, the AS/400 system gives \*PUBLIC all rights to this object. If you do not want to allow this type of permission, in the integrated file system under the **Root** folder, right-click on the new object that you just created and select **Permissions**. The display shown in Figure 11 appears.

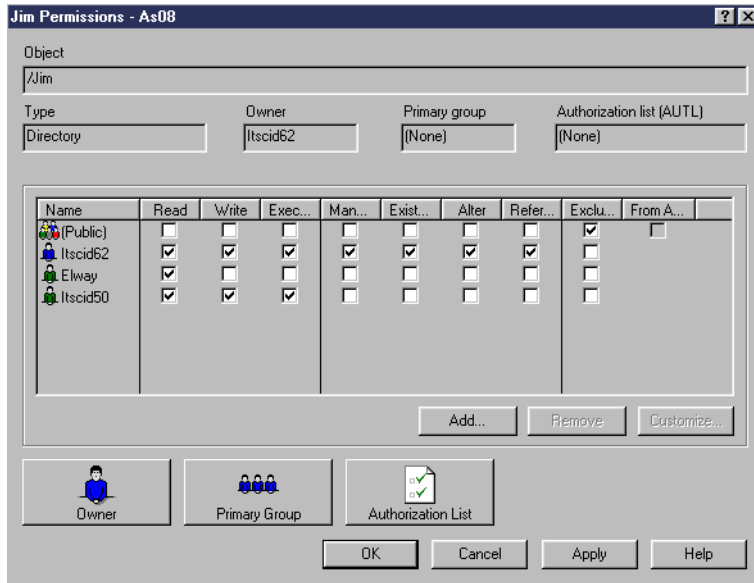


Figure 11. Folder permissions

**Note**

If a share that you create is defined as Read/Write, normal AS/400 security is in effect. That is, the authority that is granted under the AS/400 user profile and the permissions set for that particular directory will be used.

However, if a share is set to Read only, the privileges granted by the AS/400 user profile do not matter. Files in that directory cannot be altered, moved, or deleted.

At this point, if you prefer to limit access to selected users that you choose, select the **Exclude** check box from the **Public** name. If a share is defined with Read/Write access and the objects accessible through this share have their permissions set to \*PUBLIC \*ALL, all users have access to your files. Add specific authorities for selected users by name or group.

### 3.1.1 File text conversion

In V4R4 and later, you can specify AS/400 file types that are automatically converted from EBCDIC to ASCII and vice versa. With text conversion enabled, AS/400 EBCDIC data is automatically translated to ASCII when it is downloaded to the PC to be viewed, for example, using Windows Notepad.

To configure text conversion on an existing file share, information on the Text Conversion page must be added as shown in Figure 12.

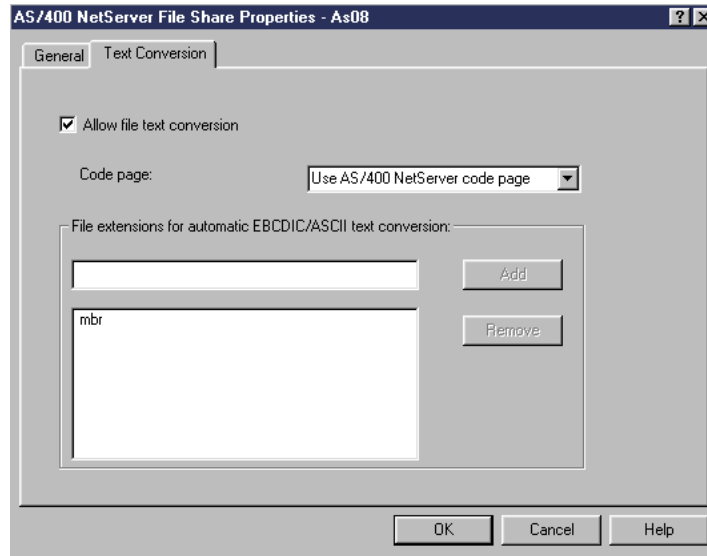


Figure 12. File text conversion

Using Operations Navigator, follow these steps:

1. Open a connection to Operations Navigator on your AS/400 system.
2. Expand **Network**.
3. Expand **Servers**.
4. Click **TCP/IP** to retrieve a list of TCP/IP servers available.
5. Right-click **AS/400 NetServer**, and select **Open**.
6. Double-click **Shared Objects**.
7. Locate the file share that requires the text conversion, and right-click on it. Select **Properties**.
8. Click on the **Text Conversion** tab.

The Code Page parameter defines the ASCII code page used for converting data for this share. The default is to use the AS/400 NetServer code page. You define the AS/400 NetServer code page on the AS/400 NetServer Properties page shown in Figure 4 on page 15.

The text conversion is triggered by file extensions. For example, an AS/400 file member is displayed in the Network Neighborhood with the file extension .mbr. To enable automatic text conversion for file members, follow these steps:

1. Type the extension type of the files that you want to convert. In the example shown in Figure 12, the .mbr file type is added.

2. Click the **Add** button.
3. Click **OK**.

**Notes**

- Text conversion is disabled when the option **Allow file text conversion** is deselected.
- If necessary, you can share a file more than once. This may be a useful solution if more than one user wants to perform text conversion for different languages on the same file.

This functionality may be particularly useful for customers who wish to edit files such as the source of the AS/400 startup program (by default QSYS/QSTRUP). Figure 13 shows the source of the QSTRUP program as seen on the AS/400 when using Source Entry Utility (SEU).

```

Columns . . . : 1 71          Browse          QGPL/STRUP
SEU==>          QSTRUP
FMT **  ...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
***** Beginning of data *****
0001.00 /*****
0002.00 /*
0003.00 /* 5769SS1 V4R4M0 990521      RTVCLSRC Output      10/19/99 10:07:11  */
0004.00 /*
0005.00 /* Program name . . . . . : QSTRUP          PN*/
0006.00 /* Library name . . . . . : QSYS           PL*/
0007.00 /* Original source file . . . . . : QCLSRC        SN*/
0008.00 /* Library name . . . . . : QGPL           SL*/
0009.00 /* Original source member . . . . . : QSTRUP        SM*/
0010.00 /* Source file change
0011.00 /* date/time . . . . . : 10/13/99 19:05:55 SC*/
0012.00 /* Patch option . . . . . : *NOPATCH       PO*/
0013.00 /* User profile . . . . . : *USER          UP*/
0014.00 /* Text . . . :
0015.00 /* Owner . . . . . : DEEPAKP          OW*/
0016.00 /* Patch change ID . . . . . :
F3=Exit  F5=Refresh  F9=Retrieve  F10=Cursor  F11=Toggle  F12=Cancel
F16=Repeat find  F24=More keys

```

Figure 13. QSTRUP program

Using AS/400 NetServer, you can now edit the source physical file member with a PC text editor. An AS/400 NetServer file share is configured to the location where the source physical file member resides. The Text Conversion properties are modified as shown in Figure 12 on page 29.

Figure 14 on page 31 shows the directory representation of the source physical file that holds the member we want to change.



Figure 14. File share

If files with extension .mbr are not associated with any text editors on the PC, you can hold the **Shift** key down and right-click on the file to obtain an Open With... command. You can then select which editor you wish to use to view and amend the file.

In Figure 15, we use the Notepad utility to edit the Qstrup.mbr file.

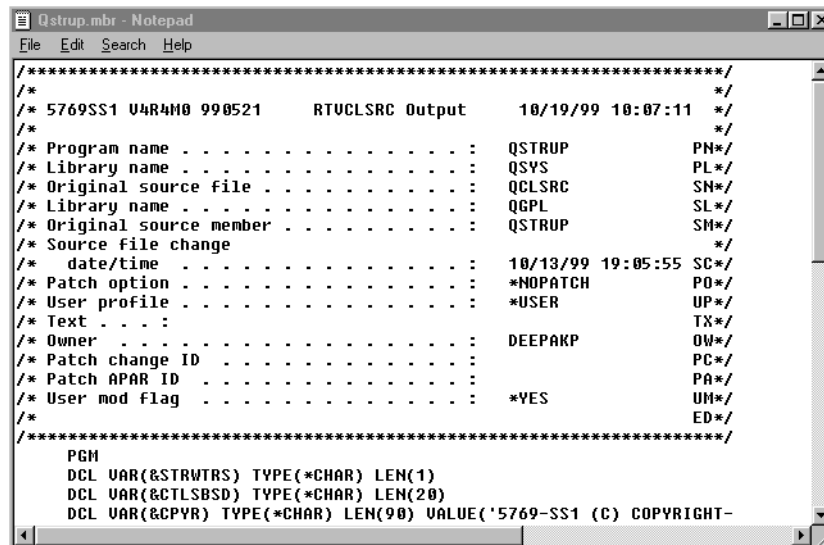


Figure 15. Notepad view of file member

In our environment, we deleted some lines using Notepad. When the file was saved by using **File-> Save**, the changes could be seen in the AS/400 file member when it was viewed as an EBCDIC file with SEU.

## 3.2 Mapping network drives

You can use your Windows clients to access AS/400 file shares with AS/400 NetServer by simply mapping a logical drive. Depending on your operating system, the procedures used to accomplish this may be somewhat different.

### **Windows 95/98/NT**

There are several ways to map network drives:

- Select **Find-> Computer**. Locate your AS/400 NetServer. Then, open it by double-clicking on it. Select the file share you need, and right-click on it to get the context menu. Select **Map Network Drive**.
- Using Windows Explorer, open the **Tools** file pull-down menu, and select **Map Network Drive**.
- Through Operations Navigator, select **File Systems-> File Shares**.
- Use the NET USE command.

To map a network drive using Windows Explorer, follow these steps:

1. Right-click the **Start** button, and choose **Explore** to open the Windows Explorer.
2. Open the **Tools** pull-down menu on the Windows Explorer, and select **Map Network Drive**.
3. Select the letter of a free drive for the file share.
4. Enter the Universal Naming Convention (UNC) name of an AS/400 NetServer file share, where `AS/400NetServerName` is the server name of AS/400 NetServer on AS/400, and `Sharename` is the name of the file share you want to use.

#### **Note**

The UNC is a naming format used to specify the location of resources on a local area network (LAN). UNC uses the following format:

```
\\server-name\shared-resource-pathname
```

For example, you could enter the following name:

```
\\AS/400NetServerName\Sharename
```

5. Click **OK**.

### **Windows 3.11**

To map an AS/400 NetServer file share to a logical drive on your Windows 3.11 PC, follow these steps:

1. Open the **Windows File Manager**.
2. Open the **File** menu, and select the **Connect Network Drive** menu item.
3. Specify the UNC name of the file share in the Path field, where `AS/400NetServerName` is the name of AS/400 NetServer on AS/400 and `Sharename` is the name of the file share you want to use. For example, you could enter:

```
\\AS/400NetServerName\Sharename
```

4. Click **OK**.

### **Operations Navigator**

An AS/400 NetServer administrator can use Operations Navigator to map a drive to a share that was created using AS/400 NetServer. To do this, follow these steps:

1. Open a connection to your AS/400 using Operations Navigator.
2. Expand **File Systems**.
3. Open **File Shares**.
4. Right-click on the share to which you want to map, as shown in Figure 16.

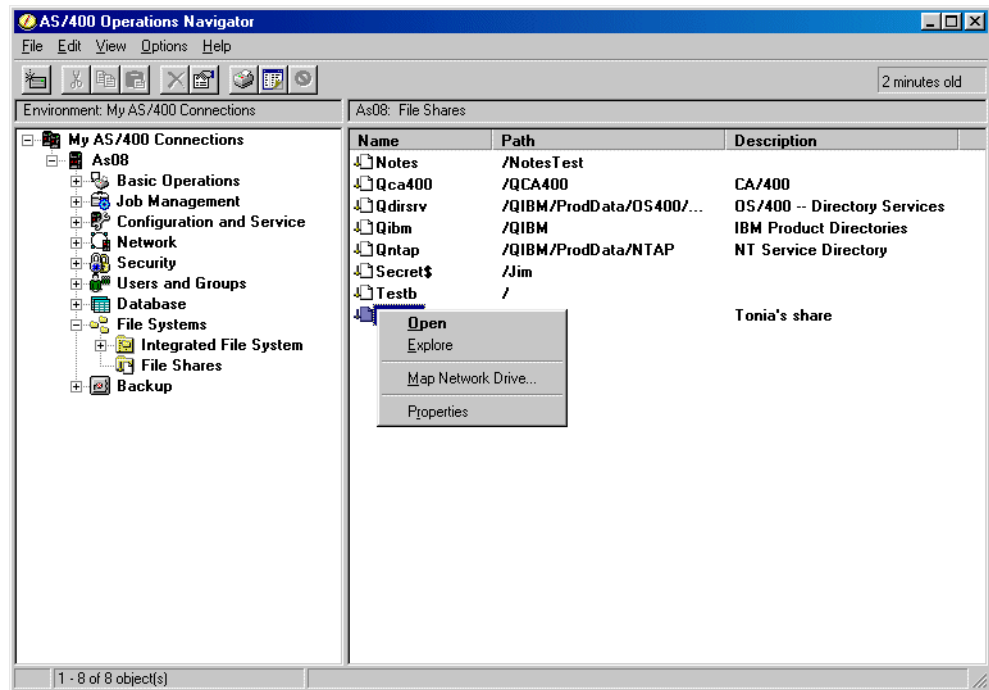


Figure 16. Map a network drive

5. Select **Map Network Drive...**
6. Select a drive letter that is currently not being used.

If you do not know what operating system you are using, the following example creates a logical drive, regardless of the Windows platform:

1. Open an MS-DOS window.
2. Enter the following command (where *z:* is a drive not in use, *AS/400NetServerName* is the name of your AS/400 NetServer, and *Sharename* is the name of the file share that you want to map):

```
net use Z: \\AS/400NetServerName\Sharename
```

#### Notes

You do not always need to map a drive to access files in a shared directory. Instead, you can use the Windows drag and drop function to place the shared file or folder on your desktop. To do this, follow these steps:

1. Use **Find-> Computer** to access AS/400 NetServer.
2. Select the shared resource.
3. Drag and drop the shared resource to your desktop.

Provided that you have the proper authority, you can also use the Copy and Paste function or the drag-and-drop technique to copy and move files between AS/400 NetServer and other clients on the Microsoft network. For example, in Figure 17, you can copy the **test.txt** file from the AS/400 NetServer (**Qas08**) to the Test directory in the AS/400 NetServer (**Qas23**) by using either the Copy function or the drag-and-drop technique. You can drag the test.txt icon from within the window on Qas08 onto the icon for the Test directory on QAS23. The file will be copied into the directory.

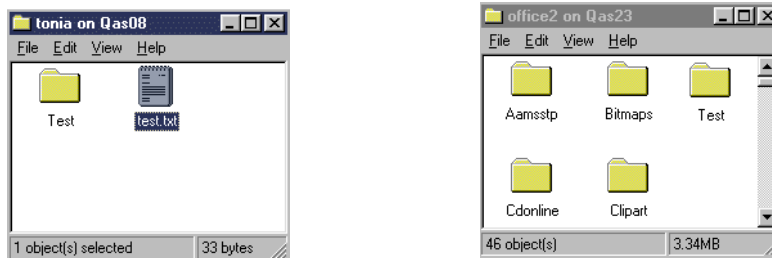


Figure 17. Copying the test.txt file to the Test folder

### 3.3 AS/400 NetServer print shares

You can share any AS/400 output queue with PC clients in the network by using AS/400 NetServer. Consequently, you can create, display, configure, and end print shares.

AS/400 NetServer uses the QNPSEVD and QNPSEVS jobs for printing. These are the same jobs used by Client Access for Windows 95/NT. These Network Print Server jobs can be started by using the following command once the QSYSWRK and QUSRWRK subsystems are started:

```
STRHOSTSVR SERVER (*NETPRT)
```

To create a print share by using Operations Navigator, follow this process:

1. Open a connection to Operations Navigator on your AS/400 system.
2. Expand **Network**.
3. Expand **Servers**.
4. Click **TCP/IP** to retrieve a list of the TCP/IP servers available.
5. Right-click **AS/400 NetServer**, and select **Open**.
6. Right-click **Shared Objects**, and select **New**. Then, select **Printer**.

The window shown in Figure 18 on page 35 appears. If you are using OS/400 V4R2 or V4R3, your display will look slightly different since you will not have a Printer file option and you cannot specify the Spooled file type to be Auto-select.



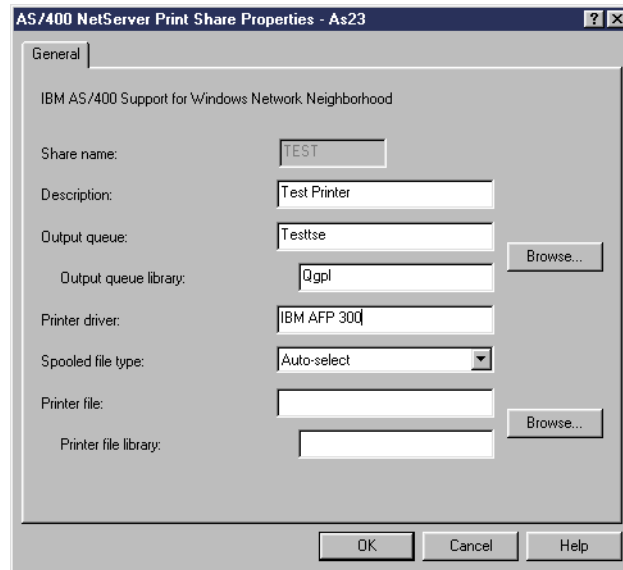


Figure 18. Create a print share

7. Configure the new print share with a name, description, output queue, printer driver, spooled file type, and printer file.

**Note**

The default printer file is \*LIBL/QPNPSPRTF and is located in the QSYS library by default.

### 3.3.1 Authority considerations

Authority to access the AS/400 output queues is required and can be set by using the Edit Object Authority (`EDTOBJAUT`) command. It is important to review the necessary authorities to prevent unauthorized actions on the spooled files in the output queues.

At least \*USE authority must be defined for the users who should use an output queue. It may be easier to give \*PUBLIC the \*USE authority. This level of authority allows the following operations on the output queue:

- Spooled files can be sent to that output queue.
- All spooled files on the output queue can be seen.
- Only the users' individual spooled files can be manipulated. Alterations, including deleting, to any other spooled files will be rejected with an authority error.

A user created with \*SPLCTL special authority on the AS/400 system can perform all functions on all the entries in an output queue. The security of spooled files and output queues is covered in *OS/400 Security*, SC41-5302.

---

## 3.4 Installing a network printer

Once you share an AS/400 output queue with the network, you have to enable the PC client to direct the output to this particular output queue. This is achieved by installing a network printer in Windows. A print share consists of an AS/400 output queue and output queue library, printer driver, and spooled file type. The following spooled file types are supported:

- **User ASCII:** Is used when the application is able to generate printer output specific to a certain type of printer.
- **Advanced Function Printing (AFP):** Is a printer definition language that is used on laser printers attached to the AS/400 system. It is used to mix text and graphics.
- **SNA Character String (SCS):** Is widely used with matrix and line printers attached to the AS/400 system. SCS printers are typically used to print lists.
- **Auto-select:** AS/400 NetServer determines which type of printer data stream is used in the output sent to the AS/400 system and creates the spooled file. Auto-select is available in V4R4 and later.

### Note

The spooled file types determine how the spooled files are created on your AS/400 system. If Auto-select is not used, the spooled file type must correspond exactly to the output queue destination or you will experience a print error. IBM recommends using Auto-select unless you experience problems with printing. For more information, refer to *AS/400 Printing V, SG24-2160*.

A printer that you share may be attached to the AS/400 system in one of three ways:

- Locally
- Over a LAN
- Through a PC5250 printer emulation

### 3.4.1 Using an IBM AFP or SCS printer

### Note

It is important to note that the printer driver specified in the AS/400 NetServer print share configuration (shown in Figure 18 on page 35) must match the printer model. This is so the correct driver is used when adding a printer on the PC client.

To use an IBM AFP or SCS printer, you can install the printer drivers shipped with Client Access Express for Windows. Follow these steps to install the network printer:

1. Connect to AS/400 NetServer, and open the explorer view of the AS/400 NetServer shares, as shown in Figure 19 on page 37.

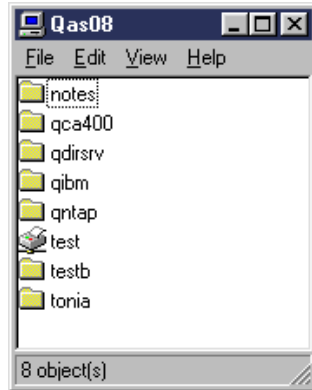


Figure 19. Available AS/400 NetServer shares

2. Double-click on the print share that you want to use. The message box shown in Figure 20 appears.

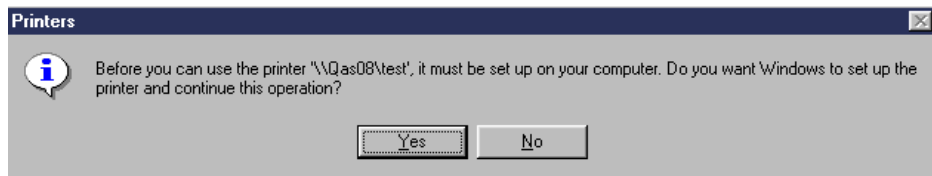


Figure 20. Installing a printer driver

3. Click **Yes** and proceed through the Add Printer Wizard display shown in Figure 21.

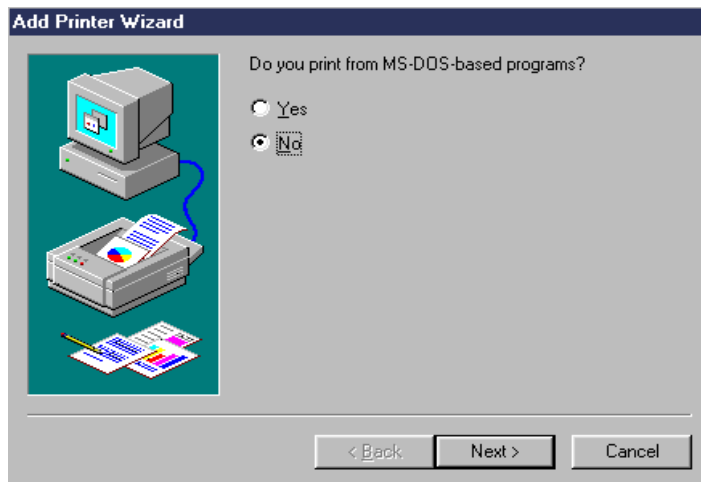


Figure 21. Add Printer Wizard

**Note**

The procedure that is used to access print shares, and this wizard, is somewhat different depending on the Windows operating system that you use. Refer to 3.5, “Using your Windows clients to access print shares” on page 39, for more information.

4. If you have not installed the specified printer driver on the client PC that was defined in the Printer Driver box within the print share definition (see Figure 18 on page 35), then you will be prompted with a list of drivers, as displayed in Figure 22. This choice is also necessary if no printer driver was specified in the Printer Driver options within the print share definition.

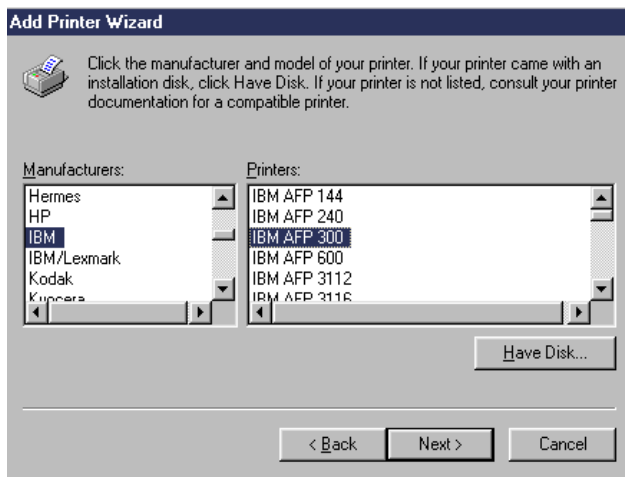


Figure 22. Add Printer Wizard

**Note**

Client Access family members (prior to Express client) must use a custom installation and select printer drivers under Operations Navigator to cause IBM to show up as a printer manufacturer.

Select the appropriate printer model. The name of the printer model is the Printer Driver name you need to specify when defining a print share as shown in Figure 18 on page 35.

When you click **Next** on this panel, a printer object is added to your PC printer folder. You can now use this printer from any Windows application.

#### 3.4.1.1 AS/400 AS/400 NetServer without Express client

If you are using AS/400 AS/400 NetServer without Client Access Express for Windows, you can find stand-alone AFP and SCS printer drivers in the Client Access for Windows 95/NT directory (\QCA400\Win32\Install\Printer) on the AS/400 system. AFP print drivers are also available for free as a download from the IBM Printing Systems Company Web site at: <http://www.printers.ibm.com>

Note, however, that you do not need a Client Access/400 Windows Family license (5769XW1) to use the AFP and SCS printer drivers available from Client Access Express for Windows install images accessed by using the QIBM AS/400 NetServer file share.

---

## 3.5 Using your Windows clients to access print shares

There are several ways to install network printers with Windows 95/98/NT:

- Select **Find-> Computer**. Locate your AS/400 NetServer. Then, open it by double-clicking on it. Select the print share. Then, right-click to get the context menu with **Open** or **Install**.
- Double-click on the print share you wish to install.
- Select **Start-> Settings-> Printers**, double-click **Add Printer**, and specify the UNC name of the network printer in the format:  

```
\\AS/400ServerName\ShareName
```
- Use the NET USE command.

You can use your Windows clients to access print shares with AS/400 NetServer by completing the steps described in the following sections.

### **Windows 95/98**

To access print share using Windows 95 or 98, complete this series of steps:

1. Open the Windows **Start** menu.
2. Select **Find**, and then select **Computer**.
3. Enter the AS/400 NetServer server name.
4. Click **Find Now**.
5. When the computer is found, double-click on it.
6. Double-click on the shared printer.
7. Select **Yes** to setup the printer.
8. Select the appropriate response for MS-DOS based programs.
9. If prompted, select the appropriate driver for your printer.
10. Click **Next**
11. If prompted, enter a printer name for your shared printer, and then click **Next**.
12. Choose whether to print a test page from the shared printer.
13. Click **Finish**.

### **Windows NT**

When using Windows NT to access the print shares, follow these steps:

1. Open the Windows **Start** menu.
2. Select **Find**, and then select **Computer**.
3. Enter the AS/400 NetServer server name.
4. Click **OK**.
5. Open AS/400 NetServer by double-clicking the computer that was found.
6. Right-click a shared printer, and select **Open**.
7. If prompted, select **Yes** to set up the printer on your computer.
8. If prompted, select the appropriate driver for your printer.
9. Click **Next**.
10. When you have properly set up the shared printer, click **Finish**.

### **Windows 3.11**

You can use your Windows 3.11 (Windows for Workgroups) PC client to access print shares from the AS/400 system with AS/400 NetServer by following these steps:

1. Map an AS/400 printer output queue to a logical printer on the Windows 3.11 PC client:

- a. Open an MS-DOS window.
- b. Enter the following command at the DOS prompt to get a list of AS/400 print shares:

```
net view \\AS/400NetServerName
```

- c. Choose a print share (output queue) name from the list provided.
- d. Enter the following command:

```
net use lpt2: \\AS/400NetServerName\Sharename
```

**Note**

In this example, the name of the logical printer port that you want to map the print share to is lpt2. AS/400NetServerName is the name of AS/400 NetServer on AS/400. Sharename is the name of the desired print share.

2. Map the AS/400 NetServer print share to a Windows 3.11 PC client printer driver:
  - a. Open **Control Panel** in the Main program group.
  - b. Open **Printers**.
  - c. Click the **Add** button on the Printers window.
  - d. Select the appropriate printer from the list provided.
  - e. Click **Install**. You may need to provide the necessary printer driver with your Microsoft Windows 3.11 installation diskettes.
  - f. Select the installed printer driver.
  - g. Click **Connect**.
  - h. Select the logical printer port you mapped in earlier (for example, lpt2), and click **OK**.

**Note**

If you choose to delete a configured printer, you may be prompted with a message indicating that certain files are no longer in use and will also be deleted. These files include the necessary printer driver. Select **Yes** if you are sure that the printer will not be used again. If you then find that you want to use it later, you have to reinstall the driver.

### 3.6 PC5250 printer emulation session

Consider the example shown in Figure 23.

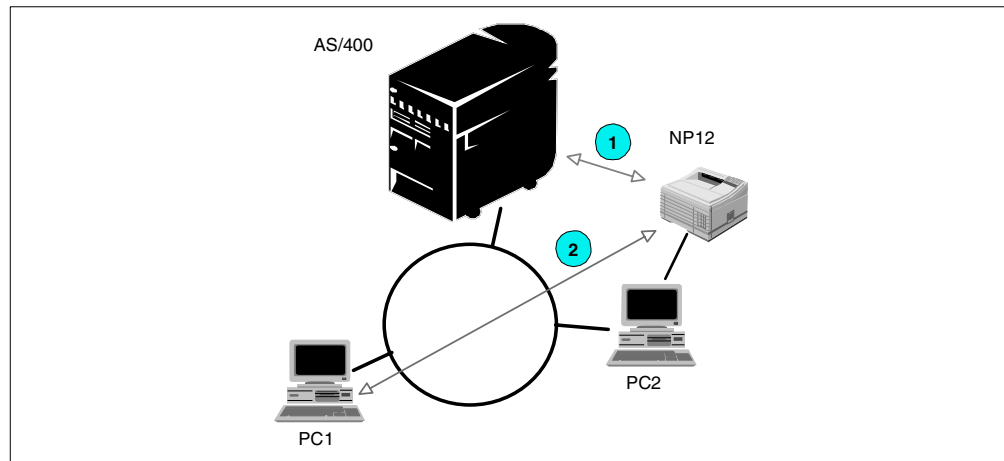


Figure 23. PC5250 printer emulation

PC2 is connected to an AS/400 system on the Token-Ring using Client Access. Printer NP12, which is an IBM Network Printer 12, is attached to the parallel port of PC2. The printer is a Postscript printer.

There is a PC5250 printer emulation session on PC2 that connects NP12 to the AS/400 system. In Figure 23, this connection is represented with the arrow marked with a "1". The AS/400 system cannot print to NP12 because the printer is a Postscript printer, and the AS/400 system cannot produce Postscript output.

In our example, the AS/400 system shares an output queue for printer NP12 using the spooled file type User ASCII.

PC1 is connected to the AS/400 system and the AS/400 NetServer, and has requested to install a network printer for the print share NP12. In the course of installing the printer, the printer driver is requested, as shown in Figure 20 on page 37. The printer driver used will be IBM Network Printer 12 because that is the type of printer installed on PC2.

The (virtual) connection between PC1 and NP12 is shown as an arrow marked with a "2" in Figure 23.

Connection 1 is *PC5250 printer emulation*. The printer data stream is sent from the AS/400 system to PC2, which in turn sends it to the printer attached to it.

Connection 2 is *printer sharing*. PC1 sends its printer data stream to the AS/400 system, which forwards it to the printer attached to PC2.

In this example, PC1 is spooling data to a PC attached printer. Therefore, the print share on AS/400 NetServer is configured to spooled file type User ASCII. That means the AS/400 system does not process the data sent from PC1, but sends it directly to PC2, which, in turn, passes it on to NP12. The output queue on the AS/400 system that is created for this printer emulation session can be shared using AS/400 NetServer.

For more information on PC5250 printer emulation, refer to *AS/400 Client Access Express for Windows: Implementing V4R4M0*, SG24-5191.

**Note**

If the printer that you share is neither an AFP or a SCS printer or a PC5250 printer emulation session, you need to install the driver of the printer manufacturer.

---

### 3.7 Using AS/400 NetServer from a DOS window

There are still users who prefer a simple command line over a GUI. There are still methods in Windows that allow network administration and resource access using a command prompt. Of course, these commands can also be used in batch files. Here are a few examples:

**net view \\qas400**

Gives a list of all shared resources for AS/400 NetServer Qas400

**net use x: \\qas400\qibm**

Maps the directory shared with AS/400 NetServer file share qibm to network drive x:

**net use x: /del**

Disconnects the drive mapped x:

**dir \\qas400\qibm**

Displays the contents of the directory shared with AS/400 NetServer file share qibm

**net print \\qas400\printer**

Displays the list of spooled files in the output queue shared with AS/400 NetServer print share printer

**net use lpt3: \\qas400\printer**

Redirects a local print port towards the output queue shared with the AS/400 NetServer print share printer

**net use lpt3: /del**

Disconnects the redirected port lpt3:

---

### 3.8 AS/400 NetServer session properties

AS/400 NetServer starts a session on the AS/400 system whenever a client accesses a shared file or print resource. You can view the current statistics for a workstation session connection to AS/400 NetServer through Operations Navigator. The session displays the PC client and user name, as well as the properties that document the activity of the user since the session was established. However, you cannot change or reconfigure the session connection statistics, because they are records of client activity that only contain information.

After you view the list of available sessions, double-click a session. Then, right-click the share connection, and select **Status**. In addition, you can end a session by right-clicking on the user session and selecting **Stop**. This stops all client workstation use of file and print shares on that session.



To display the properties for an AS/400 NetServer session, follow these steps:

1. Open a connection to your AS/400 using Operations Navigator.
2. Expand **Network**.
3. Expand **Servers**.
4. Click **TCP/IP** to retrieve a list of the TCP/IP servers available.
5. Right-click **AS/400 NetServer**, and select **Open**.
6. Expand **Sessions**. If any sessions have been established, they will be displayed as shown in Figure 24.

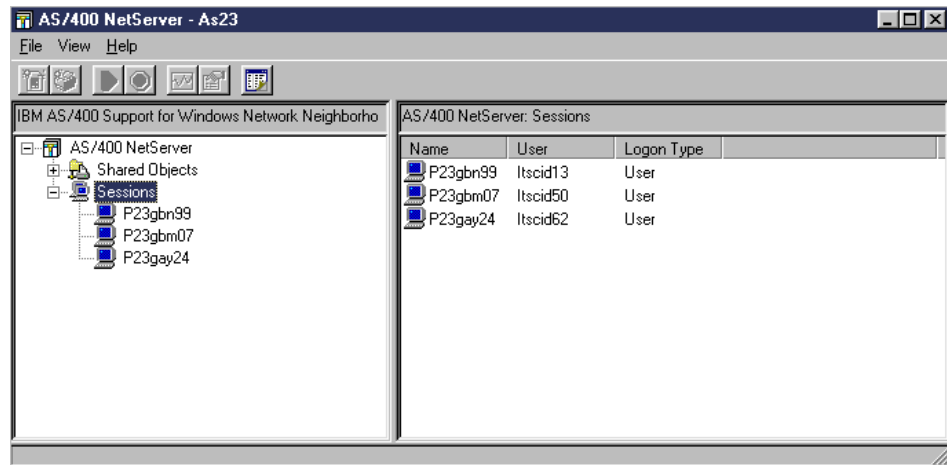


Figure 24. AS/400 NetServer sessions

7. Right-click a user session, and select **Properties**. Information about a particular session is displayed, as shown in Figure 25.

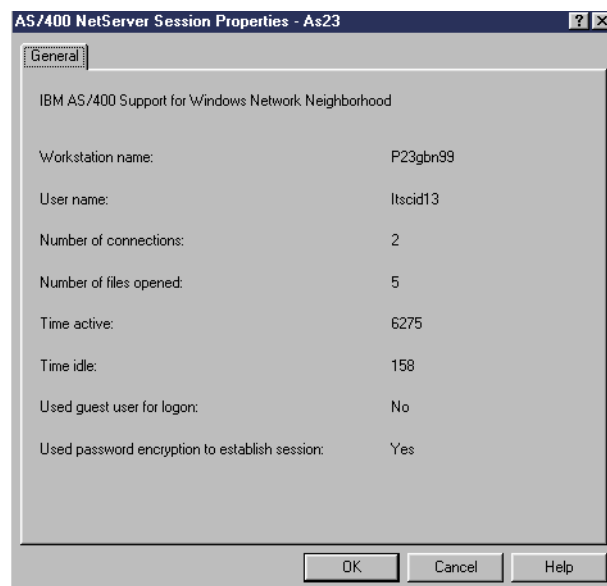


Figure 25. AS/400 NetServer session properties

### 3.8.1 Multiple user support

AS/400 NetServer now supports multiple users, including guests, logged on from the same workstation. Information for each session now displays the actual user name even if the guest account was used for authentication. If guest support is used to establish the session, the value of the Logon Type indicates Guest as shown in Figure 26.

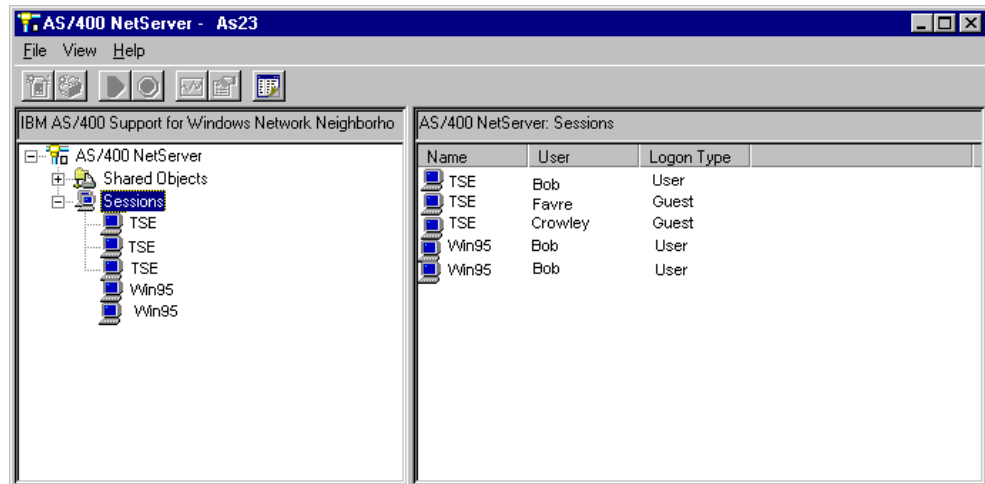


Figure 26. Multiple session support

As a result, you can see duplicate sessions with the same workstation and user name, when you display session properties for the duplicate session. The cumulative total from all sessions with the same workstation and user name is retrieved for the following fields:

- Number of connections
- Number of files opened

The shortest idle time and the longest session establishment time retrieved from all sessions with the same workstation and user are also displayed. This also applies if multiple sessions are established for a workstation with different users, and the User profile name field contains a value of \*.

There may be more AS/400 NetServer sessions than there are users accessing AS/400 NetServer. These additional sessions are established by the client for various reasons, and they may have active user activity. Because AS/400 NetServer now allows the establishment of multiple sessions from the same workstation, many times clients take advantage of this support even for a single user.

When listing explored shared objects for an individual session, connection information for all sessions with the same workstation name are displayed.

When the AS/400 NetServer idle time-out value has expired for a session, then that session will end. This occurs regardless of whether there are open files for that session.

When you attempt to end an AS/400 NetServer session for a workstation from which multiple sessions are established, an unpredictable subset of sessions with the same workstation name is ended. AS/400 NetServer ends the first NetBIOS

over TCP/IP (NBT) session found for that workstation, which could result in the specified AS/400 NetServer session being ended along with all other user activity for that NBT session, or another AS/400 NetServer session altogether. For more information on this topic, see 8.5.1, “Multiple session support” on page 122.

Multiple users can be active from the same workstation session. Ending a user session ends all AS/400 NetServer file and print activity for that workstation session.

---

## 3.9 Monitoring AS/400 NetServer

This section demonstrates how to view the AS/400 NetServer status and statistics.

### 3.9.1 Viewing AS/400 NetServer status

The AS/400 NetServer status screen provides an overview of various statistics relating to an active AS/400 NetServer. To display the AS/400 NetServer status screen, follow these steps:

1. Open a connection to your AS/400 using Operations Navigator.
2. Expand **Network**.
3. Expand **Servers**.
4. Click **TCP/IP** to retrieve a list of the TCP/IP servers available.
5. Right-click **AS/400 NetServer**, and select **Status**.

Figure 27 shows the status information available for AS/400 NetServer.

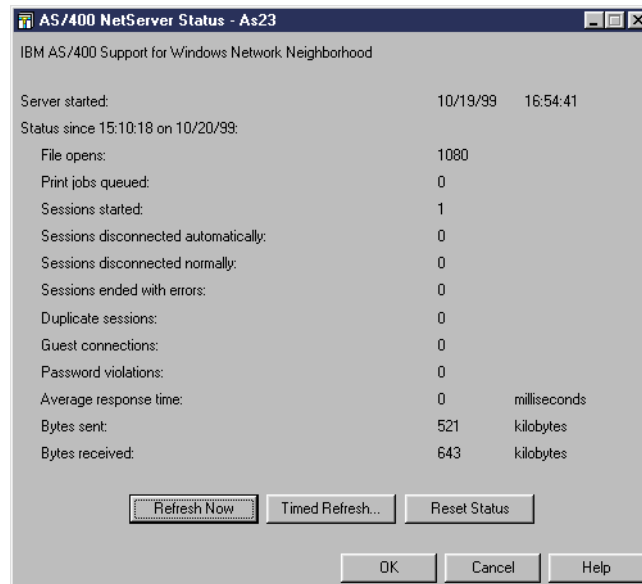


Figure 27. AS/400 NetServer status

In addition, there are three buttons that are available:

- **Refresh Now:** When used, this button refreshes the screen immediately.
- **Timed Refresh:** The frequency of the refresh can be configured. When the Timed Refresh window appears, check the **Timed Refresh** box. This enables a value (in minutes) to be entered.
- **Reset Status:** When used, this button resets all statistics to zero.

Because there is no longer a one-to-one correlation between the NBT and AS/400 NetServer sessions, the AS/400 NetServer Statistics have different meanings. Values for Sessions ended with errors and Duplicate sessions are no longer supported and will always be zero. Sessions disconnected normally include sessions disconnected for any reason except being idle timed out.

For further details on the individual statistics, consult the Operations Navigator Help information.

### 3.9.2 Displaying server jobs

Starting with V4R4, it is possible to view the server jobs running on the AS/400 system. This also includes all AS/400 NetServer related jobs.

To view the server jobs, perform the following steps:

1. Open a connection to your AS/400 using Operations Navigator.
2. Expand **Job Management**.
3. Expand **Server Jobs**.

From this window, you can manipulate an AS/400 NetServer job and gather information about it. This is done by selecting the job and right-clicking on it.

### 3.9.3 Viewing shared object status

The Shared Object Status screen displays the current statistics for the shared object connection to the server. To view the shared object status window, complete the following tasks:

1. Open a connection to your AS/400 using Operations Navigator.
2. Expand **Network**.
3. Expand **Servers**.
4. Expand **TCP/IP**.
5. Right-click **AS/400 NetServer**, and select **Open**.
6. Expand **Sessions**.
7. Click on the object for which the status information is required. The shared object connections are listed in the right column of the screen.
8. Right-click on the required shared object connection, and select **Status**. The window shown in Figure 28 on page 47 is displayed.

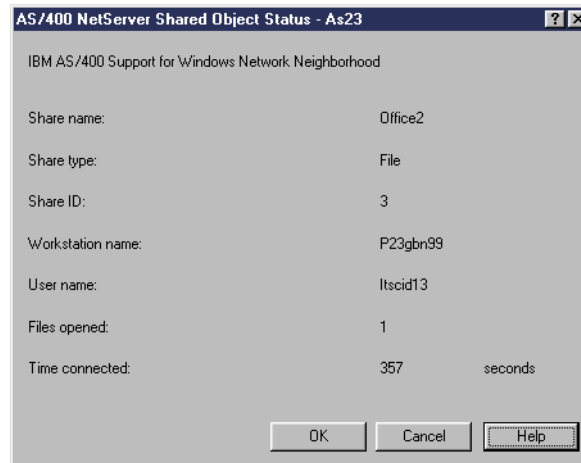


Figure 28. Shared object status

For further details on the individual statistics, refer to the Operations Navigator Help information.

### 3.9.4 Viewing session status

The Session Status screen displays the current statistics for the workstation connection to the server. To view the session status window, complete the following steps:

1. Open a connection to your AS/400 using Operations Navigator.
2. Expand **Network**.
3. Expand **Servers**.
4. Expand **TCP/IP**.
5. Right-click **AS/400 NetServer**, and select **Open**.
6. Expand **Shared Objects**.
7. Double-click on the client for which the status information is required. The session connections are listed in the right column of the screen.
8. Right-click on the required session connection, and select **Status**. The window shown in Figure 29 on page 48 is displayed.

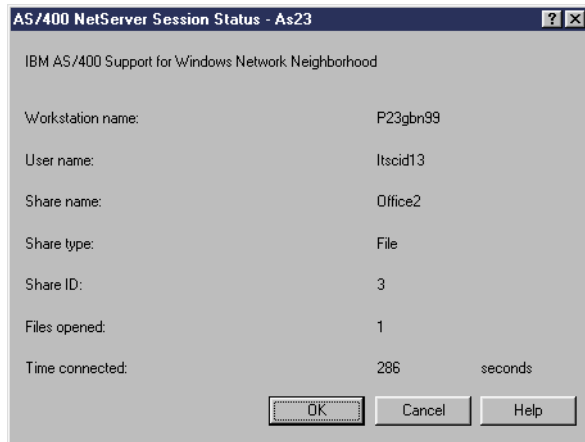


Figure 29. Session status

For further details on the individual statistics, refer to the Operations Navigator Help information.

---

### 3.10 Backup and recovery of configuration and share information

AS/400 NetServer uses files in the integrated file system to store configuration values and share information. User data is also in the integrated file system. All these files can be saved using normal AS/400 commands:

- **SAVOBJ** or **SAVLIB**: Used if the data resides in QSYS or libraries within QSYS.
- **SAV**: Used if the data is stored somewhere else in the integrated file system.
- **SAVDLO**: Used if the data is in a folder.

Because the configuration file and data files are in the integrated file system, you will back them up every time that you save the entire AS/400 system. You should also back up the configuration files each time you change the administration of AS/400 NetServer. You should plan the frequency of your save operations carefully to ensure that you always have a usable backup available if your system should fail.

The location of the AS/400 NetServer configuration and share data files on the AS/400 system is: `/QIBM/UserData/OS400/NetServer`. The files that are needed are:

- **Qazlscfg**: Contains configuration information.
- **Qazlsshr**: Contains share information.
- **Qazlsexxxx**: Contains text conversion information for a file share, where xxxx is a file share name. This file only exists if text conversion is used.

Both the AS/400 NetServer configuration files and the user data can be backed up using the Entire System Save (option 21 on the SAVE menu). You can save individual directories and subdirectories with the SAV command. For further information on these commands and other useful save and restore options, refer to *OS/400 Backup and Recovery*, SC41-5304.

---

### 3.11 AS/400 NetServer administration using AS/400 APIs

The administration interface for AS/400 NetServer is provided through AS/400 Operations Navigator, which is part of Client Access. All administrative functions available through AS/400 Operations Navigator are accessible through AS/400 APIs. You may use the *AS/400 System API Reference*, SC41-5801, as a guide when implementing AS/400 administration through your CL, COBOL, RPG, C, and C++ programs. The available APIs include:

- Add File Server Share (QZLSADFS)
- Add Print Server Share (QZLSADPS)
- Change File Server Share (QZLSCHFS)
- Change Print Server Share (QZLSCHPS)
- Change Server Guest (QZLSCHSG)
- Change Server Information (QZLSCHSI)
- Change Server Name (QZLSCHSN)
- End Server (QZLENDIS)
- End Server Session (QZLENSIS)
- List Server Information (QZLSLSTI)
- Open List of Server Information (QZLSOLST)
- Remove Server Share (QZLSRMS)
- Start Server (QZLSSTRS)

---

### 3.12 Exit programs

AS/400 NetServer uses the same host servers as Client Access for Windows 95/NT. Therefore, the same user exit points are used. In fact, there is no way that the host server can tell the difference between a Client Access client and an AS/400 NetServer client. If you are using an AS/400 application for security, nothing needs to be changed if your clients use AS/400 NetServer instead of Client Access for Windows 95/NT for network drives and printers.

See Appendix C, “Exit program” on page 145, for an example of an exit program that may be useful for debugging.





## Chapter 4. AS/400 NetServer security

The use of AS/400 security ensures that unauthorized users do not have access to AS/400 NetServer resources, configuration, or share data. Unlike file serving from a Windows NT Server running on the Integrated Netfinity Server, you do not need to be concerned with another security model. That is, everything that applies to AS/400 user rights and permissions also applies to AS/400 NetServer.

### 4.1 AS/400 NetServer user profile authority requirements

You must have \*IOSYSCFG special authority to change AS/400 NetServer configuration properties. In addition, you must have \*SECADM and \*IOSYSCFG special authorities to set the guest user profile for AS/400 NetServer.

#### 4.1.1 Considerations for using the guest user profile

AS/400 NetServer supports guest user profiles (also known as an anonymous user profile). The guest user profile may be used if a user needs access to an AS/400 shared resource without a valid AS/400 user profile. The AS/400 system can automatically assign an unknown AS/400 user to the guest user profile to allow limited access to AS/400 NetServer shared resources.

If you want to use AS/400 NetServer print shares with a guest user profile, the guest user profile on the AS/400 system cannot have a password of \*NONE and must be enabled. The Network Print Server on the AS/400 system requires the user profile to have a password and be enabled. See Figure 30 for an example of the Create User Profile (CRTUSRPRF) command. Here, it is being used to create a guest user profile that can be used for AS/400 NetServer print shares.

```
                                Create User Profile (CRTUSRPRF)

Type choices, press Enter.

User profile . . . . . Guest           Name
User password . . . . . gu3st         Name, *USRPRF, *NONE
Set password to expired . . . . *NO          *NO, *YES
Status . . . . . *ENABLED            *ENABLED, *DISABLED
User class . . . . . *USER            *USER, *SYSOPR, *PGMR...
Assistance level . . . . . *SYSVAL     *SYSVAL, *BASIC, *INTERMED...
Current library . . . . . *CRTDFT      Name, *CRTDFT
Initial program to call . . . . *NONE        Name, *NONE
  Library . . . . .                Name, *LIBL, *CURLIB
Initial menu . . . . . > *SIGNOFF      Name, *SIGNOFF
  Library . . . . .                Name, *LIBL, *CURLIB
Limit capabilities . . . . . *NO        *NO, *PARTIAL, *YES
Text 'description' . . . . . AS/400 NetServer Guest user profile

                                                                Bottom
F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys
```

Figure 30. Create User Profile

Your network administrator can specify and change the guest user profile that AS/400 NetServer uses, if necessary, on the AS/400 NetServer Advanced - Next start page within Operations Navigator. In general, the guest user profile should have few authorities because the guest user is considered a non-trusted user.

If you are creating this user through Operations Navigator, ensure that the user has no special authority, as indicated in Figure 31.

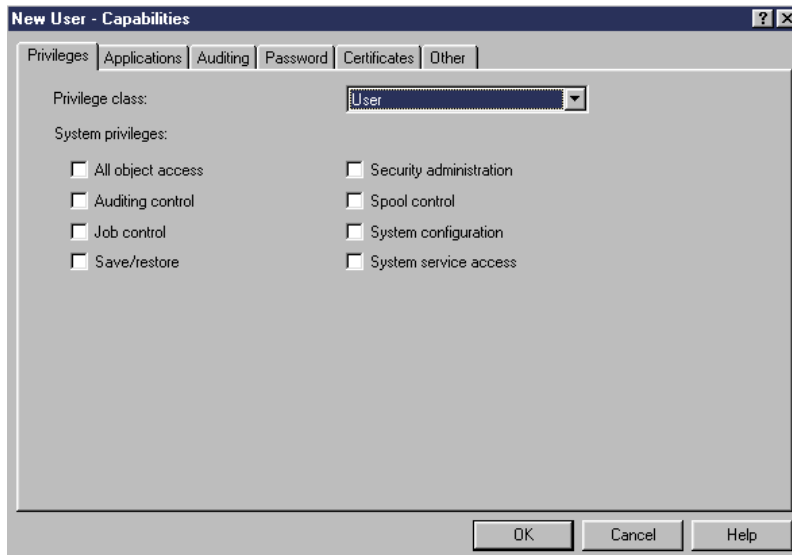


Figure 31. Guest user authority

Otherwise, if you are using the guest user profile, we recommend that you specify an initial menu parameter of \*SIGNOFF. Consequently, the profile cannot be used to actually sign on to the AS/400 system.

#### 4.1.2 Understanding user names and passwords

AS/400 NetServer authenticates client file and print requests that are based on the user ID and password that are used in the Windows desktop logon. If an AS/400 user profile matches the Windows desktop client user profile, then the passwords are checked. If the passwords do not match, AS/400 NetServer prompts the client to enter the correct one. For a better understanding of AS/400 NetServer user profile authentication, refer to Table 2.

Table 2. AS/400 NetServer logon scenarios

AS/400 and Windows user name	AS/400 and Windows password	Guest user enabled	Logon to AS/400 NetServer allowed
Same	Same	No	Yes, as user
Same	Different	No	Password prompt
Different	Same or different	No	No <sup>1</sup>
Same	Same	Yes	Yes, as user
Same	Different	Yes	Password prompt <sup>2</sup>
Different	Same or different	Yes	Yes, as guest

AS/400 and Windows user name	AS/400 and Windows password	Guest user enabled	Logon to AS/400 NetServer allowed
<ol style="list-style-type: none"> <li>1. The user is prompted for a password. Windows 95/98 asks for a password only, so logon is not possible. Windows NT prompts for a user name and password. If the information provided is correct, logon is possible.</li> <li>2. Logon is only possible with the correct AS/400 password. Guest user access is not used.</li> </ol>			

**Note**

On the AS/400 system, you can create an entirely numeric password by specifying Q as the first character. If a user specifies Q12345 as the password on the Change Password display, the user can specify either 12345 or Q12345 as the password on the Sign On display. This is because the AS/400 system adds a Q in front of the password when it is all numeric.

When the Windows profile and password are used for AS/400 authentication, as they are for AS/400 NetServer, Microsoft does not add a Q in front of the numeric password to make it valid. Therefore, we recommend that you use an AS/400 password that has an alphabetic character in the first position. Subsequent characters may be alphanumeric.

To access AS/400 NetServer shared resources, clients may not need an AS/400 user profile that matches their Windows desktop user. AS/400 NetServer can provide guest support for those clients that need only basic file and print services. This support is not automatically enabled, but can be configured by following these steps:

1. Right-click on the **AS/400 NetServer** icon, and select **Properties**.
2. Select the **Advanced** tab.
3. Click the **Next Start** button.
4. Specify the guest profile that you create in the **guest user profile** field.
5. Click **OK**.

**Note**

- The guest user profile that you specify will take effect the next time you start AS/400 NetServer.
- If you want to change the profile that you specify to the currently configured and active profile, click the **Reset to Current** button.

#### 4.1.2.1 User profiles become disabled

AS/400 NetServer uses AS/400 user profiles and passwords to allow network administrators to control how users can access data. In addition, an AS/400 system value named QMAXSIGN specifies how many unauthorized sign-on attempts disable the AS/400 NetServer or any other AS/400 user.

A user profile becomes disabled for AS/400 NetServer use when the user tries to access AS/400 NetServer with an incorrect password more than the number of times specified by QMAXSIGN. A user profile cannot become completely disabled when connecting to an AS/400 system with AS/400 NetServer. If a user

exceeds the maximum number of sign-on attempts, the user profile becomes disabled only for AS/400 NetServer use. Other types of access, such as a system signon, are not prevented. If a user profile becomes disabled, you can enable it by changing the user profile, for example:

```
CHGUSRPRF USRPRF (ELWAY)
```

In addition, stopping and then restarting AS/400 NetServer also enables the user profile.

AS/400 NetServer uses the "last-changed" date on AS/400 user profiles to determine if they have changed since becoming disabled. If the "last-changed" date is newer than the date of becoming disabled, then the user profile becomes enabled for use with AS/400 NetServer, and authentication is verified once again.

#### 4.1.2.2 Windows profile and password incompatibilities

The AS/400 user profiles and passwords are limited to 10 characters, but Windows clients can have profiles and passwords that are greater than 10. Therefore, when using AS/400 NetServer, you must consider these points:

- If you have a Windows user profile that is greater than 10 characters, the user will adopt the guest user profile, if enabled.
- If your Windows password is greater than 10 characters, and you have a known AS/400 user profile, the guest user profile is not adopted, and you are prompted for a password. You must then enter a password valid for the AS/400 user profile.

---

## 4.2 Hiding AS/400 NetServer

You can hide AS/400 NetServer from Windows Network Neighborhood to add an additional measure of security. To hide AS/400 NetServer, follow these steps:

1. Open a connection to Operations Navigator on your AS/400 system.
2. Expand **Network**.
3. Expand **Servers**.
4. Click **TCP/IP** to display a list of TCP/IP servers available.
5. Right-click **AS/400 NetServer**, and select **Properties**.
6. Go to the **Advanced** page, and click **Next Start**. In the **Browsing announcement interval** field, enter 0. If this interval is set to 0, the host stops all announcements to the network.

### 4.2.1 Hiding shared resources

Both file and print shares can be hidden by adding a \$ (dollar sign) to a share name. For example, the file SECRET\$ is not displayed when you view shares from Windows Network Neighborhood using AS/400 NetServer.

Even though the share is hidden, you can connect to AS/400 NetServer and use the hidden share if you know its name.

---

## Chapter 5. Troubleshooting AS/400 NetServer

The following sections help solve common AS/400 NetServer problems. For example, you may experience various difficulties when trying to locate AS/400 NetServer on the AS/400 network or use AS/400 NetServer resources. These difficulties may relate to the status of AS/400 NetServer on AS/400, the PC client connections, or the user profile that you use to operate AS/400 NetServer.

---

### 5.1 Troubleshooting AS/400 NetServer user profile connections

When you are trying to access a file share, an error code may appear for any of the following reasons:

- User profiles may not be authorized to a particular shared directory. If this occurs, ensure that the user can access the directory by using Operations Navigator. To do this, follow these steps:
  1. Right click on the share.
  2. Select **Permissions**.
- Users may be unable to use AS/400 NetServer if they attempt to connect to the AS/400 system with an incorrect password too many times. If this occurs, then the AS/400 system sends message CPIX682 to the QSYSOPR message queue:

```
User profile FAVRE disabled for AS/400 Support for Windows Network  
Neighborhood access.
```

This message indicates that the user profile has been disabled for AS/400 NetServer access. This does not disable the user profile for the AS/400 system or Client Access, but it stops the user profile from accessing AS/400 NetServer. To enable the user profile, update the change date on the user profile to a time later than when AS/400 NetServer disabled the user profile. The easiest way to do this is to use the Change User Profile (CHGUSRPRF) CL command:

1. Enter the command:

```
CHGUSRPRF USRPFR (FAVRE)
```

2. Press Enter.

For more information on this, see 4.1.2.1, "User profiles become disabled" on page 53.

- Clients will connect to the AS/400 system and AS/400 NetServer by using their user profile and not the guest user profile, if they have a valid user profile. There is one QZLSFILE job in the QSERVER subsystem for each active client that connects to an AS/400 NetServer file share. A message in the job log indicates to which user the QZLSFILE job belongs.

In addition, there is one QNPSEVS job in the QSYSWRK subsystem for each active client that connects to an AS/400 NetServer print share. A message in the job log indicates to which user the QNPSEVS job belongs.

**Note**

In V4R4, QNPSEVS jobs were moved to the QUSRWRK subsystem by default, but can be configured to run elsewhere.

## 5.2 Troubleshooting the AS/400 NetServer location on the network

One of the most common problems associated with AS/400 NetServer users is finding AS/400 NetServer on the network. Follow the troubleshooting guide to help resolve this problem:

1. Verify that you have the correct server name for AS/400 NetServer. If the AS/400 system was recently started, one method is to use the QSYSOPR message queue. You can access this message queue by entering the `DSPMSG QSYSOPR` command.

Messages are logged to QSYSOPR each time that AS/400 NetServer starts and stops and when there are any specific errors to report. The following message appears:

```
Job 043444/QPGMR/QZLSSERVER was ended by user QSECOFR.  
All prestart jobs are ending for program QZLSFILE in QSYS.  
AS/400 Support for Windows Network Neighborhood (NetServer)  
AS/400NetServerName ended.  
Subsystem QSERVER prestart job entry for program QZLSFILE in QSYS is no  
longer active.  
AS/400 Support for Windows Network Neighborhood (NetServer)  
AS/400NetServerName  
initialization complete.
```

From this message, you can see whether the AS/400 NetServer has started properly and the AS/400 NetServer server name (AS/400NetServerName).

If AS/400 NetServer fails to start properly, the QSYSOPR message queue logs an error that indicates a reason for the failure. If you receive a Reason Code 6, with return code 16 for message ID CPIB683, there is a duplicate name on the network.

Otherwise, if AS/400 NetServer has been stopped and restarted, you can use the `DSPLOG MSGID(CPIB680)` command to check the AS/400 NetServer name. The following statement appears:

```
AS/400 Support for Windows Network Neighborhood (NetServer)  
AS/400NetServerName initialization complete.
```

2. Verify that AS/400 NetServer is active. You can use the Work with TCP/IP Status (`NETSTAT *CNN`) command to verify this. Verify that the following entries appear in the NETSTAT output file. If you cannot find these entries, then you must restart AS/400 NetServer.

```
** netbios>001:27:44 Listen  
** netbios>000:00:01 *UDP  
** netbios>000:00:00 *UDP  
** netbios>000:30:57 Listen
```

For more information on verifying that AS/400 NetServer is active, see 5.3, “File and print share problems” on page 60.

3. From your PC, perform a ping to the AS/400 NetServer server name. Pinging the AS/400 NetServer server name verifies that your network server name-to-IP address resolution strategy is working properly. If you cannot find the AS/400 NetServer when using Windows NT, try entering a fully qualified domain name in the Find: Computer window. For example, enter:

AS/400NetServerName.DOMAIN.COM

4. If this does not work, perform a ping to the AS/400 NetServer using the IP address.
5. The `NETSTAT` command is a Windows command line tool that gathers and displays protocol statistics and current TCP/IP connections using NetBIOS over TCP/IP. See the following practical examples:
  - If you enter `NETSTAT -c`, you can see the names that are currently in the cache on the local PC.
  - If you enter `NETSTAT -a AS/400NetServerName`, you see the names that are currently in the cache for a remote computer.
  - If you enter `NETSTAT -R`, the NBT cache reloads using the LMHOSTS file.

A complete list of parameters is shown in Table 3.

Table 3. *NETSTAT* parameters

NETSTAT parameter	Description
-a (adapter status)	Lists the remote machine's name table given its name
-A (Adapter status)	Lists the remote machine's name table given its IP address
-c (cache)	Lists the remote name cache including the IP addresses
-n (names)	Lists local NetBIOS names
-r (resolved)	Lists names resolved by broadcast and via WINS
-R (Reload)	Purges and reloads the remote cache name table
-S (Sessions)	Lists the sessions table with the destination IP addresses
-s (sessions)	Lists the sessions table converting destination IP addresses to host names through the hosts file
RemoteName	Remote host machine name
IP address	Dotted decimal representation of the IP address
interval	Re-displays selected statistics and pauses <i>interval</i> seconds between each display; press Ctrl+C to stop re-displaying statistics

6. If these steps are not successful, there is a problem with the PC client ability to resolve the AS/400 NetServer name to an IP address. Depending on your environment, you may need to perform one of the following steps to solve this problem:
  - If you are using *Domain Name Service (DNS)*, resolve the AS/400 NetServer name server name to its IP address by using DNS.
  - If you are using *Windows Internet Name Service (WINS)*, resolve the AS/400 NetServer server name to its IP address using WINS.

See 2.3, “Configuring your network clients” on page 18, for more information about DNS and WINS.

- Resolve the AS/400 NetServer server name to its IP address by adding an entry to the LMHOSTS file. Refer to 5.2.1, “Creating an LMHOSTS file” on page 58, for more information on how to do this.

**Note**

During tests that we conducted, we also had success by adding an entry to the PC HOSTS file to resolve the AS/400 NetServer name to its IP address. This may not work on all client PCs.

In a Windows NT environment, you can specify to use the LMHOSTS file for name resolution by selecting the appropriate checkbox as shown in Figure 32. In addition, if there is an existing LMHOSTS file that you want to use, click the **Import LMHOSTS** button, and specify the file to use.

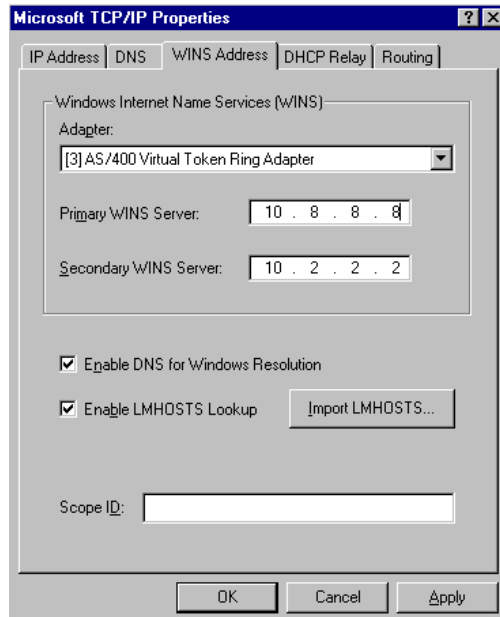


Figure 32. Enable LMHOSTS

### 5.2.1 Creating an LMHOSTS file

To create a LMHOSTS file, follow these steps:

1. Go to the directory that contains the LMHOSTS.SAM file. For Windows 95 and Windows 98, it is Windows. For Windows NT, it may be winnt\system32\drivers\etc.
2. Copy the LMHOSTS.SAM file.

Save it as LMHOSTS (with no file extension) in the same directory as it was found. For example, in Windows 95, the LMHOSTS.SAM file is found in the C:\Windows directory. You are presented with a window similar to the example shown in Figure 33 on page 59.



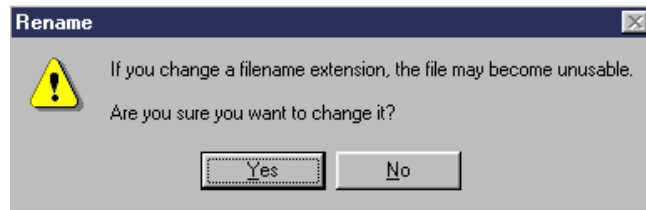


Figure 33. Creating an LMHOSTS file

3. Select **Yes**.
4. Open the file in Notepad.
5. Add an entry like the following example:

```
10.5.5.99 AS/400NetServerName #PRE
```

AS/400NetServerName is the TCP/IP name of your AS/400 NetServer. If you specify #PRE, the entry will be preloaded into the NBT cache when your PC is started.

The sample file LMHOSTS.SAM contains information on how you can use an LMHOSTS file in another location such as an AS/400 NetServer file share.

#### LMHOSTS and Notepad

Do not create an LMHOSTS file directly in Notepad because Notepad sometimes adds the extension .txt.

### 5.2.2 Early versions of Windows 95 and 3.11

If you are using a pre-Operating System Release 2 (OSR2) version of Windows 95 or Windows 3.11, the Universal Naming Convention (UNC) file name access may fail until you explicitly map a network drive to an AS/400 NetServer share. When the UNC access fails, you may also experience problems when finding AS/400 NetServer. To solve this problem, you must specify that the LMHOSTS entry be pre-loaded on your pre-OSR2 operating system. The LMHOSTS file contains the mappings of IP addresses to computer names. Follow these steps to resolve this error:

1. If you suspect that you may have this problem, you can determine the version of your operating system by following these steps:
  - a. Right-click **My Computer**.
  - b. Select **Properties**.

The General properties dialog specifies which version you have installed. If you *do not* see the following message on a Windows 95 system, you are running a pre-OSR2 version of Windows 95:

```
System:  
Microsoft Windows 95  
4.00.950 B
```

**Note:** The character B can actually be B or higher (for example, C)

2. Find your LMHOSTS file:

- a. Click **Start-> Find-> Files or Folders**
- b. In the **Named:** field, enter: LMHOSTS\*
- c. If you have an existing LMHOSTS file, Windows should find two entries: LMHOSTS and LMHOSTS.SAM.
- d. Edit the LMHOSTS file and add the following entry:

```
10.5.5.99 AS/400NetServerName #PRE
```

AS/400NetServerName represents your AS/400 NetServer server name. If you specify #PRE, the entry that you just added will be preloaded into the NBT cache when your PC is started.

If Windows found only the LMHOSTS.SAM file, see 5.2.1, “Creating an LMHOSTS file” on page 58.

---

## 5.3 File and print share problems

This section describes problems that you may run into with file or print shares and how you can resolve them.

### 5.3.1 File shares

If you experience problems with AS/400 NetServer file share readiness on the AS/400 system, you should check the status of AS/400 NetServer on the AS/400 system. In addition, you can also use this troubleshooting guide if you have problems starting AS/400 NetServer. To do so, follow these steps:

1. Verify that TCP/IP is started.
2. Verify that the AS/400 system has started the QSERVER subsystem. If the AS/400 system has not already started the QSERVER subsystem, start it by using the STRSBS QSERVER command.

**Note**

If you had to start TCP/IP started in step 1, then restart AS/400 NetServer even if it is already active.

3. Use the Work with Active Job (WRKACTJOB) command to verify that the AS/400 system has started the QZLSSERVER job within QSERVER. Alternatively, you can use Operations Navigator to verify that QZLSSERVER is active:
  - a. Open a connection to your AS/400 using Operations Navigator.
  - b. Expand **Network**.
  - c. Expand **Servers**.
  - d. Select **TCP/IP**.
  - e. Right-click on **AS/400 NetServer**, and select **Open**.
  - f. Right-click on **AS/400 NetServer**, and select **Server Jobs**. The window shown in Figure 34 on page 61 appears.

Job name	Current user	Server	Job type	Job status	Time entered system	Date entered
Qzlsfile		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	10:45:44	09/30/99
Qzlsserver		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	16:11:14	09/30/99
Qzlsfile		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	16:11:15	09/30/99
Qzlsfile		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	15:23:15	09/30/99
Qzlsfile		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	15:23:15	09/30/99
Qzlsserver		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	11:21:53	10/01/99
Qzlsfile		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	11:21:53	10/01/99
Qzlsserver		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	11:34:44	10/01/99
Qzlsfile		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	11:34:44	10/01/99
Qzlsfile		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	08:36:25	10/04/99
Qzlsfile		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	08:36:25	10/04/99
Qzlsserver		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	11:50:00	10/04/99
Qzlsfile		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	11:50:00	10/04/99
Qzlsfile		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	11:51:17	10/04/99
Qzlsfile		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	15:28:09	10/04/99
Qzlsserver		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	15:29:04	10/04/99
Qzlsfile		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	15:44:28	10/04/99
Qzlsfile		AS/400 Netserver (AS/400 Su. Batch	Batch	Printer output	15:44:28	10/04/99
Qzlsfile	QUSER	AS/400 Netserver (AS/400 Su. Batch	Batch	Active	14:53:23	10/06/99
Qzlsserver	QPGMR	AS/400 Netserver (AS/400 Su. Batch	Batch	Active	14:53:30	10/06/99

Figure 34. Displaying server jobs

g. Find **QZLSSERVER**, and ensure that it is active.

If it is not started, you must restart AS/400 NetServer.

4. Verify that the QZLSFILE prestarted job is waiting for a program start request (PSRW status on the Work with Active Jobs screen). If the QZLSFILE prestarted job is not waiting for a program start request, then use the Start Prestart Jobs (STRPJ) CL command. Enter the following command:

```
STRPJ SBS(QSERVER) PGM(QZLSFILE)
```

This starts the prestarted job.

**Note**

AS/400 NetServer should automatically start a QZLSFILE job on the AS/400 system when a PC client accesses a file share for the first time. Each QZLSFILE job supports one session and all of the file shares that are accessed by that session when using AS/400 NetServer.

5. Add the QZLSFILE prestarted job entry to the QSERVER subsystem description if it is not already present. You can use the Add Prestarted Job Entry (ADDPJE) CL command to add the prestarted job entry. Enter the following command:

```
ADDPJE SBS(QSERVER) PGM(QZLSFILE)
```

### 5.3.2 Print shares

You may experience trouble when using an AS/400 NetServer network printer for any of the following reasons:

- The network printer may not work because the user does not have authorization to the AS/400 output queue. If this occurs, you should ensure that the user has access to the object by using OS/400 CL commands, such as the Edit Object Authority (EDTOBJAUT) command.
- The Network Print Server is not up and running. If you do not start it, then AS/400 NetServer print shares will not function properly. To start the Network Print Server, enter the following command:

```
STRHOSTSVR SERVER (*NETPRT)
```

- All users who will use the service are not enabled or do not have a password. Network Print Server requires them to be enabled and have a password.
- Clients connect to the AS/400 system and AS/400 NetServer by using their user profile and not the guest user profile, if they have a valid user profile. There is one QNPSEVS job entry in the QSYSWRK subsystem for each active session connected to AS/400 NetServer. The QNPSEVS job starts when a session is connected to a shared print resource.

In V4R4, QNPSEVS jobs are configured by default to be in the QUSRWRK subsystem.

- A maximum of 350 spooled files are displayed in a network printer window when accessing OS/400 V4R4 or later.
- The TCP/IP LOOPBACK interface for IP address 127.0.0.1 is not started. This interface must be started so that AS/400 NetServer can communicate with the Network Print Server. Use option 1 of the Configure TCP/IP (CFGTCP) menu interface (Work with TCP/IP Interfaces) to verify that this interface is active, and start the interface if necessary.

### 5.3.3 Guest user print problems

If you are using AS/400 NetServer guest user support, there may be problems when trying to access AS/400 output queues, or the specified printer may go offline. Typically, this is because the guest user profile that you specify must have a password and must be enabled. The Network Print Server must have a password for its authentication. However, in the case of the guest user profile, it will not prompt the user for one. Ensure that the guest user profile also has an initial menu parameter set to \*SIGNOFF to deny signon access. Use the Change User Profile (CHGUSRPRF) command to set the parameter INLMNU to the value

```
*SIGNOFF
```

---

## 5.4 AS/400 NetServer properties causes an illegal operation error

An *illegal operation performed* error may be encountered from cwbunzls.dll when you select the properties menu item in AS/400 NetServer. The problem occurs if the comct132.dll file on your PC is out of date. If you are running Windows NT, the file is located in \WINNT\system32. If you are running Windows 95, the file is located in \Windows\system. If the date on the file is 07/11/95, or earlier, you must obtain an update from Microsoft. Download com32upd.exe from <ftp://ftp.microsoft.com/softlib/mslfiles/>

---

## 5.5 File name case sensitivity

All AS/400 file systems, except for three, are case insensitive and do not cause case sensitivity conflicts with supported PC clients. However, the following three AS/400 file systems are case sensitive:

- QOpenSys
- User-Defined File System (UDFS): If specified, it is case-sensitive when created.
- Network File System (NFS): It depends on which remote file system you access.

The case of file names is significant in case-sensitive file systems. The names can consist of both upper-case and lower-case characters. For example, the QOpenSys file system could have three files in it with the following names:

- NETSERVE.DAT
- NetServe.DAT
- netserve.DAT

These three files have technically different names (because QOpenSys is case sensitive) and represent three distinct, separate objects on the AS/400 system.

All the PC clients that AS/400 NetServer supports (Windows 3.11, Windows 95, Windows 98, and Windows NT) are case insensitive. The case of file names is insignificant because all file names are translated automatically into upper case. For example, from the three example files that are listed above, all the PC clients AS/400 NetServer supports would recognize only the NETSERVE.DAT file.

Therefore, AS/400 NetServer may not work correctly when using files in case-sensitive file systems. This is particularly true when working with case-sensitive file systems while you are using a graphical user interface such as the Windows 95 Explorer or the Windows 3.11 File Manager.

All other AS/400 file systems are case insensitive and do not cause case-sensitivity conflicts with supported PC clients.

---

## 5.6 File name length considerations

If you are using old utilities that only support short names (8.3 syntax), you may experience strange behavior when you attempt to use those utilities against AS/400 NetServer shares.

The AS/400 system supports only long names. Windows 32-bit systems support up to two names per object: the real name (long name) and if the real name does not meet the 8.3 syntax, a short name. The short name is typically made up of the first six characters of the name, a tilde ~, and a number, followed by an extension truncated to three characters. If an object already exists with that name, the system increments the number until a free name is found. Fewer characters of the original name are used if the number of collisions is greater than nine. Short names are not supported by any system other than Windows. Other systems have been long name enabled from the start and do not have legacy DOS applications that cannot handle longer names. Short names and long names may collide.

When you move a file from one Windows machine or directory to another, the shortname may change since the number of collisions that occur may be different. When you move the file to a non-Windows directory, no collisions occur since no short names are created. Some file serving solutions make up for this when they are asked for a short name by simply truncating the names to fit the 8.3 format, but without worrying about the name being unique.

The long file name problem occurs for 16-bit applications: DOS windows, Install Shield, etc. It can occur for any component in the path. For example, the third nested directory may actually cause trouble in `\dir1\dir2\longdirectoryname3\dir4\filename`. Most 32-bit applications use the long file name only.

Consider these two recommendations for the customer to work around this incompatibility:

- Use a modern application that uses long names. Forget that shortnames ever existed since they are problem prone and inconsistent.
- Create additional links to the file that meet the 8.3 convention and are unique.

---

## 5.7 Unreadable text when printing

When using the AFP print drivers downloaded from the IBM Printing Systems Company Web site, <http://www.printers.ibm.com/>, you may experience unreadable printed text. This most likely occurs because font substitution is done by using information directly embedded into the print stream of the print job.

Because of this, one of the following two actions must be done when using this driver:

- Turn off Font Substitution from the properties of the printer on the PC.
- Install License Program AFP Fonts 5769FN1 or AFP DBCS Fonts 5769FNT (depending on whether you are using DBCS) on the AS/400 system.

The QCA400 NetServer shared directory makes available stand-alone print drivers for Advanced Function Printing (AFP) and SNA Character String (SCS). These printer drivers can be found under the directory appropriate for your client type. You can also use the AFP and SCS printer drivers from Client Access Express for Windows.

---

## 5.8 Incorrect disk space shown for a file share

When attempting to ascertain the disk space left on an AS/400 NetServer file share, the result may be misleading.

When using Windows for Workgroups or Windows 95/98, the maximum disk space shown does not exceed 2,147,483 KB. This is a limitation of the Windows operating system (4-byte arithmetic limit).

For Windows NT users, the disk space shown is correct since Windows NT does not have this limitation (8-byte arithmetic).

---

## Part 2. Migrating to AS/400 NetServer

The following two chapters cover the migration to AS/400 NetServer from Warp Server and Novell NetWare. An example scenario also follows at the end of each chapter.

---

### Why migration to AS/400 NetServer should be considered

IBM announced with V4R3 and V4R4 that the following licensed programs would not be available in future releases of OS/400 after V4R4M0:

- 5769SA3 IBM OS/400 Integration for Novell NetWare (V4R2M0)
- 5769XZ1 OS/2 Warp Server for AS/400 (V4R1M0)

While 5769SA2 IBM Integration Services for FSIOP, will be supported in the next OS/400 release, support for 5769SA2 will have a early end of currency. Therefore, it is better to not continue using 5769SA2 to support an AS/400 system LAN Adapter configuration once 5769XZ1 and 5769SA3 are no longer used. See Informational APAR II11689 for options for migrating from using the Integrated Netfinity Server LAN adapter as the AS/400 system LAN adapter. Informational APARS can be found at <http://as400service.ibm.com> under **Tech Info** and **Databases**.)

#### Important

For customers upgrading to future releases beyond V4R4 without migrating first, user data contained in the Network Server storage spaces is no longer accessible using the \*LANSERVER or \*NETWARE Network Server Descriptions.

For customers currently using either of the above products, some consideration should be given to the file and print sharing strategy that may need to be adopted in the near future. There are, of course, a number of options to be reviewed. These are referred to in Informational APAR II11689.

**Note:** This redbook deals only with migration from the two products listed above to AS/400 NetServer.

There may also be some customers who are interested in what AS/400 NetServer has to offer compared with their current business configurations.

---

### Benefits of migrating to AS/400 NetServer

There are a number of potential benefits that become apparent when considering migration from the Integrated Netfinity Server-based products OS/2 Warp Server for AS/400 or Novell NetWare to AS/400 NetServer. These benefits include:

- The licensing requirements are reduced. There is no need for additional Warp Server or Novell NetWare licenses.
- Since AS/400 NetServer is part of the AS/400 Operating System, there are no additional licensed programs required. This reduces the DASD requirement on the AS/400 system.

- Potentially simpler to administer because all configuring can be done with the AS/400 system.
- All backup and restore functions are dealt with by the AS/400 system. There is no need for additional products or skills.
- No additional client applications are required. The client requirements come with the client operating systems. Consequently, this reduces the PC hard disk drive usage.
- Eliminates the potential cost of administering multiple servers and platforms.
- Uses AS/400 user profiles and security.
- Potentially reduces the need for additional AS/400-based hardware since an Integrated Netfinity Server is not required.



---

## Chapter 6. Migration from Warp Server

This chapter covers the steps and considerations that are necessary to migrate from OS/2 Warp Server for AS/400 to AS/400 NetServer.

---

### 6.1 Migration from Warp Server to AS/400 NetServer

The topics to consider when migrating are divided into six categories:

- **File migration:** Migration of files and directories from the Warp Server on the Integrated Netfinity Server, and any additional Warp Servers to the AS/400 integrated file system and administration of the security of the file server.
- **Printer migration:** Considerations when migrating printers from the Warp Server environment to the AS/400 NetServer environment.
- **Client migration:** Removal of the DOS LAN Services client and re-configuration of file and printer shares.
- **User migration:** Moving user IDs from Warp Server to AS/400 NetServer.
- **Cleaning up the AS/400 system:** What consideration to give to the objects that can be removed on the AS/400 system once the previous tasks are completed.
- **Backup considerations:** The changes that need to be made in backing up the migrated data.

Section 6.2, “Example scenario: Warp Server to AS/400 NetServer” on page 83, shows an example of the steps taken when migrating from Warp Server to AS/400 NetServer.

**Note**

Prior to V4R4, if you are using multiple Warp Servers to serve clients using different languages, it is not possible to consolidate all of the user data onto one AS/400 NetServer setup. This is because AS/400 NetServer cannot handle clients with different code pages. At V4R4 and above, this restriction no longer applies.

#### 6.1.1 File migration

**Note**

We advise that you make a backup copy of the Warp Server data before any migration is attempted. In the event of an error, the data can be restored back, and therefore, will not be totally lost.

The object of the file migration exercise is to transfer all user files and directories (typically those stored in the Network Server Storage Spaces) from the Warp Server to the AS/400 integrated file system. There are two possible ways to perform this transfer:

- Use AS/400 commands.
- Use a PC that has both DOS LAN Services for Warp Server and a connection to an AS/400 NetServer file share.

The basis of the first transfer solution relies on a directory link that is found within the AS/400 integrated file system called *QLANSRv*. The *QLANSRv* file system provides access to the directories and files on the Warp Servers in your domain. It is required that you have the Warp Server licensed program installed on the AS/400 system and a Primary Domain Controller or Backup Domain Controller on the Integrated Netfinity Server. The Integrated Netfinity Server must also be varied on and in ACTIVE status when viewed using the Work with Network Server Status (WRKNWSSTS) command. For additional information on the *QLANSRv* file system, refer to *OS/2 Warp Server for AS/400 Administration*, SC41-5423.

The second method involves using Network Neighborhood or File Manager to copy and paste from the Warp Server drives to the AS/400 NetServer shares.

To create the new directories in the AS/400 integrated file system to which the Warp Server data will be transferred, you can use the Create Directory (CRTDIR) or Make Directory (MKDIR) commands. To create a directory called USERDATA, see Figure 35.

```

                                Create Directory (CRTDIR)

Type choices, press Enter.

Directory . . . . . /USERDATA_____
-----
Public authority for data . . . *EXCLUDE   Name, *INDIR, *RWX, *RW...
Public authority for object . . *NONE     *INDIR, *NONE, *ALL...
      + for more values
Auditing value for objects . . . *SYSVAL   *SYSVAL, *NONE, *USRPRF...

                                                    Bottom
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

```

Figure 35. CRTDIR command

The newly created directory will be owned by the user profile who created it. This profile will have all rights to it.

It is possible to define the authorities for \*PUBLIC as well. Both data and object authorities for \*PUBLIC can be defined within the CRTDIR or MKDIR command. As a general guide, we recommend that the data and object authorities for \*PUBLIC are set to \*EXCLUDE and \*NONE respectively. If \*INDIR is selected, the \*PUBLIC rights from the directory above will be assumed (in this case, /root).

Once the necessary directories are created within the AS/400 integrated file system, you can begin copying the Warp Server files from Network Server Storage Spaces to the AS/400 integrated file system.

**Note**

Because the Warp Server data is migrated across into other areas of the AS/400 integrated file system, it is worth noting that some parts of the AS/400 integrated file system have different constraints. Some areas of the integrated file system, for example, are case sensitive.

For further information on AS/400 integrated file system constraints, refer to the *Integrated File System* book on the Web at:

<http://www.as400.ibm.com/infocenter>

### 6.1.1.1 File migration using QLANSRv

This section describes the considerations for migrating files from the Warp Server domain to the AS/400 integrated file system using the QLANSRv directory structure. It is possible to use either of the following two AS/400 commands to place the Warp Server files into the new directories within the AS/400 integrated file system:

- MOV
- CPY

Both of these commands may give slightly different results in addition to the fact that the CPY command only produces a replica of the file. There are authority and attribute considerations of which you need to be aware. They are covered later in this chapter.

You must ensure that the user profile you use to migrate the data to the AS/400 integrated file system also has an appropriate high level of authority. If possible, you should use a profile with \*ALLOBJ authority.

The MOV command is generally recommended because it preserves the ownership of objects. If the CPY command is used, the user who copies the objects becomes their owner (if the file system supports this).

It must also be noted that when using either of these commands, some attributes, extended attributes, and authorities may be discarded. Therefore, it is *important* that you review these considerations thoroughly before file migration. For additional information, refer to the *Integrated File System* book, which is on the Web at: <http://www.as400.ibm.com/infocenter>

The MOV and CPY commands are fairly similar in appearance and can be used on single or multiple files.

In Figure 36 on page 70, the CPY command is being used for a single file (test.fm) within the userdata/sales directory on the Warp Server K: drive. The target directory for this file copy is the userdata directory. Notice that the access to this file is through QLANSRv. KDRIVE is an already existing alias that was set up to allow Warp Server users to have access to the K: drive.

```

                                Copy Object (CPY)

Type choices, press Enter.

Object . . . . . > '/QLANSrv/KDRIVE/userdata/sales/test.fm'

To directory . . . . . '/userdata'

To object . . . . .

Symbolic link . . . . . *NO          *NO, *YES
From Code Page . . . . . *OBJ        1-32767, *OBJ, *PCASCII
To Code Page . . . . . *OBJ        1-32767, *OBJ, *CALC...
Data Format . . . . . *BINARY       *BINARY, *TEXT

Bottom
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

```

Figure 36. CPY Object command for a single file

To copy a single file from Warp Server to another area within the AS/400 integrated file system, follow these steps:

1. Type `WRKLNK` on an empty command line, and press Enter.
2. Locate the `QLANSRV` link, and type `5` next to it. Press Enter to go to the next level. Keep using option `5` to progress down through your aliases until you locate your chosen file.
3. Type option `3` next to the file you wish to copy, and press **F4** to prompt. We see the same basic screen as shown in Figure 36.
4. Add the name of the destination directory in the `To directory` line. In this example, we used the `userdata` directory that was created earlier by using the `CRTDIR` or `MKDIR` command. Press Enter. The file is then copied to the new directory.
5. Once you are satisfied that the copy has succeeded and if you have no further use for it, you may delete the original by typing option `4` next to it. If preferred, file deletion can be done after all necessary files are migrated. To do so, remove the Network Server Storage Space where the files reside (see 6.1.5, “Cleaning up the AS/400 system” on page 82).

Multiple file copy can also be achieved to save time. Refer to Figure 37 on page 71 to see how this can be done.

```

Work with Object Links

Directory . . . . : /QLANSrv/KDRIVE/userdata/sales

Type options, press Enter.
 3=Copy  4=Remove  5=Next level  7=Rename  8=Display attributes
11=Change current directory ...

Opt  Object link          Type  Attribute  Text
 3   test.fm              DSTMF
 3   useful.txt           DSTMF
 3   vpb32r10.exe         DSTMF
 3   AV32.exe             DSTMF
 3   CSOCK.EXE           DSTMF
 3   IBMFINO.NUK         DSTMF
 3   IBM95.nuk           DSTMF

Parameters or command
===> todir('/userdata')
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve  F12=Cancel  F17=Position to
F22=Display entire field  F23=More options

Bottom

```

Figure 37. CPY command method for multiple files

Enter option 3 next to all of the files in one directory on the Warp Server and specify the parameter `todir('/userdata')` on the command line. By doing so, all of the files with option 3 next to them are copied to the userdata directory when you press Enter.

As mentioned earlier, the MOV command is generally recommended. However, since the MOV and CPY commands are similar in use, the same techniques can be applied.

```

Move Object (MOV)

Type choices, press Enter.

Object . . . . . > '/QLANSrv/KDRIVE/userdata/sales/test.fm'

To directory . . . . . > '/userdata'

To object . . . . .

From Code Page . . . . . *OBJ      1-32767, *OBJ, *PCASCII
To Code Page . . . . . *OBJ      1-32767, *OBJ, *CALC...
Data Format . . . . . *BINARY    *BINARY, *TEXT

Bottom

F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

```

Figure 38. MOV command for a single object

A comparison of Figure 38 and Figure 36 on page 70 clearly shows that the two commands are similar. This is also true for multiple object moving. To move a file, use option 2, not option 3 (Figure 39).

```

Work with Object Links

Directory . . . . : /QLANSrv/KDRIVE/userdata/sales

Type options, press Enter.
 3=Copy  4=Remove  5=Next level  7=Rename  8=Display attributes
11=Change current directory ...

Opt  Object link      Type      Attribute  Text
 2   test.fm         DSTMF
 2   useful.txt      DSTMF
 2   vpb32r10.exe    DSTMF
 2   AV32.exe        DSTMF
 2   CSOCK.EXE       DSTMF
 2   IBMFINO.NUK     DSTMF
 2   IBM95.nuk       DSTMF

Parameters or command
===> todir('/userdata')
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve  F12=Cancel  F17=Position to
F22=Display entire field  F23=More options

Bottom

```

Figure 39. MOV command for multiple objects

Using either of these methods, all of the files you need to migrate can be transferred to the other areas in the AS/400 integrated file system. These directories will eventually be made into shares for the AS/400 NetServer users.

### 6.1.1.2 File migration using a client

There are two reasons why you may decide to use this method of file migration rather than the QLANSRv method:

- The Warp Server on the Integrated Netfinity Server is a \*SERVER. The Warp Server on the Integrated Netfinity Server must be a Primary or Backup Domain Controller to use QLANSRv.
- Using the AS/400 integrated file system to migrate files can be a time-consuming exercise since only file objects can be migrated, not directories. For customers who have many sub-directories, there is also an increased risk that some files may be overlooked in error.

This method of data migration requires a PC client that has a connection to the Warp Server share *and* an AS/400 NetServer file share to the empty destination directory. Then, using either File Manager, Network Neighborhood, or even a DOS command line, files can be copied from one drive to another. This method can ultimately prove to be the fastest since entire directory structures can be transferred at a single time. If you have not already set up your AS/400 NetServer shares, refer to Chapter 2, “Getting started with AS/400 NetServer” on page 11, and Chapter 3, “Using AS/400 NetServer” on page 25, for information on setting up AS/400 NetServer and defining file shares. You must also ensure that the user profiles you are using have adequate authority to copy or move objects from one directory to another. A profile with \*ALLOBJ authority is advisable for AS/400

NetServer and similarly a Warp Server administrator profile for Warp Server access.

As a general guide, it may be easier to use the same user profile. For many customers, a profile from the AS/400 system that has \*ALLOBJ authority is propagated down to the Warp Server and this becomes the administrator. Therefore, this profile can be used for AS/400 NetServer. When the PC is started, make sure that this profile and password are used to log onto the Windows Network. When starting DOS LAN Services, use the profile and password there as well.

Figure 40 shows the window that is seen when using Windows Explorer in Windows 95. The F: drive is the Warp Server KDRIVE alias, which points to the Network Server Storage Space linked as the K: drive on the Network Server Description. The G: drive is the AS/400 NetServer file share to the directory called /userdata in the AS/400 integrated file system.

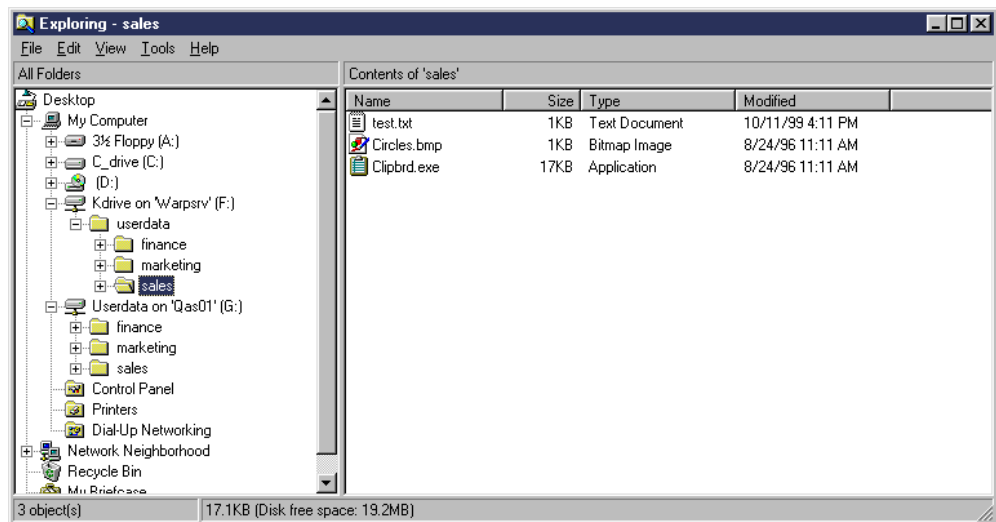


Figure 40. Warp Server and AS/400 NetServer shares on one PC (Windows 95)

Perform the following steps to migrate the files from Network Server Storage Spaces to the AS/400 integrated file system:

1. Start DOS LAN Services and map a drive to the Warp Server alias that has the files to be migrated. In the example shown in Figure 40, the F: drive is used.
2. Select **Start-> Programs-> Windows Explorer**.
3. When Windows Explorer has started, go to **Tools-> Map Network Drive**.
4. In the Path, enter the name of the share you want to map the drive to. In the example in Figure 40 on page 73, the AS/400 NetServer is called "Qas01", and the file share is called "userdata". The following path is entered:  
\\Qas01\userdata to achieve a mapped network drive to this directory on the AS/400 system.
5. Select all of the directories within the userdata directory on the Warp Server share (F: drive).
6. Right-click and select **Copy**. Then, right-click, and select **Paste** on the destination directory (G: drive). Entire directories and files can be copied in one step.

### 6.1.1.3 Authority considerations

Give special attention to the authorities of the files and directories migrated from Warp Server to AS/400 NetServer. If this part of the migration is neglected, then there may be potential security issues. Users may be prevented from accessing their own data, and unauthorized users may have access to data that is not intended for public viewing.

The resulting authorities on any files or directories that have been migrated from Warp Server to AS/400 NetServer are likely to be different from what was originally set up. The AS/400 NetServer does not use aliases like Warp Server does. You need to spend some time revising security issues on the individual directory shares.

Because of the size of many customers data directories, you may want to migrate over a period of time, rather than all at once. We observed that when moving data around the AS/400 integrated file system, certain authorities are removed and new ones are placed. This requires some attention by the administration.

The following two sections briefly show the changes in authority that we experienced when migrating data from Warp Server to AS/400 NetServer. The key to successful data migration is to consider creating many directories in AS/400 NetServer rather than having many subdirectories. The authorities can be set in the initial first-level directory. Files or directories migrated into it will take on those authorities. The results in the following two sections represent our findings when migrating data in lab conditions.

#### ***Authority considerations when using QLANSRv methods***

There are distinct differences between resulting authorities on files that are migrated to other areas of the AS/400 integrated file system depending on whether the MOV or CPY command is used. Use the Work with Authority (`WRKAUT`) command to examine and modify object authorities.

As shown in Figure 41 on page 75, the two profiles ITSCID13 and ARTHURM are listed as having *all* data and object authorities for the destination directory within the AS/400 integrated file system (userdata), while \*PUBLIC is \*EXCLUDE.



```

Work with Authority

Object . . . . . : /userdata
Owner . . . . . : ITSCID13
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

Opt  User          Data      --Object Authorities--
      Authority  Exist  Mgt  Alter  Ref

      *PUBLIC      *EXCLUDE
ITSCID13  *RWX          X    X    X    X
ARTHURM   *RWX          X    X    X    X

Parameters or command
====>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display detail data authorities  F12=Cancel  F24=More keys

Bottom

```

Figure 41. Work with Authority (WRKAUT) display

Figure 42 shows the authorities assigned to the file ACCOUNTS.TXT in the userdata/accounting directory on the Warp Server. If a CPY command is used to copy this file to the userdata directory elsewhere in the AS/400 integrated file system, some changes occur.

```

Work with Authority

Object . . . . . : /QLANSrv/KDRIVE/userdata/accounting/acco >
Owner . . . . . : QDF1TOWN
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

Opt  User          Data      -----Data Authorities-----
      Authority  Objopr  Read  Add  Update  Delete  Execute

      ITSCID13  USER DEF  X    X          X    X    X
      ACCOUNTS  *R        X    X

Parameters or command
====>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display object authorities  F12=Cancel  F24=More keys

Bottom

```

Figure 42. WRKAUT for the ACCOUNTS.TXT file

The resulting copied file, which is shown in Figure 43 on page 76, retains its previous data and object authority settings for any profiles already specified.

```

                                Work with Authority

Object . . . . . : /userdata/accounts.txt
Owner . . . . . : ITSCID13
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

      Data
Opt  User      Authority  Objopr  Read  Add  Update  Delete  Execute
-----Data Authorities-----
      *PUBLIC  *RWX        X      X    X    X      X      X
      ITSCID13  USER DEF   X      X          X      X      X
      ACCOUNTS  *R         X      X

Parameters or command
====>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display object authorities  F12=Cancel  F24=More keys
Bottom

```

Figure 43. WRKAUT for a copied file using the CPY command

However, there are two differences:

- Ownership of the file has now changed to the profile that copied it.
- \*PUBLIC \*RWX data authority to this file has been added.

When moving the file using the MOV command, a slightly different result is achieved.

In Figure 44 on page 77, the object ownership has remained the same this time and that the same authority of ITSCID13 (the profile used to perform the MOV command) has been given to QDFTOWN. \*PUBLIC \*RWX data authority has been granted for this file, and the other data and object authority information has been retained.

```

Work with Authority

Object . . . . . : /userdata/accounts.txt
Owner . . . . . : QDFTOWN
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

Opt  User          Data Authority -----Data Authorities-----
      User          Authority Objopr  Read  Add  Update  Delete  Execute

      *PUBLIC      *RWX      X      X      X      X      X      X
      QDFTOWN      USER DEF  X      X      X      X      X      X
      ACCOUNTS     *R        X      X

Parameters or command
====>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display object authorities  F12=Cancel  F24=More keys
Bottom

```

Figure 44. WRKAUT on a file moved using the MOV command

**Authority considerations when using a client to migrate data**

As mentioned earlier, it is possible that this may be the faster of the two methods. However, by using the copy and paste method from DOS, Windows for Workgroups (Windows 3.11), or Windows 95, 98, or NT, the authorities on the files and directories are lost. For this reason, it is important that when the AS/400 NetServer directory is created, it has the correct authorities on it. This way, any files or directories that are migrated assume the correct security from the directory into which they are copied.

Figure 45 on page 78 shows the userdata directory that was created earlier. Notice that the \*PUBLIC has been excluded. The owner is the profile that created it, and therefore, has all authority to it. The ACCOUNTS user profile has been added manually to the userdata directory and given \*RWX and all object rights.

```

Work with Authority

Object . . . . . : /userdata
Owner . . . . . : ITSCID13
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

      Data      --Object Authorities--
Opt  User      Authority  Exist  Mgt  Alter  Ref
-----
      *PUBLIC   *EXCLUDE
      ITSCID13  *RWX      X     X     X     X
      ACCOUNTS  *RWX      X     X     X     X

Parameters or command
====>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display detail data authorities  F12=Cancel  F24=More keys
Bottom

```

Figure 45. Work with Authority

Figure 46 shows the list of authorized users for the sales directory. The ACCOUNTS profile has \*RW and ACC2 has only \*R. Notice also that QDFTOWN is the owner of the directory.

```

Work with Authority

Object . . . . . : /QLANSrv/KDRIVE/userdata/sales
Owner . . . . . : QDFTOWN
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

      Data      --Object Authorities--
Opt  User      Authority  Exist  Mgt  Alter  Ref
-----
      ITSCID13  *RWX      X     X
      ACCOUNTS  *RW
      ACC2      *R

Parameters or command
====>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display detail data authorities  F12=Cancel  F24=More keys
Bottom

```

Figure 46. WRKAUT for Warp Server directory

These authorities change when migrated using the copy and paste method from a client PC to the userdata directory, which is to be used for AS/400 NetServer.

Figure 47 shows the resulting authorities on the sales directory after being migrated from the Warp Server KDRIVE to the directory (userdata) within the AS/400 integrated file system. Notice how the authorities that were present as shown in Figure 46 on page 78, have been altered. The new authorities for this directory (*and* the files contained within it) have adopted the /userdata authorities (see Figure 45 on page 78).

```

Work with Authority

Object . . . . . : /userdata/sales
Owner . . . . . : ITSCID13
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

Opt  User          Data      --Object Authorities--
      Authority    Exist  Mgt  Alter  Ref
-----
      *PUBLIC      *EXCLUDE
      ITSCID13     *RWX      X    X    X    X
      ACCOUNTS     *RWX      X    X    X    X

Parameters or command
====>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display detail data authorities  F12=Cancel  F24=More keys
Bottom

```

Figure 47. WRKAUT after migration from Warp Server to AS/400 NetServer

With this in mind, it is clear that if the authorities are set correctly at the *first* level directory, then all other authorities will fall into place when the data is migrated across from Warp Server. This is why customers may find it easier to create a directory for every user, rather than set up authorities for many sub-directories.

## 6.1.2 Printer migration

This section explains considerations for migrating printers from Warp Server to AS/400 NetServer.

### 6.1.2.1 Overview

Warp Server supports LAN-to-LAN printing. That is, it supports a PC on a LAN printing to a printer, which is also on the LAN. It is not designed to support printers attached to other PCs, nor AS/400-attached printers. The PC sends the printer output to the Warp Server, which in turn, communicates with the network printer using either IEEE802.2 or TCP/IP.

AS/400 NetServer supports both LAN-to-LAN and LAN-to-HOST printing techniques. This means that printers on the LAN and printers attached to other PCs or AS/400 systems can be accessed.

The printers that are configured for use with the Warp Server domain are not visible to the AS/400 system since the print serving is done by Warp Server. For the AS/400 NetServer to use these printers, you need to make the printers visible

to the AS/400. This is done by using the Create Output Queue (CRTOUTQ) command, which sets up an output queue to the printer. Once this is done, it can be shared for the AS/400 NetServer users.

### ***Network printers***

Network printers that were used for Warp Server printing must be configured for TCP/IP. Details of how to do this are provided in the supporting printer and LAN card documentation.

Depending on the printer make and model or how it is attached to the LAN, it may be possible to set up either LPR/LPD from the AS/400 system to the printer using a remote output queue (RMTOUTQ) or if the printer is PCL/PJL compatible, a LAN Device Description can be used. For details on how to set up these connections, refer to *AS/400 Printing V*, SG24-2160.

### ***Host printers***

As mentioned earlier, AS/400 NetServer can also support LAN-to-HOST printing. This involves printers that are connected to other PCs or AS/400 systems and are, therefore, not connected directly to the LAN. It is possible to use printer emulation, where printers connected to PC LPT ports can be accessed from the AS/400 system. IBM Client Access is one product with which this can be achieved. It is also possible to use LPR/LPD from the AS/400 system to the host with the attached printer.

#### **6.1.2.2 Authority considerations**

Authority to allow users access to AS/400 output queues is required. It is important to review the necessary authorities to prevent unauthorized functions on the spooled files in the output queues.

After migration, there may be a requirement to restrict certain users from using some printers. The authority considerations are covered in 3.3.1, "Authority considerations" on page 35. The security of spooled files and output queues is covered in *OS/400 Security*, SC41-5302.

#### **6.1.2.3 Client installation**

For details on how to set up the printers on the client, refer to 3.3, "AS/400 NetServer print shares" on page 34.

### **6.1.3 Client migration**

To use AS/400 NetServer, the PC requires no special applications. This is different from Warp Server where your clients may have software such as DOS LAN Services. The functionality to use AS/400 NetServer is available with the supported Windows operating systems and requires only minimal additions to the current setups (if any).

When migrating clients, the client PCs will effectively fall into one of the two following categories:

- Operating systems supported with AS/400 NetServer. These include:
  - Windows for Workgroups (Windows 3.11)
  - Windows 95/98/NT/2000/Terminal Server Edition

- Operating systems *not* supported with AS/400 NetServer. These include:
  - OS/2
  - DOS
  - Windows 3.1

The clients that are *not* supported for use with AS/400 NetServer also have to be migrated to a supported operating system.

The clients that are supported ideally should have the DOS LAN Services or OS/2 LAN Requestor client removed from the PC since this application is no longer required. The removal of this application will depend upon the operating system on which it is installed.

Once the DOS LAN Services or OS/2 LAN Requestor application has been removed and the PC has been configured with one of the above listed supported operating systems, the task of redefining the network drives and printers to point toward the new locations can begin. This involves setting up mapped drives and network printers provided by AS/400 NetServer. Setting up file and printer shares is explained in Chapter 3, “Using AS/400 NetServer” on page 25.

It is worth noting that since the new network drives and printers will reference the new AS/400 NetServer shares (a new drive on a different server), it is easy to revert back to the old drive mappings. If the DOS LAN Services or OS/2 LAN Requestor client is not removed, then the mapped drives on Warp Server can be redefined again by pointing to the old Warp Server aliases. This provides the customer with an option to revert back to Warp Server if necessary.

#### 6.1.4 User migration

The Warp Server solution allows users to be enrolled into the domain in two ways:

- Create an AS/400 user profile using the Create User Profile (CRTUSRPRF) command. Then, allow the profile to be propagated down to Warp Server.
- Create Warp Server users within Warp Server without creating an AS/400 user.

There are advantages and disadvantages of these two methods which are not discussed here. However, it is highly likely that most business setups have a mixture of both AS/400 users and Warp Server only users.

All AS/400 NetServer users *must* be set up as AS/400 users, unless they are to assume the optionally configured guest user profile. The configuration of the guest user profile is covered in detail in 2.4, “Configuring the guest user profile” on page 20.

Warp Server users who are already AS/400 users should now log on to the Windows Network with their AS/400 user profile and password.

Users who have no AS/400 profile and password can log on to the Windows Network as any user and, if configured, they assume the guest profile on AS/400 NetServer. Should they need access to further shares, we recommend that you create AS/400 profiles and make sure that the users log on to the Windows Network with these profiles and their associated passwords.

### 6.1.5 Cleaning up the AS/400 system

Once you have completed the migration process up to this point, you need to assess what redundant objects on the AS/400 system can be removed. The objects that can be removed will depend on different business environments. The following list defines what objects can be considered for removal:

- 5769XZ1 Warp Server licensed program
- 5769SA2 Integration Services if there are no other Integrated Netfinity Server products on your AS/400 system that require it. To use any Integrated Netfinity Server hardware as a simple LAN adapter on your AS/400 system, you need the 5769SA2 licensed program.
- Network Server Storage Spaces
- Warp Server Network Server Description and Line Description
- Integrated Netfinity Server hardware

The Integrated Netfinity Server on which Warp Server, Windows Server and Novell NetWare run can also perform as a LAN adapter for the AS/400 system by providing a communications link between the network and OS/400. Many customers use the Integrated Netfinity Server for both purposes. This means that considerations for these setups need to be addressed once the Integrated Netfinity Server based products are no longer needed or available.

For customers that have separate LAN cards in addition to their Integrated Netfinity Servers, this is not a problem. Once the Integrated Netfinity Server products are redundant, both the software *and* Integrated Netfinity Server can be removed from the AS/400 system. The separate LAN card can be used as the link for the AS/400 system onto the network.

For customers that still want to use the Integrated Netfinity Server as a LAN adapter, you can continue to use it in this fashion when running Windows Server on the Integrated Netfinity Server or 5769SA2 Integration Services. We do not recommend this. The options for resolving this issue are detailed in the following list:

- If physical constraints allow, purchase a new LAN card.
- Depending on the system hardware environment, it may be possible to move the LAN card away from the Integrated Netfinity Server to be used separately. For further assistance, contact your hardware representative.

Should you still require the Integrated Netfinity Server just as a LAN card, we advise that you delete the old Warp Server Network Server Description and create a new \*BASE Network Server Description. For more information, refer to *OS/400 Integration Services for the Integrated PC Server*, SC41-5123. You also need to redefine the TCP/IP interfaces. For more information, refer to *TCP/IP Configuration and Reference*, SC41-5420.

If you find that the Integrated Netfinity Server is totally redundant now, the hardware can be removed and the licensed programs can be removed by completing the following steps:

1. Type GO LICPGM. Press Enter. Then, type option 12. Press Enter.
2. Locate the unnecessary licensed programs, and enter option 4 next to them. Press Enter.



3. Press Enter again to confirm the deletion.

Once this is done, the Warp Server Network Server Description and the Network Server Storage Spaces can be removed. For more information relating to this removal and the objects involved, refer to *OS/2 Warp Server for AS/400 Administration*, SC41-5423.

The current business requirements for each customer dictate what happens to any stand-alone Warp Server PCs. Some customers may choose to keep these PCs as part of the original Warp Server domain, but redundant PCs can be re-used elsewhere within the business for other purposes.

### 6.1.6 Backup considerations

Now that all of the data has been migrated from the Warp Server domain to AS/400 NetServer, there are likely to be some changes in the way the data is backed up. With Warp Server, there are a number of stages to back up the data. These include:

- Using the QLANSRv directory structure to save files and directories on both local and remote Warp Servers or use the directory QFPNWSSTG to save all of the Integrated Netfinity Server network server storage spaces
- Saving the Warp Server on Integrated Netfinity Server configuration objects
- Client backup using ADSM or similar third-party product

However, with AS/400 NetServer, all of the user data resides within the AS/400 integrated file system. This simplifies matters since it means that all of the user data can be saved using conventional AS/400 backup techniques.

The SAV command can be used from the AS/400 command line. This also means that an entire system save (option 21 from the SAVE menu) will back up *all* AS/400 NetServer data. One example of this command is given here:

```
SAV DEV(qsys.lib/tap01.devd) OBJ('//*') ('/QSYS.LIB' *OMIT) ('/QDLS' *OMIT)
UPDHST(*YES)
```

The SAV command specified saves all information in the AS/400 integrated file system, with the exception of QSYS.LIB and QDLS.

It is unlikely that any client backup is required. If this is not the case, the previous client backup methods can be used. For additional information on backing up AS/400 integrated file system data, refer to *OS/400 Backup and Recovery*, SC41-5304.

---

## 6.2 Example scenario: Warp Server to AS/400 NetServer

This section provides a simple fictional business scenario. It explains the necessary steps that were undertaken to migrate from Warp Server to AS/400 NetServer.

### 6.2.1 Introduction

Coffey Industries is a small business that has a head office and one regional branch. They currently have a Warp Server domain that is comprised of a Primary Domain Controller at the head office on an Integrated Netfinity Server in a

V4R3M0 AS/400 system and a Backup Domain Controller on a standalone PC at the regional office.

With new recruits arriving soon, the decision was made to move the few existing users from Warp Server and use the AS/400 NetServer functionality.

### 6.2.1.1 Business setup

Figure 48 shows the current setup of the business infrastructure. There are two Token-Ring networks connected by routers. One PC at the head office has a locally attached printer. There is a standalone printer at the regional office. The PC user (PAULINEB) at the regional office is just a Warp Server user and has no AS/400 user profile. The PC user at the head office is a Warp Server user and an AS/400 user. This AS/400 profile has been propagated down to the Warp Server (ARTHURM).

The PCs, which are both running Windows 95, are configured for NetBIOS over TCP/IP and the network printer uses TCP/IP.

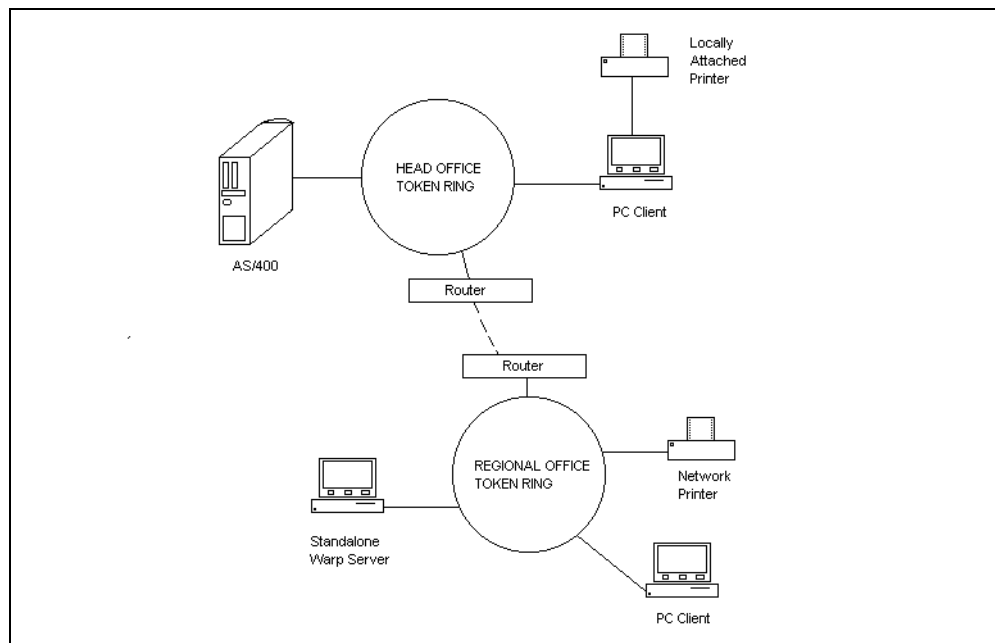


Figure 48. Example scenario - Setup

Each of the two users has their own data directory. They also share another directory that has had a word processor and other applications loaded into it. When they want to use applications, they simply run a desktop shortcut, which points to the executable file on the mapped drive letter.

The mapped drives, using DOS LAN Services, are assigned as follows:

- Both users have a K: drive. This is for their own user data. Two aliases have been created for this and are listed here:
  - Alias ARTHURM links to k:/userdata/arthurm on the Warp Server.
  - Alias PAULINEB links to k:/userdata/paulineb on the Warp Server.

Each user has *no* access to other users aliases.

- Each user has a G: drive, which is used for the word processor and other applications. The alias links to k:/shared/apps. Both users can use this alias but cannot make changes.

Therefore, each PC has a G: and a K: drive.

User ARTHURM has access to both the locally attached printer and the network printer. User PAULINEB has access only to the network printer.

There is an administrator of the Warp Server domain, and the user profile was propagated down from the AS/400 system. The steps to migrate from Warp Server to AS/400 NetServer are detailed here and follow the same format that is described 6.1, “Migration from Warp Server to AS/400 NetServer” on page 67.

### 6.2.1.2 File migration

The file migration exercise migrates all data, both individual and shared, across to another part of the AS/400 integrated file system so that it can be shared once again using AS/400 NetServer. Using the *Integrated File System* book, on the Web at <http://www.as400.ibm.com/infocenter>, it was decided that the directory structures, as shown in Figure 49, would be created for the migrated data.

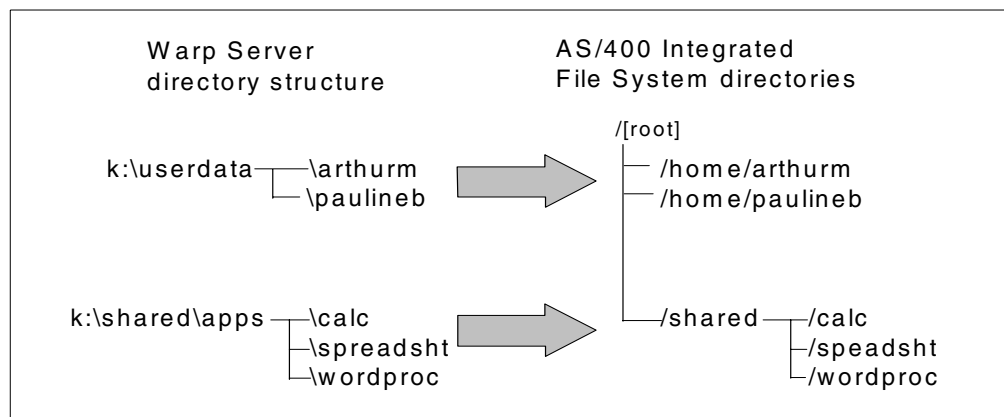


Figure 49. File migration proposal

The following steps are performed to migrate the data:

1. The administrator creates the directories /home/arthurm, /home/paulineb and /shared in the AS/400 Integrated File System using the CRTDIR command.
2. \*PUBLIC \* EXCLUDE is specified for the users directories, but \*PUBLIC \*RX is specified for the /shared directory since it has been agreed that all users should have access to these applications.
3. User PAULINEB is added to the AS/400 system using the Create User Profile (CRTUSRPRF) command. It is not necessary to add ARTHURM since this user already has an AS/400 profile.
4. The administrator adds authority for the users to their own directories, \*RWX and all object authorities in both cases.
5. Operations Navigator is used to share the three new directories using AS/400 NetServer.
6. Using the method detailed in 6.1.1.2, “File migration using a client” on page 72, the administrator obtains mapped drives to all relevant Warp Server

shares. The AS/400 NetServer shares are also mapped using the Map Network Drive function. The administrator logs onto the Windows Network with the AS/400 user profile so that in both environments, the administrator has all authorities.

7. All files and directories are copied and pasted into their new directories using Windows Explorer.

### **6.2.1.3 Printer migration**

There are two printers to consider in this example. The first is the network LAN-attached printer, and the second is the locally attached printer in the head office. Both of these printers need to become visible to the AS/400 system if they are to be used with AS/400 NetServer.

#### ***LAN-attached printer migration***

The administrator should refer to *AS/400 Printing V*, SG24-2160, to find out the options that are available when considering connecting an ASCII LAN-attached printer to the AS/400 system. Once an output queue has been created, it can be shared to the AS/400 NetServer users using Operations Navigator. The following tasks were used to migrate the network printer to a simple LPR/LPD configuration:

1. The printer is configured for TCP/IP using the supporting information provided with the printer and the LAN card. This has already been done previously for Warp Server.
2. The administrator creates a remote output queue on the AS/400 system using the Create Output Queue (CRTOUTQ) command and specifying the IP address of the printer.
3. \*PUBLIC \*USE authority is given to the output queue using the Edit Object Authority (EDTOBJAUT) command.
4. If not already started, the writer is started by using the Start Remote Writer (STRRMTWTR) command.
5. With the output queue created, the administrator shares it by using Operations Navigator (see 3.3, "AS/400 NetServer print shares" on page 34).
6. The new print share can be installed as a network printer on the client. Follow the information in 3.3, "AS/400 NetServer print shares" on page 34.

#### ***PC-attached printer migration***

In the case of a printer attached to a PC in the network, it is also necessary to make the printer visible to the AS/400 system. This printer was not used before by Warp Server since this product only supports LAN-to-LAN printing.

This can be done with Client Access/400 or by using LPR/LPD. Client Access provides a printer emulation function that allows the locally attached printer to become visible to the AS/400 system.

LPD functionality is not shipped with Windows 95 although it can be obtained from third-party suppliers. The configuration of this method is not covered here. Please refer to the instructions provided by the third-party manufacturers.

The following steps are necessary to allow this printer to be used:

1. Client Access Express is loaded on the PC with the locally attached printer, and a PC printer emulation session is configured (see *AS/400 Client Access*

*Express for Windows*, SG24-5191). An output queue for the printer is created automatically on the AS/400 system. \*PUBLIC \*USE authority is given to the output queue.

2. The session is started, and the printer writer is started.
3. The output queue is shared by the administrator (see 3.3, “AS/400 NetServer print shares” on page 34).
4. The new print share can be installed as a network printer on the AS/400 NetServer client. You can refer to 3.3, “AS/400 NetServer print shares” on page 34.

#### **6.2.1.4 Client migration**

The administrator can remove the DOS LAN Services client since it is no longer required. In this example, the PCs already have TCP/IP setup on them. However, it would have been necessary to add TCP/IP if the customer used Warp Server with the NetBEUI protocol instead.

Once AS/400 NetServer is running and the data has been migrated across, new file and printer shares can be created (refer to Chapter 3, “Using AS/400 NetServer” on page 25). To ensure the users have minimal changes to consider, set new mapped drives using the original letters used with Warp Server. This change in client will not affect the applications called from the remote application directories.

When the users now log on to the Windows network, they are asked for their AS/400 user profiles and associated passwords.

#### **6.2.1.5 User migration**

The only user migration was the addition of an AS/400 user profile for the user PAULINEB, which was achieved using the Create User Profile (CRTUSRPRF) command. This had to be done at an early stage to allow the administrator to set the correct authorities on the new AS/400 integrated file system directories. User ARTHURM already exists on the AS/400 system.

#### **6.2.1.6 Backup considerations**

The backup strategy can be classified into:

- Client backup
- Warp Server backup

There are no requirements to back up the clients in our example. Normal routines apply to customers who want to back up clients. There will be no change in this strategy if it already exists.

The previous Warp Server backup strategy included:

- Nightly incremental backup of the user data only
- Weekly backup of Warp Server E: drive
- Monthly backup of the entire AS/400 system
- Monthly backup of the Warp Server objects

The nightly incremental backup can still be done, except when specifying the QLANSRv/\*, the user data directories can be specified. The weekly backup of the E: drive is not needed anymore. The entire system save will capture all AS/400

NetServer data and objects. The final part of the backup strategy can be disregarded.

#### **6.2.1.7 AS/400 cleanup**

Once the administrator is satisfied that everything is working, they can consider cleaning up the AS/400 system.

In this example, the AS/400 system has no separate LAN card so the Integrated Netfinity Server is still required to provide a LAN connection for the AS/400 system. The administrator performs the following steps:

1. Power off the external Warp Server at the regional office.
2. Vary off the existing Warp Server Network Server Description.
3. Create a new \*BASE Network Server Description and line description (refer to *OS/400 Integration Services for the Integrated PC Server, SC41-5123*).
4. Remove and redefine the TCP/IP interfaces for the AS/400 system (use *TCP/IP Configuration and Reference, SC41-5420*).
5. Vary on the \*BASE Network Server Description.
6. The Warp Server objects can be deleted (use *OS/2 Warp Server for AS/400 Administration, SC41-5423*).
7. Remove the 5769XZ1 Warp Server licensed program.

---

## Chapter 7. Migration from Novell NetWare

This chapter covers the steps and considerations necessary to migrate from Novell NetWare on an Integrated Netfinity Server to AS/400 NetServer.

---

### 7.1 Migration from Novell NetWare to AS/400 NetServer

The topics to consider when migrating are divided into six categories:

- **File migration:** Migration of files and directories from the NetWare server on the Integrated Netfinity Server, and any additional NetWare servers to the AS/400 integrated file system and administration of the security of the file server.
- **Printer migration:** Considerations when migrating printers from Novell NetWare to the AS/400 NetServer environment.
- **Client migration:** Removal of the NetWare client and re-configuration of file and printer shares.
- **User migration:** Moving user IDs from Novell NetWare to AS/400 NetServer.
- **Cleanup of the AS/400 system:** What consideration to give to the objects that can be removed on the AS/400 system once the previous tasks are complete.
- **Backup considerations:** The changes that need to be made in backing up the migrated data.

Section 7.2, “Example scenario: Novell NetWare to AS/400 NetServer” on page 106, shows an example of the steps to be considered when migrating from Novell NetWare to AS/400 NetServer.

This chapter was compiled from information gathered during a migration using Novell NetWare 4.11. For further information on the supported versions of Novell NetWare and their constraints, refer to *OS/400 Integrating AS/400 with Novell NetWare*, SC41-5124.

#### Note

Prior to V4R4, if you are using multiple Novell NetWare servers to serve clients using different languages, then it is not possible to consolidate all of the user data onto one AS/400 NetServer setup. This is because AS/400 NetServer cannot handle clients with different code pages. At V4R4 and above, this restriction no longer applies.

#### 7.1.1 File migration

#### Note

We advise that you make a backup copy of the NetWare data before any migration is attempted. In the event of an error, the user data can be restored back, and therefore, will not be totally lost.

The object of the file migration exercise is to transfer all user files and directories (typically those stored in the Network Server Storage Spaces) from the NetWare servers to the AS/400 integrated file system. There are two possible ways of achieving this transfer:

- Use AS/400 commands
- Use a PC that has both the NetWare Client for a connection to the NetWare servers and a connection to an AS/400 NetServer share.

The basis of the first transfer solution relies on a directory link that is found within the AS/400 integrated file system called *QNETWARE*. The *QNETWARE* file system provides access to the directories and files on both local and remote NetWare servers. It is required that you have the 5769SS1 option 25 OS/400 - NetWare Enhanced Integration licensed program installed, as well as the 5769SA3 IBM OS/400 Integration for Novell NetWare licensed program on the AS/400 system. For further information on the *QNETWARE* file system, refer to *OS/400 Integrating AS/400 with Novell NetWare*, SC41-5124.

The second method involves using Network Neighborhood or File Manager to copy and paste from the NetWare server drives to the Netserver shares.

To create the new directories in the AS/400 integrated file system to which the NetWare server data will be transferred, you can use the Create Directory (CRTDIR) or Make Directory (MKDIR) commands. To create a directory called *USERDATA*, see Figure 50.

```

                                Create Directory (CRTDIR)

Type choices, press Enter.

Directory . . . . . /USERDATA_____

Public authority for data . . . *EXCLUDE   Name, *INDIR, *RWX, *RW...
Public authority for object . . *NONE     *INDIR, *NONE, *ALL...
+ for more values
Auditing value for objects . . . *SYSVAL   *SYSVAL, *NONE, *USRPRF...

                                Bottom
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

```

Figure 50. CRTDIR command

The newly created directory will be owned by the user profile who created it. This profile will have all rights to it.

It is possible to define the authorities for \*PUBLIC as well. Both data and object authorities can be defined within the CRTDIR or MKDIR command. As a general guide, we recommend that the data and object authorities for \*PUBLIC are set to



\*EXCLUDE and \*NONE respectively. If \*INDIR is selected, the \*PUBLIC rights from the directory above will be assumed (in this case, /root).

Once the necessary directories are created within the AS/400 integrated file system, you can begin copying the NetWare server files from Network Server Storage Space to the AS/400 integrated file system.

**Note**

Because the NetWare server data is migrated across into the AS/400 integrated file system, it is worth noting that some parts of the AS/400 integrated file system have different constraints. Some areas of the integrated file system, for example, are case sensitive.

For further information on AS/400 integrated file system constraints, refer to the *Integrated File System* book, which is located on the Web at:

<http://www.as400.ibm.com/infocenter>

#### 7.1.1.1 File migration using QNETWARE

This section describes the considerations for migrating files from the NetWare servers to the AS/400 integrated file system using the QNETWARE directory structure. The configuration of the Enhanced Integration to allow the use of the QNETWARE directory structure is not detailed here. The following migration method assumes that this has already been done. For further information, refer to Chapter 15 of *OS/400 Integrating AS/400 with Novell NetWare*, SC41-5124.

It is possible to use either of the following two AS/400 commands to migrate both the local and remote NetWare server files into the new directories within the AS/400 integrated file system:

- MOV
- CPY

Both of these commands may give slightly different results in addition to the fact that the CPY command only produces a replica of the file. There are authority and attribute considerations of which you need to be aware. They are covered later in this chapter.

You must ensure that the user profile you use to migrate the data to the AS/400 integrated file system also has an appropriate high level of authority. If possible, you should use a profile with \*ALLOBJ authority. This profile must also have been authenticated for use with the NetWare servers.

The MOV command is generally recommended because it preserves the ownership of objects. If the CPY command is used, the user who copies the objects becomes their owner (if the file system supports this).

It must also be noted that when using either of these commands, some attributes, extended attributes, and authorities may be discarded. Therefore, it is *important* that you review these considerations thoroughly before file migration.

The MOV and CPY commands are fairly similar in appearance and can be used on single or multiple files.

In Figure 51, the CPY command is being used for a single file (accounts.txt) within the ITSCID13 user directory on the NetWare Server. Notice that the access to this file is through QNETWARE. The destination directory is called userdata.

```

                                Copy Object (CPY)

Type choices, press Enter.

Object . . . . . > '/QNetWare/Netware.SVR/SYS/ITSCID13/ACCOUNTS
.TXT'
To directory . . . . . '/userdata'

To object . . . . .

Symbolic link . . . . . *NO          *NO, *YES
From Code Page . . . . . *OBJ       1-32767, *OBJ, *PCASCII
To Code Page . . . . . *OBJ       1-32767, *OBJ, *CALC...
Data Format . . . . . *BINARY      *BINARY, *TEXT

                                                                Bottom
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

```

Figure 51. CPY Object command for a single file

To copy a single file from a NetWare Server to another area within the AS/400 integrated file system, follow these steps:

1. Type `WRKLNK` on an empty command line, and press Enter.
2. Locate the QNETWARE link, and type `5` next to it. Press Enter to go to the next level. Locate the name of the desired NetWare server, and type option `5` next to it. Keep using option `5` to progress down until you locate your chosen file.
3. Type option `3` next to the file that you want to copy, and press **F4** to prompt. We see the same basic screen as shown in Figure 51.
4. Add the name of the destination directory in the To directory line. In this example, we used the `/userdata` directory that was created earlier by using the `CRTDIR` or `MKDIR` command. Press Enter. The file is then copied to the new directory.
5. Once you are satisfied that the copy has succeeded and if you have no further use for it, you may delete the original by typing option `4` next to it. If preferred, file deletion can be done after all necessary files are migrated. To do so, remove the Network Server Storage Space where the files reside (see 7.1.5, "Cleaning up the AS/400 system" on page 104).

Multiple file copy can also be achieved to save time. Refer to Figure 52 on page 93 to see how this can be done.

```

Work with Object Links

Directory . . . . : /QNetWare/Netware.SVR/SYS/ITSCID13

Type options, press Enter.
 3=Copy  4=Remove  5=Next level  7=Rename  8=Display attributes
11=Change current directory ...

Opt  Object link      Type  Attribute  Text
 3   ACCOUNTS.TXT    DSTMF
 3   IBMNINO.NUK     DSTMF
 3   IBM95.NUK       DSTMF
 3   TEST.FM         DSTMF

Parameters or command
===> todir('/userdata')
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve  F12=Cancel  F17=Position to
F22=Display entire field  F23=More options

Bottom

```

Figure 52. CPY command method for multiple files

Enter option 3 next to all of the files in one directory on the Warp Server and specify the parameter `todir('/userdata')` on the command line. By doing so, all of the files with the option 3 next to them are copied to the `userdata` directory when you press Enter.

As mentioned earlier, the MOV command is generally recommended. However, since the MOV and CPY commands are similar in use, the same techniques can be applied.

A comparison of Figure 53 on page 94 and Figure 51 on page 92 clearly shows that the two commands are similar. This is also true for multiple object moving.

```

                                Move Object (MOV)

Type choices, press Enter.

Object . . . . . > '/QNetWare/Netware.SVR/SYS/ITSCID13/ACCOUNTS
.TXT'
To directory . . . . . '/userdata'

To object . . . . .

From Code Page . . . . . *OBJ          1-32767, *OBJ, *PCASCII
To Code Page . . . . . *OBJ          1-32767, *OBJ, *CALC...
Data Format . . . . . *BINARY        *BINARY, *TEXT

                                                                Bottom
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

```

Figure 53. MOV command for a single object

To move a file, use option 2, not option 3 (Figure 54).

```

                                Work with Object Links

Directory . . . . : /QNetWare/Netware.SVR/SYS/ITSCID13

Type options, press Enter.
  3=Copy  4=Remove  5=Next level  7=Rename  8=Display attributes
  11=Change current directory ...

Opt  Object link      Type  Attribute  Text
  2   IBMNINO.NUK     DSTMF
  2   IBM95.NUK       DSTMF
  2   TEST.FM         DSTMF

                                                                Bottom

Parameters or command
===> todir('/userdata')
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve  F12=Cancel  F17=Position to
F22=Display entire field  F23=More options

```

Figure 54. MOV command for multiple objects

Using either of these methods, all of the files you need to migrate can be transferred to the other areas in the AS/400 integrated file system. These directories will eventually be made into shares for the AS/400 NetServer users.

### 7.1.1.2 File migration using a client

There are two reasons why you may decide to use this method of file migration, rather than the QNETWARE method:

- The Enhanced Integration part of the OS/400 operating system (option 25) is not loaded or used. This prevents access to the local and remote NetWare servers using the AS/400 integrated file system.
- Using the AS/400 integrated file system to migrate files can be a time-consuming exercise since only file objects can be migrated, not directories. For customers who have many sub-directories, there is also an increased risk that some files may be overlooked in error.

This method of data migration relies on a PC client that has a connection to NetWare *and* an AS/400 NetServer file share to the empty destination directory. Then, using either File Manager, Network Neighborhood, or even DOS command line files can be copied from one drive to another. This method can ultimately prove to be the fastest since entire directory structures can be transferred at a single time. If you have not already set up your AS/400 NetServer shares, refer to Chapter 2, "Getting started with AS/400 NetServer" on page 11, and Chapter 3, "Using AS/400 NetServer" on page 25, for information on setting up AS/400 NetServer and defining file shares.

You must also ensure that the user profiles you are using have adequate authority to copy or move objects from one directory to another. A profile with \*ALLOBJ authority is advisable for AS/400 NetServer and similarly a NetWare Administrator profile for Netware Access.

As a general guide, it may be easier to use the same user profile and password. For example, if the NetWare Administrator profile is called ADMIN, create the same profile on the AS/400 system, and give \*ALLOBJ authority and the same password as used with NetWare. The same user identification can be used to migrate the files. This prevents encountering authority problems with the guest profile and maybe even not connecting to the AS/400 NetServer share as Windows uses the profile and password entered for the NetWare connection.

For customers running Enhanced Integration, the user profiles from the AS/400 system can be propagated down to the NDS tree. An AS/400 profile with adequate authority may already exist.

Figure 55 on page 96 shows the window that is seen when using Windows Explorer in Windows 95. The H: drive is the NetWare drive and ITSCID13 is the user directory. The E: drive is the AS/400 NetServer file share to the directory called /userdata in the AS/400 integrated file system.

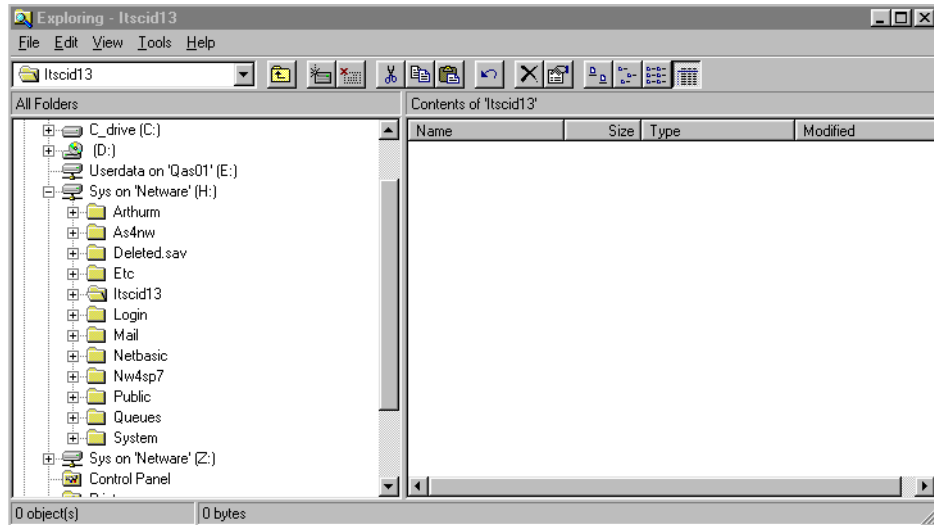


Figure 55. NetWare drives and AS/400 NetServer shares on one PC (Windows 95)

To migrate the data, perform the following steps:

1. Logon to NetWare and map a drive to the directory that has the files to be migrated. In the example shown in Figure 55, the H: drive is used.
2. Select **Start-> Programs-> Windows Explorer**.
3. When Windows Explorer has started, go to the **Tools** menu, and select **Map Network Drive**.
4. In the Path, enter the name of the share to which you want to map the drive. In the example in Figure 55, the AS/400 NetServer is called "Qas01", and the file share is called "userdata". In the Path box, the \\Qas01\userdata path was entered to achieve a mapped network drive to this directory on the AS/400 system.
5. Select all of the directories required within the users NetWare directory on the NetWare drive (H: drive).
6. Right-click, and select **Copy**. Then right-click, and select **Paste** on the destination directory (E: drive). Entire directories and files can be copied in one step.

### 7.1.1.3 Authority considerations

Give special attention to the authorities of the files and directories migrated from NetWare to AS/400 NetServer. If this part of the migration is neglected, there may be potential security issues. Users may be prevented from accessing their own data, and unauthorized users may have access to data that is not intended for public viewing.

The resulting authorities on any files or directories that have been migrated from NetWare to AS/400 NetServer are likely to be different from what was originally set up because the migrated data now obeys AS/400 object security.

Because of the size of many customer data directories, you may want to migrate over a period of time, rather than all at once. We observed that when moving data around the AS/400 integrated file system, certain authorities are removed and new ones are placed. This requires some attention by the administrator.

The following two sections briefly show the changes in authority that we experienced when migrating data from NetWare to AS/400 NetServer. The key to successful data migration is to consider creating many directories in the AS/400 integrated file system rather than having many subdirectories. The authorities can be set in the initial first-level directory. Files or directories migrated into it will take on those authorities. The results in the following two sections represent our findings when migrating data in lab conditions.

**Authority considerations when using QNETWARE methods**

There are distinct differences between resulting authorities on files that are migrated to other areas of the AS/400 Integrated File System depending on whether the MOV or CPY command is used. Use the Work with Authority (WRKAUT) command to examine or modify object authorities.

As shown in Figure 56, the two profiles ITSCID13 and ARTHURM are listed as having all data and object authorities for the destination directory (called userdata), while \*PUBLIC is \*EXCLUDE.

```

Work with Authority

Object . . . . . : /userdata
Owner . . . . . : ITSCID13
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

      Data      --Object Authorities--
Opt  User      Authority  Exist  Mgt  Alter  Ref
-----
  *PUBLIC      *EXCLUDE
  ITSCID13     *RWX        X    X    X    X
  ARTHURM      *RWX        X    X    X    X

Parameters or command
====>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display detail data authorities  F12=Cancel  F24=More keys
(C) COPYRIGHT IBM CORP. 1980, 1998.
Bottom

```

Figure 56. Work with Authority (WRKAUT) display

Figure 57 on page 98 shows the authorities assigned to the file ARTHURM.TXT in the sys:arthurm directory on the NetWare Server.

```

Work with Authority

Object . . . . . : /qnetware/Netware.SVR/SYS/ARTHURM/ARTHUR >
Owner . . . . . : ARTHURM
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

      Data      --Object Authorities--
Opt  User      Authority  Exist  Mgt  Alter  Ref
-----
      *NIWIRF   *RWX             X    X    X
      *NIWEFF   *RWX             X    X    X

Bottom

Parameters or command
====>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display detail data authorities  F12=Cancel  F24=More keys
(C) COPYRIGHT IBM CORP. 1980, 1998.

```

Figure 57. WRKAUT for the ARTHURM.TXT file

If the CPY command is used to copy this file to the userdata directory elsewhere in the AS/400 integrated file system, some changes occur.

```

Work with Authority

Object . . . . . : /userdata/ARTHURM.TXT
Owner . . . . . : ITSCID13
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

      Data      --Object Authorities--
Opt  User      Authority  Exist  Mgt  Alter  Ref
-----
      *PUBLIC    *RW
      ITSCID13   *RW             X    X    X    X

Bottom

Parameters or command
====>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display detail data authorities  F12=Cancel  F24=More keys

```

Figure 58. WRKAUT for a copied file using the CPY command

The resulting copied file has had the authority settings changed. The differences are listed here:



- Ownership of the file has now changed to the profile that copied it, and all object and data authorities have been added except EXECUTE. This is because the ARTHURM.TXT file is not an executable file.
- \*PUBLIC \*RW data authority to this file has been added.

When moving the file using the MOV command, a slightly different result is achieved.

In Figure 59, the object ownership has remained the same this time. \*PUBLIC \*RW data authority has been granted for this file. User ARTHURM has been added as an authorized user and given *all* rights, except EXECUTE. As before, the userdata directory lists both ARTHURM and ITSCID13 as having all data and object authorities. Also \*PUBLIC is \*EXCLUDE.

```

                                Work with Authority

Object . . . . . : /userdata/ARTHURM.TXT
Owner . . . . . : ARTHURM
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

Opt  User          Data Authority  --Object Authorities--
      User          Authority Exist  Mgt  Alter  Ref

      *PUBLIC      *RW
      ARTHURM      *RW          X    X    X    X

Parameters or command
====>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display detail data authorities  F12=Cancel  F24=More keys

```

Figure 59. WRKAUT on a file moved using the MOV command

**Authority considerations when using a client to migrate data**

As mentioned earlier, it is possible that this may be the faster of the two methods. However, by using the copy and paste method from DOS, Windows for Workgroups (3.11), or Windows 95, 98, or NT, the authorities on the files and directories are lost. For this reason, it is important that when the AS/400 NetServer directory is created, it has the correct authorities on it. This way, any files or directories that are migrated acquire the correct security from the directory into which they are copied.

In Figure 60 on page 100, notice the userdata directory that was created earlier. Notice that \*PUBLIC has been excluded. The owner is the profile that created it, and therefore, has all authority to it. The ACCOUNTS user profile has been added manually to the userdata directory and given \*RX rights, and ARTHURM has been provided with all data and object authorities.

```

Work with Authority

Object . . . . . : /userdata
Owner . . . . . : ITSCID13
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

      Data      --Object Authorities--
Opt  User      Authority  Exist  Mgt  Alter  Ref
-----
      *PUBLIC   *EXCLUDE
      ITSCID13  *RWX      X      X    X     X
      ACCOUNTS *RX
      ARTHURM   *RWX      X      X    X     X

Parameters or command
====>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display detail data authorities  F12=Cancel  F24=More keys
(C) COPYRIGHT IBM CORP. 1980, 1998.
Bottom

```

Figure 60. Work with Authority

In Figure 61, the list of authorized users for the /A directory is shown. Notice that ARTHURM is the owner of the directory.

```

Work with Authority

Object . . . . . : /qnetware/Netware.SVR/SYS/ARTHURM/A
Owner . . . . . : ARTHURM
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

      Data      --Object Authorities--
Opt  User      Authority  Exist  Mgt  Alter  Ref
-----
      *NIWIRF   *RWX      X      X    X     X
      *NIWEFF   *RWX      X      X    X     X

Parameters or command
====>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display detail data authorities  F12=Cancel  F24=More keys
Bottom

```

Figure 61. WRKAUT for NetWare directory

These authorities change when migrated by using the copy and paste method to the userdata directory, which is to be used for AS/400 NetServer.

Figure 62 shows the resulting authorities on the /A directory after being migrated from the NetWare user directory to a directory within the AS/400 integrated file system, userdata. Notice how the authorities that were present, as shown in Figure 61 on page 100, have been altered. The new authorities for this directory *and* the files contained within it have adopted the userdata authorities (see Figure 60 on page 100).

```

Work with Authority

Object . . . . . : /userdata/A
Owner . . . . . : ITSCID13
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

Opt  User          Data      --Object Authorities--
     Authority    Exist  Mgt  Alter  Ref
-----
     *PUBLIC      *EXCLUDE
     ITSCID13    *RWX      X    X    X    X
     ACCOUNTS    *RX
     ARTHURM     *RWX      X    X    X    X

Parameters or command
====>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display detail data authorities  F12=Cancel  F24=More keys
Bottom

```

Figure 62. WRKAUT after migration from NetWare user directory to AS/400 NetServer

With this in mind, it is clear that if the authorities are set correctly at the *first* level directory, then all other authorities will fall into place when the data is migrated across from the NetWare Server. This is why customers may find it easier to create a directory for every user, rather than set up authorities for many sub-directories.

## 7.1.2 Printer migration

This section explains considerations for migrating printers from Novell NetWare to AS/400 NetServer.

### 7.1.2.1 Overview

NetWare supports the following printing possibilities:

- LAN-to-LAN printing. That is, it supports a PC on a LAN printing to a printer, which is also on the LAN.
- Using a third-party product called *HostPrint/400*, it is possible to print from NetWare to AS/400 printers.
- Using the Enhanced Integration, it is possible to print from the AS/400 system to NetWare printers.

AS/400 NetServer supports both LAN-to-LAN and LAN-to-HOST printing techniques. This means that printers on the LAN and printers attached to other PCs or AS/400 systems can be accessed.

The printers that are configured for use with NetWare are not necessarily visible to the AS/400 system since the standard print serving is done by the NetWare Server. When using Enhanced Integration to print to NetWare printers, an output queue exists on the AS/400 system, but it is configured for use with the NetWare server and needs to be modified.

For the AS/400 NetServer to use any printers, you need to make the printers visible to the AS/400 system. This is done by using the Create Output Queue (CRTOUTQ) command, which sets up an output queue to the printer. Once this has been done, it can be shared for the AS/400 NetServer users.

### **Network printers**

Network printers that were used for NetWare printing alone must be configured for TCP/IP. Details of how to do that are provided in the supporting documentation for the printer LAN card or associated hardware. Printers that were visible to the AS/400 system by means of the Enhanced Integration functions need their output queues modified to point directly to the printers rather than the server.

Depending on the printer make and model or how it is attached to the LAN, it may be possible to setup either LPR/LPD from the AS/400 system to the printer using a remote output queue (RMTOUTQ). If the printer is PCL/PJL compatible, a LAN Device Description can be used. For details on how to set up these connections, refer to *AS/400 Printing V*, SG24-2160.

### **Host printers**

As mentioned earlier, AS/400 NetServer can also support LAN-to-HOST printing. This includes printers that are connected to other PCs or AS/400 systems and are therefore, not connected directly to the LAN. It is possible to use printer emulation, where printers connected to PC LPT ports can be accessed from the AS/400 system. IBM Client Access is one product with which this can be achieved. It is also possible to use LPR/LPD from the AS/400 system to the host with the attached printer.

#### **7.1.2.2 Authority considerations**

Authority to allow users access to AS/400 output queues is required. It is important to review the necessary authorities to prevent unauthorized functions on the spooled files in the output queues.

After migration, there may be a requirement to restrict certain users from using some printers. The authority considerations are covered in 3.3.1, "Authority considerations" on page 35. The security of spooled files and output queues is covered in *OS/400 Security*, SC41-5302.

#### **7.1.2.3 Client installation**

For details on how to set up the printers on the client, refer to 3.3, "AS/400 NetServer print shares" on page 34.

### **7.1.3 Client migration**

To use AS/400 NetServer, the PC requires no special applications, unlike NetWare which requires a client application. The functionality to use AS/400 NetServer is available with the supported Windows operating systems and requires only minimal additions to the current setups.

When migrating clients, the client PCs effectively fall into one of the two following categories:

- Operating systems supported with AS/400 NetServer. These include:
  - Windows for Workgroups (3.11)
  - Windows 95/98/NT/2000/Terminal Server Edition
- Operating systems *not* supported with AS/400 NetServer. These include:
  - OS/2
  - DOS
  - Windows 3.1

The clients that are *not* supported for use with AS/400 NetServer also have to be migrated to a supported operating system.

The clients that are supported must first have the NetWare client removed from the PC since this application is no longer required. The removal of this application depends on the operating system on which it is installed.

Once the NetWare client application is removed, the PC is configured with one of the listed supported operating systems, and TCP/IP installed and configured, the task of redefining the network drive and printers to point toward the new shares can begin. This involves setting up mapped network drives and network printers that are provided by AS/400 NetServer. Setting up file and printer shares is explained in Chapter 3, “Using AS/400 NetServer” on page 25.

It is worth noting that since the network drives and printers will reference the new AS/400 NetServer shares (a new drive on a different server), it is easy to revert back to the old drive mappings. If the NetWare client and the IPX protocol are not removed, the mapped drives in the NetWare environment can be redefined again by invoking the NetWare client. This provides the customer with an option to revert back to NetWare if necessary.

#### 7.1.4 User migration

The NetWare solution allows users to be enrolled into the NDS tree in two ways:

- Create an AS/400 user profile using the Create User Profile (`CRTUSRPRF`) command. Then, allow the profile to be propagated down to the NDS tree (Enhanced Integration only).
- Create NetWare users within NetWare using the standard NetWare applications without creating an AS/400 user.

There are advantages and disadvantages of these two methods which are not discussed here. However, it is possible that most business setups will have a mixture of both AS/400 users and NetWare-only users.

All AS/400 NetServer users *must* be set up as AS/400 users, unless they are to assume the optionally configured guest user profile. The configuration of the guest user profile is covered in detail in 2.4, “Configuring the guest user profile” on page 20.

NetWare users who are already AS/400 users should now log on to the Windows Network with their AS/400 user profile and password.

Users who have no AS/400 profile and password can log on to the Windows Network as any user and, if configured, they assume the guest profile on AS/400 NetServer. Should they need access to further shares, we recommend that you create AS/400 profiles and make sure that the users log on to the Windows Network with these profiles and their associated passwords.

### 7.1.5 Cleaning up the AS/400 system

Once you have completed the migration process up to this point, you need to assess what redundant objects on the AS/400 system can be removed. The objects that can be removed depend on different business environments. The following list defines what objects can be considered for removal:

- 5769SA3 IBM OS/400 Integration for Novell NetWare licensed program
- 5769SS1 option 25 NetWare Enhanced Integration licensed program
- 5769SA2 Integration Services if there are no other Integrated Netfinity Server products on your AS/400 system that require it. To use any Integrated Netfinity Server hardware as a simple LAN adapter on your AS/400 system, you need the 5769SA2 licensed program.
- Network Server Storage Spaces
- NetWare Network Server Description and Line Description
- Integrated Netfinity Server hardware

The Integrated Netfinity Server on which Warp Server, Windows Server, and Novell NetWare run can also perform as a LAN adapter for the AS/400 system by providing a communications link between the network and OS/400. Many customers use the Integrated Netfinity Server for both purposes. This means that considerations for these setups need to be addressed once the Integrated Netfinity Server based products are no longer needed or available.

For customers that have separate LAN cards in addition to their Integrated Netfinity Servers, this is not a problem. Once the Integrated Netfinity Server products are redundant, both the software *and* Integrated Netfinity Server can be removed from the AS/400 system. The separate LAN card can be used as the link for the AS/400 onto the network.

For customers that still want to use the Integrated Netfinity Server as a LAN adapter, you can continue to use it in this fashion when running Windows Server on the Integrated Netfinity Server or 5769SA2 Integration Services. We do not recommend this. The options for resolving this issue are detailed in the following list:

- If physical constraints allow, purchase a new LAN card.
- Depending on the system hardware environment, it may be possible to move the LAN card away from the Integrated Netfinity Server to be used separately. For further assistance, contact your hardware representative.

Should you still require the Integrated Netfinity Server just as a LAN card, we advise that you delete the old NetWare Network Server Description and create a new \*BASE Network Server Description. For more information, refer to *OS/400 Integration Services for the Integrated PC Server*, SC41-5123. You also need to redefine the TCP/IP interfaces. For more information, refer to *TCP/IP Configuration and Reference*, SC41-5420.

If you find that the Integrated Netfinity Server is totally redundant now, the hardware can be removed and the licensed programs can be removed by completing the following steps:

1. Type `GO LICPGM`. Press Enter. Then, type option `12`. Press Enter.
2. Locate the unnecessary licensed programs, and enter option `4` next to them. Press Enter.
3. Press Enter again to confirm the deletion.

Once this is done, the NetWare Network Server Description and the Network Server Storage Spaces can be removed. For more information relating to this removal and the objects involved, refer to *OS/400 Integrating AS/400 with Novell NetWare*, SC41-5124.

The current business requirements for each customer dictate what happens to any stand-alone NetWare servers. Some customers may choose to keep these PCs as part of the original NetWare tree, but redundant PCs can obviously be re-used elsewhere within the business for other purposes.

### 7.1.6 Backup considerations

Now that all of the data has been migrated from the NetWare servers to AS/400 NetServer, there are likely to be some changes in the way that the data is backed up. With Novell NetWare, there are a number of options to back up the data. These include:

- Using the QNETWARE directory structure to save files and directories on both local and remote servers or use the directory QFPNWSSTG to save all of the Integrated Netfinity Server network server storage spaces
- Saving the Novell NetWare on Integrated Netfinity Server configuration objects
- Using SBACKUP or ARCserve products to backup all NetWare servers and workstations

However, with AS/400 NetServer, all of the user data resides within the AS/400 integrated file system. This simplifies matters since it means that all of the user data can be saved using conventional AS/400 backup techniques.

The SAV command can be used from the AS/400 command line. This also means that an entire system save (option `21` from the SAVE menu) will back up *all* AS/400 NetServer data. One example of this command is given here:

```
SAV DEV(qsys.lib/tap01.devd) OBJ((/*) ('/QSYS.LIB' *OMIT) ('/QDLS' *OMIT)  
UPDHST(*YES)
```

The SAV command specified will save all information in the AS/400 integrated file system with the exception of QSYS.LIB and QDLS.

It is unlikely that any client backup is required. If this is not the case, the previous client backup methods can be used. For additional information on backing up AS/400 integrated file system data, refer to *OS/400 Backup and Recovery*, SC41-5304.

## 7.2 Example scenario: Novell NetWare to AS/400 NetServer

This section provides a simple fictional business scenario. It explains the necessary steps that were taken to migrate from Novell NetWare to AS/400 NetServer.

### 7.2.1 Introduction

Coffey Industries is a small business that has a head office and one regional branch. They currently have a NetWare setup that is comprised of NetWare on the Integrated Netfinity Server at the head office in a V4R3M0 AS/400 system (NetWare1) and another NetWare server, which is part of the same NDS tree on a stand-alone PC at the regional office (NetWare2).

With some new recruits arriving soon, the decision was made to move the few existing users from NetWare and use the AS/400 NetServer functionality.

#### 7.2.1.1 Business setup

Figure 63 shows the current setup of the business infrastructure. There are two Token-Ring networks connected by routers. One PC at the head office has a locally attached printer. There is a stand-alone printer at the regional office. The PC client at the regional office is just a NetWare user and has no AS/400 user profile. The PC client at the head office is the NetWare administrator and user and also has an \*ALLOBJ AS/400 user profile. Enhanced Integration is not used on the AS/400 system. Both PCs are running Windows 95 and use IPX to communicate with the NetWare servers.

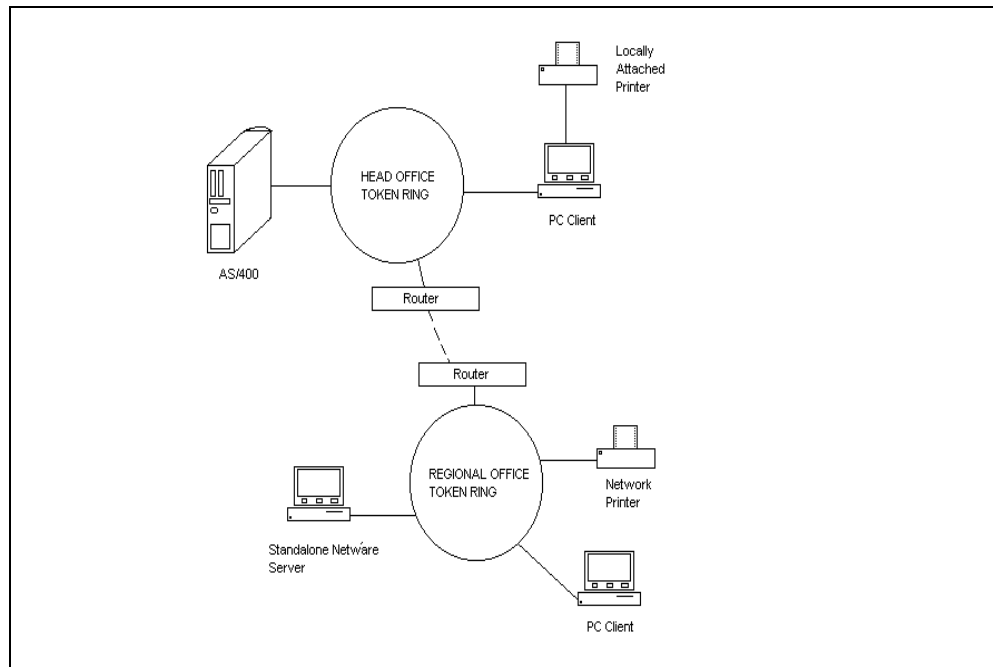


Figure 63. Example Scenario - Setup

Each of the two users has their own data directory. They also share another directory that has had a word processor and other applications loaded into it. When they want to use applications, they simply run a desktop shortcut, which



points to the executable file on a mapped drive letter. The mapped drives, using the NetWare client, are assigned as follows:

- Both users have a K: drive. This is for their own user data.
  - For user ARTHURM, the K: drive is mapped to Netware1\_SYS/arthurm.
  - For user PAULINEB, the K: drive is mapped to Netware2\_SYS/paulineb.

Each user has *no* access to other users directories.

- Each user has a G: drive, which is used for the word processor and other applications. The mapped drive points to a shared directory on the stand-alone NetWare server. Both users can use this directory, but not make changes.

Therefore, each PC has a G: and a K: drive.

User ARTHURM has access to both the locally attached printer and the network printer. User PAULINEB has access only to the network printer.

The steps to migrate from NetWare to AS/400 NetServer are detailed here and follow the same format that is described in 7.1, “Migration from Novell NetWare to AS/400 NetServer” on page 89.

### 7.2.1.2 File migration

The file migration exercise migrates all data, both individual and shared, across to another part of the AS/400 integrated file system so that it can be shared once again using AS/400 NetServer. Using the *Integrated File System* book, at <http://www.as400.ibm.com/infocenter>, it was decided that the directory structures shown in Figure 64 would be created for the migrated data.

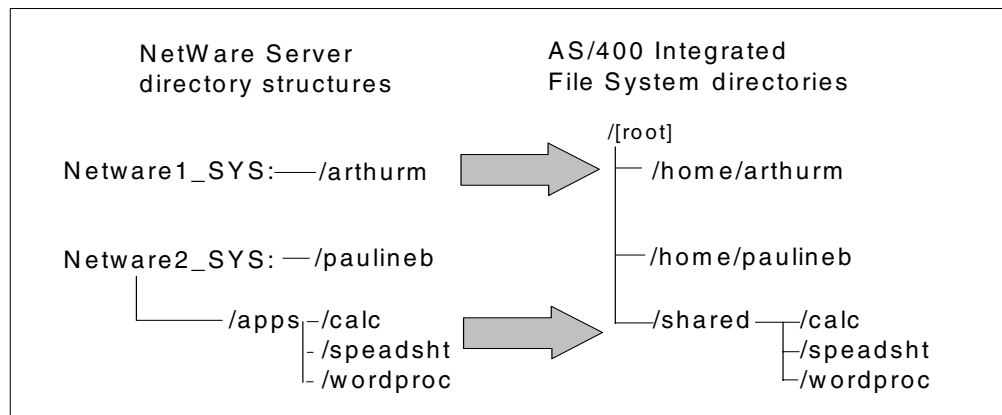


Figure 64. File migration proposal

The following steps are performed to migrate the data:

1. The AS/400 administrator creates the directories /home/arthurm, /home/paulineb, and /shared in the AS/400 integrated file system using the CRTDIR command.
2. \*PUBLIC \* EXCLUDE is specified for the users' directories, but \*PUBLIC \*RX is specified for the /shared directory since it has been agreed that all users should have access to these applications.
3. User PAULINEB is added to the AS/400 system using the Create User Profile (CRTUSRPRF) command.

4. The AS/400 administrator adds authority for the users to their own directories, \*RWX and all object authorities in both cases.
5. Operations Navigator is used to share the three new directories using AS/400 NetServer.
6. Using the method described in 7.1.1.2, "File migration using a client" on page 95, the NetWare administrator obtains mapped drives to all relevant NetWare directories. The AS/400 NetServer shares are also mapped using the Map Network Drive function.
7. All files and directories are copied and pasted into their new directories using Windows Explorer.

### **7.2.1.3 Printer migration**

There are two printers to consider in this example. The first is the network LAN-attached printer, and the second is the locally attached printer in the head office. Both of these printers need to become visible to the AS/400 system if they are to be used with AS/400 NetServer.

#### ***LAN-attached printer migration***

The administrator should refer to *AS/400 Printing V*, SG24-2160, to find out the options that are available when considering connecting an ASCII LAN-attached printer to the AS/400 system. Once an output queue is created, it can be shared to the AS/400 NetServer users by using Operations Navigator. The following tasks were used to migrate the network printer to a simple LPR/LPD configuration:

1. The printer is configured for TCP/IP using the supporting information provided with the printer and the LAN card.
2. The administrator creates a remote output queue to the AS/400 system using the Create Output Queue (`CRTOUTQ`) command and specifying the IP address of the printer.
3. \*PUBLIC \*USE authority is given to the output queue using the Edit Object Authority (`EDITOBJAUT`) command.
4. If not already started, the writer is started by using the `STRMIWTR` command.
5. With the output queue created, the administrator shares it by using Operations Navigator (see 3.3, "AS/400 NetServer print shares" on page 34).
6. The new printer share can be configured on the client. Follow the information in 3.3, "AS/400 NetServer print shares" on page 34.

#### ***PC-attached printer migration***

In the case of a printer attached to a PC on the network, it is also necessary to make the printer visible to the AS/400 system. This printer was not used before by NetWare.

This can be done with Client Access/400 or by using LPR/LPD. Client Access provides a printer emulation function that allows the locally attached printer to become visible to the AS/400 system.

LPD functionality is not shipped with Windows 95 although it can be obtained from third-party suppliers. The configuration of this method is not covered here. Please refer to the instructions provided by the third-party manufacturers.

The following steps are necessary to allow this printer to be used:

1. Client Access Express is loaded on the PC with the locally attached printer, and a PC printer emulation session is configured (see *AS/400 Client Access Express for Windows*, SG24-5191). An output queue for the printer is created automatically on the AS/400 system.
2. \*PUBLIC \*USE authority is given to the output queue using the Edit Object Authority (`EDTOBJAUT`) command.
3. The session is started and the printer writer is started.
4. The output queue is then shared by the by the AS/400 administrator (see 3.3, “AS/400 NetServer print shares” on page 34).
5. The new print share can be installed as a network printer on the client. You can refer to 3.3, “AS/400 NetServer print shares” on page 34.

#### 7.2.1.4 Client migration

The administrator can remove the NetWare client since it is no longer required. In this example, the PCs have only IPX setup on them. Therefore, TCP/IP needs to be configured additionally on each PC.

Once AS/400 NetServer is running and the data has been migrated across, new file and printer shares can be created (refer to Chapter 3, “Using AS/400 NetServer” on page 25). To ensure the users have minimal changes to consider, set new mapped drives using the original letters used with the NetWare client. This change in client will not affect the applications called from the remote application directories.

When the users now log on to the Windows network, they are asked for their AS/400 user profiles and associated passwords.

#### 7.2.1.5 User migration

The only user migration was the addition of an AS/400 user profile for the user PAULINEB, which was achieved using the `CRTUSRPRF` command. This had to be done at an early stage to allow the administrator to set the correct authorities on the new AS/400 integrated file system directories. User ARTHURM already exists on the AS/400 system.

#### 7.2.1.6 Backup considerations

The backup strategy can be classified into:

- Client backup
- NetWare Server backup

There are no requirements to backup the clients in our example. Normal routines apply to customers who want to backup clients using third-party products. There will be no change in this strategy if it already exists. For further information, customers should consult their third-party product support.

The previous NetWare backup strategy included:

- Weekly backup of NetWare Server (NETWARE1) E: drive
- Weekly backup of the NetWare server data using SBACKUP utility
- Monthly backup of the entire AS/400 system

Now, the weekly backup of the E: drive is not needed anymore. The entire system save will capture all AS/400 NetServer data, but this was done only monthly. Therefore, the customer can now use the AS/400 SAV command to back up data from specific areas within the AS/400 integrated file system on a more frequent basis. For further information, refer to *OS/400 Backup and Recovery*, SC41-5304.

The SBACKUP utility is also now redundant.

#### **7.2.1.7 AS/400 cleanup**

Once the administrator is satisfied that everything is working, they can consider cleaning up the AS/400 system. In this example, the AS/400 system has no separate LAN card so the Integrated Netfinity Server is still required to provide a LAN connection for the AS/400 system. The administrator performs the following steps:

1. Bring down the external NetWare Server at the regional office.
2. Vary off the existing NetWare Server Network Server Description.
3. The administrator creates a new \*BASE Network Server Description and a line description (refer to *OS/400 Integration Services for the Integrated PC Server*, SC41-5123).
4. Remove and redefine the TCP/IP interfaces for the AS/400 system (use *TCP/IP Configuration and Reference*, SC41-5420).
5. Vary on the \*BASE Network Server Description.
6. The NetWare Server objects can be deleted (use *OS/400 Integrating AS/400 with Novell NetWare*, SC41-5124).
7. Remove the 5769SA3 Novell NetWare licensed program.

---

## **Part 3. AS/400 NetServer and Network Stations**

Part 3 describes how to use AS/400 NetServer with Network Stations in a Windows NT server 4.0, Terminal Server Edition environment.

We present an overview of using AS/400 NetServer with Network Stations and describe the benefits that you can achieve by setting up this environment. We describe the main steps in administering a Terminal Server Edition server and Citrix Metaframe for use with Network Stations. We give a practical example for using this environment.



---

## Chapter 8. AS/400 NetServer and Network Stations

Network Stations, also called *thin clients*, are diskless computers that get their boot kernel from a boot server, which in our environment is the AS/400 system. If you want to use Network Stations as Windows NT clients in a Windows NT domain, you need a special Windows NT server, called Windows NT server, Terminal Server Edition. It allows you to run applications on the Windows NT server. The Network Stations are connected using the Independent Computing Architecture (ICA) protocol to the Windows NT server, Terminal Server Edition server. This protocol is supplied by the Citrix Metaframe software, which is installed on the Windows NT server, Terminal Server Edition server.

---

### 8.1 Benefits of using Network Stations with AS/400 NetServer

You are now in the position to set up the security and administration of your Network Stations, file servers, and print servers from one system, namely the AS/400 system. This is because you can use the Network Station Manager and AS/400 NetServer on the AS/400 system. It reduces the costs of your server software because AS/400 NetServer is included in the basic package of the OS/400. You only have to pay for the PC Server products that you are using. You do not have to buy special hardware because you are using the hardware from the AS/400 system. Also, you do not need to buy special backup software, because you can use the backup utilities from OS/400 to save your data.

If you are using the Integrated Netfinity Server as your Windows NT server, Terminal Server Edition server (application server), you can use the OS/400 utilities as well for backing up its files.

---

### 8.2 Getting started

This section lists the steps that need to be followed before you can implement the solution described in this chapter.

#### 8.2.1 Prerequisites

The following prerequisites must be installed to use Network Stations with AS/400 NetServer in a Windows NT server, Terminal Server Edition environment:

- The Integrated Netfinity Server or Integrated PC Server must be up and ready. The earliest model Integrated Netfinity Servers, known as FSIOPs, do not work with Windows NT server, Terminal Server Edition server.
- OS/400 Operating System V4R3M0 or higher, with recommended PTFs, (refer to 8.5.1, "Multiple session support" on page 122), must be installed on the AS/400 system.
- Network Station Manager V3R7M0 or higher must be installed and configured. For setting up Network Station Manager, please refer to *IBM Network Station Manager Installation and Use*, SC41-0664.
- The Windows NT server, Terminal Server Edition server must be installed and configured. For setting up this server, please refer to the related Microsoft publication or *AS/400 - Implementing Windows NT on the Integrated Netfinity Server*, SG24-2164.

- The Citrix Metaframe program must be installed on the Windows NT server, Terminal Server Edition server. We used Version 1.8 in this redbook. For setting up this program, please refer to the related Citrix publications.
- Network Stations must be configured and connected to the system that contains the Network Station Manager program (in our environment, the AS/400 system) and to the Windows NT server, Terminal Server Edition server. For setting up Network Stations, please consult *AS/400 - IBM Network Station - Getting Started*, SG24-2153, and *IBM Network Station Manager Installation and Use*, SC41-0664.
- AS/400 NetServer must be started on the AS/400 system. For administration topics, refer to Chapter 2, “Getting started with AS/400 NetServer” on page 11.

### 8.2.2 Required skills

This section shows the required skills for using Network Station in a Windows NT server, Terminal Server Edition and AS/400 NetServer environment.

- **AS/400 skills**

Basic operations skills are required, as well as some experience with using Operations Navigator. You should also be familiar with administering user authority and configuring TCP/IP.

- **Windows NT server, Terminal Server Edition skills**

It is essential to have a knowledge of Windows NT administration functions, especially in user administration, security, and resource sharing.

- **Network Station skills**

A basic skill in using Network Station Manager is required.

---

## 8.3 Windows NT server, Terminal Server Edition

This section shows:

- The two options for installing applications on a Windows NT server, Terminal Server Edition server.
- The considerations for a domain user, using Network Stations, to log on to a Windows NT server, Terminal Server Edition server.
- How to install a WINS server on a Windows NT server, Terminal Server Edition server.

### 8.3.1 Applications and Windows NT server, Terminal Server Edition

Multiple concurrent users accessing Terminal Server Edition, will log on and access applications in separate, protected sessions on a single server.

Normally the Windows NT server, Terminal Server Edition server is in a mode called *execute mode*. If we want to install applications on a Windows NT server, Terminal Server Edition server, we have to put the server into a special mode, called *installation mode*. There are two different ways to do this, which are explained in the following sections.



### 8.3.1.1 DOS commands

If you want to put the server into installation mode, perform the following tasks:

1. Log on to Windows NT server, Terminal Server Edition server with administrator authority.
2. Click **Start-> Programs-> Command Prompt** to open a DOS box.
3. Type `change user /install` and press Enter. The message `User session is ready to install applications` appears as shown in Figure 65.

```
Microsoft (R) Windows NT(TM)
(C) Copyright 1985-1998 Microsoft Corp.

E:\WINNT\Profiles\hartig>change user /install
User session is ready to install applications.

E:\WINNT\Profiles\hartig>
```

Figure 65. Installation Mode

Now the Windows NT server, Terminal Server Edition server is in the mode that allows you to install applications.

When you are finished installing the applications, before rebooting the server, perform the following steps:

1. Open a DOS Box as previously described.
2. Type `change user /execute` and press **Enter**. Then, the message `User session is ready to execute applications` appears as shown in Figure 66.

```
Microsoft (R) Windows NT(TM)
(C) Copyright 1985-1998 Microsoft Corp.

E:\WINNT\Profiles\hartig>change user /execute
User session is ready to execute applications.

E:\WINNT\Profiles\hartig>
```

Figure 66. Execute Mode

Now the Windows NT server, Terminal Server Edition server is ready for normal use and can be rebooted if necessary.

### 8.3.1.2 Add/Remove Program tool

Perform the following tasks to install applications on a Windows NT server, Terminal Server Edition server using the Add/Remove Programs tool:

1. Log on to Windows NT server, Terminal Server Edition server with administrator authority.
2. Click **Start-> Settings-> Control Panel**

3. Select **Add/Remove Programs** icon.
4. Click **Install**.
5. Click **Next**.
6. In the Run Installation Program window, shown in Figure 67, type in the path where the installation program is located (for example, the CD-ROM drive). Click **Next**.

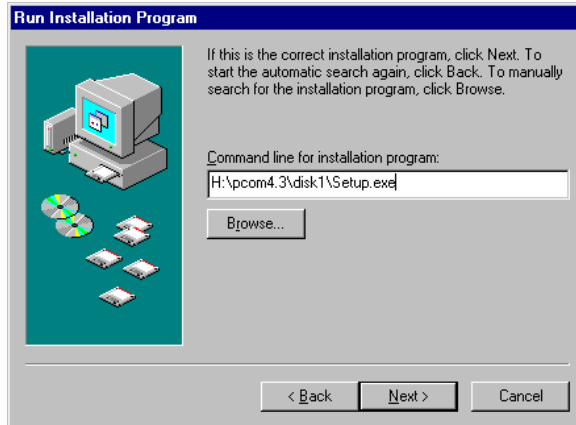


Figure 67. Run Installation Program

7. The Change User Option window appears. Leave the default as shown in Figure 68. Click **Next**.

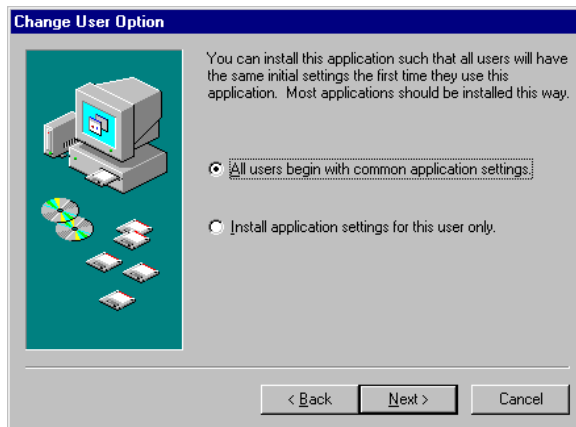


Figure 68. Change User Option

8. The installation starts. Go through the normal installation steps of your program to be installed.
9. If your installation program requests a restart of your Windows NT server, Terminal Server Edition server, select **No, I will restart my computer later**.
10. After normal installation program has ended, the After Installation window appears as shown in Figure 69 on page 117. Click **Next**.

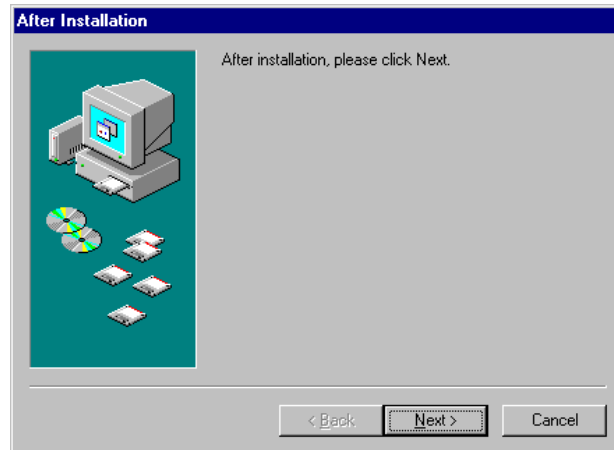


Figure 69. After Installation

11. At the next window, shown in Figure 70, click **Finish**.

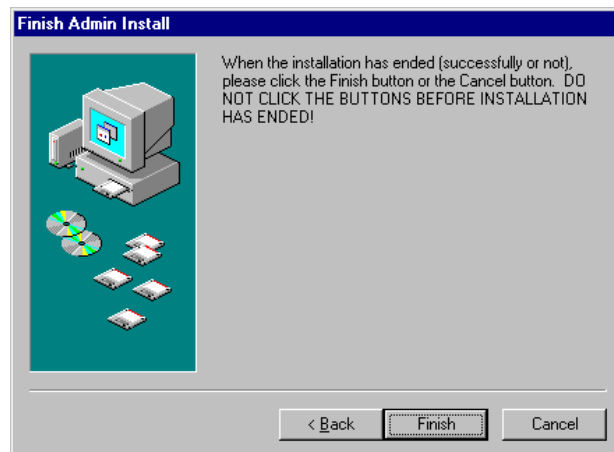


Figure 70. Finish Admin Install

The Windows NT server, Terminal Server Edition server now allows the use of the installed application.

### 8.3.2 Considerations for domain users

The following tasks allow domain users on Network stations, a *local login to the Windows NT server, Terminal Server Edition server*. These tasks must be performed if the user is to connect to the server.

1. Log on to Windows NT server, Terminal Server Edition server with administrator authority.
2. Click **Start-> Programs-> Administrative Tools-> User Manager for Domains**.
3. In the User Manager window, select **Policies-> User Rights**.
4. Select **Log on locally** from the pull-down menu as shown in Figure 71 on page 118.

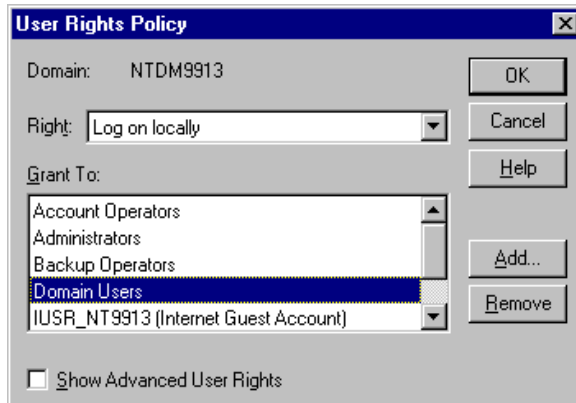


Figure 71. User Rights Policy

5. Check if the group **Domain Users** is shown in the lower list (in Figure 71). If not, proceed to the next task. Otherwise, you can stop here.
6. Click **Add**. The window shown in Figure 72 appears.

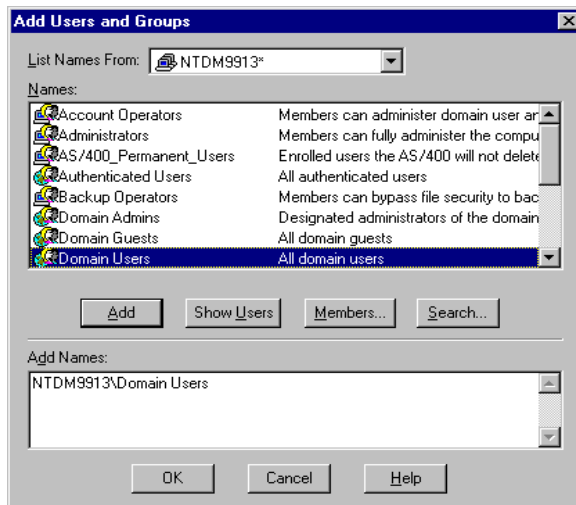


Figure 72. Add Users and Groups

7. Select the group **Domain Users** from the list as shown in Figure 72, and click the **Add** button.
8. Now the group, named **Domain Users**, should be shown in the lower list (Figure 72). Click **OK**.

**Note**

Instead of adding the group Domain Users, the group Everyone can be added. However, it will decrease the security of the domain. Therefore, we recommend that you add the group Domain Users or add special user-defined groups.

### 8.3.3 Setting up WINS Server

When using AS/400 NetServer, it is possible to use a WINS server to provide a central point for NetBIOS name resolution. Here, we explain how to set up a WINS server on a Windows NT server, Terminal Server Edition server.

To set up the WINS server, perform the following steps:

1. Click **Start-> Settings-> Control Panel**. Double-click on the **Network** icon.
2. Select the **Services** tab, and click **Add**. The window shown in Figure 73 appears.

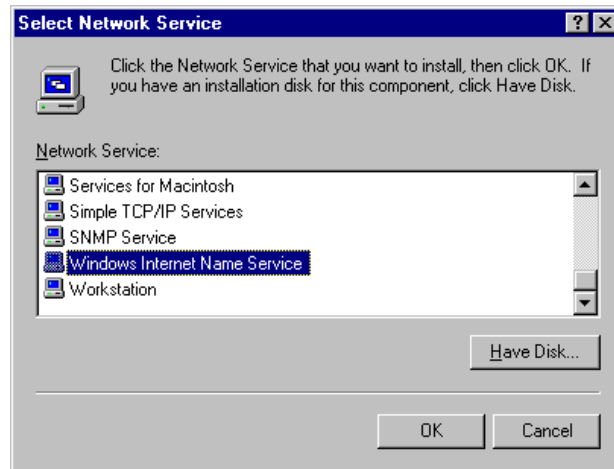


Figure 73. Select Network Service

3. Select **Windows Internet Name Service** from the list as shown in Figure 73, and click **OK**.
4. If the Windows NT Setup window appears, enter the path where your Windows NT server, Terminal Server Edition server installation files are located, for example, a CD-ROM drive. If this window does not appear, continue with the next task.
5. Some files are copied which are needed for the requested service. After copying, in the Network window, *Windows Internet Name Service* should appear as shown in Figure 74 on page 120.

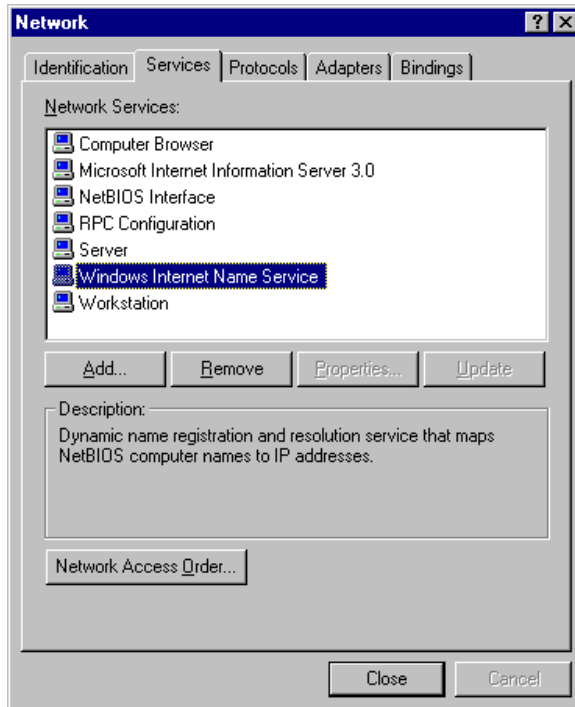


Figure 74. Network

6. Close the **Network** window, and reboot the Windows NT server, Terminal Server Edition server to activate the service.
7. After rebooting the Windows NT server, Terminal Server Edition server, click **Start-> Program-> Administrative Tools**. There is now a new menu item called *WINS Manager*. By selecting this menu item, you can administer the WINS server.

The WINS server now dynamically refreshes the NetBIOS name table and can be synchronized with other servers. To administer the WINS server, refer to the Microsoft documentation. For details on how to use the WINS server with AS/400 NetServer, refer to 2.1, "Configuring AS/400 NetServer" on page 12.

---

## 8.4 Citrix Metaframe and Network Station Manager

Citrix MetaFrame Application Server for Windows is Citrix's thin client/server system software for Windows NT server, Terminal Server Edition server. It uses the Independent Computing Architecture (ICA) protocol to connect thin-clients to the Windows NT server, Terminal Server Edition server from where the applications are deployed, managed, and executed. There is no need to download the application from the server. This results in better manageability.

There are some easy configuration steps to be done in the Network Station Manager program, so that Network Stations (ICA clients) can be connected to a Windows NT server, Terminal Server Edition server. This section describes these configuration steps. Complete the following steps to set up Network Station Manager for ICA clients:

1. Citrix Metaframe must be installed on the Windows NT server, Terminal Server Edition server to which we will connect.
2. Enter the Network Station Manager Program with a standard browser, such as Netscape Navigator or Internet Explorer. For more information, refer to *IBM Network Station Manager Installation and Use*, SC41-0664.
3. At the Network Station Manager main menu, click **Startup-> Menus-> Next**.
4. At Menu Contents - System Defaults, scroll down and choose **Local Program Menu Items**.
5. Complete the following parameters as shown in Figure 75:
  - a. *Menu item label*: Enter the name of the menu button.
  - b. *Program to run*: Type `ICACLNT`. This is the connection program for the ICA clients.
  - c. *Parameters*: Type in `-h <ip-address of WIN/TSE server> -c 256`. Here, `-h` refers to the host IP address (Windows NT server, Terminal Server Edition server), and `-c` is the color resolution. We recommend that the Network Stations have the 2 MB graphic chip installed when used with a Windows NT server, Terminal Server Edition server.

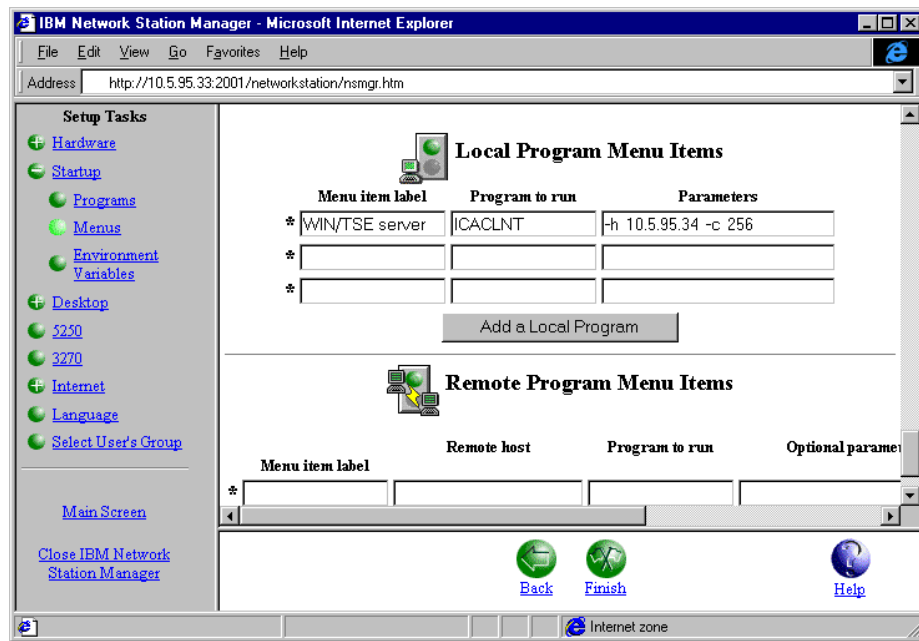


Figure 75. IBM Network Station Manager

- d. Click **Finish** to save the parameters.

After signing on to the Network Station, the new menu item appears in the task bar.

**Note**

It is also possible to configure a connection to a Windows NT server, Terminal Server Edition server as an autostart program. The parameters are the same, but instead of using the *Menus* item, we must use the *Programs* item in the *Startup* menu.

---

## 8.5 Using Network Stations with AS/400 NetServer

This section describes how to use AS/400 NetServer in a Windows NT server, Terminal Server Edition environment with Network Stations. It explains only the tasks associated with Network Stations using AS/400 NetServer.

### 8.5.1 Multiple session support

AS/400 NetServer has always supported Windows NT server, Terminal Server Edition server as a client for a single user. Until now, it has not allowed access for multiple concurrent users from a single workstation. With the V4R4M0 PTFs shown in Table 4, AS/400 NetServer can now handle multiple user sessions from one PC client (in our example, Windows NT server, Terminal Server Edition). See Informational APAR II11435 for updated information about V4R3M0 or higher releases and support.

Table 4. Multiple user session PTFs

PTF number	Description
MF23055	AS/400 NetServer support of TSE and Windows 2000 clients.
MF23047	AS/400 NetServer multiple user session tables (Prerequisite for MF23055)
MF23044	AS/400 NetServer sessions list guest user profile name instead of actual user name (Prerequisite for MF23047)

Refer to the following Informational APARs for the AS/400 PTF requirements so that AS/400 NetServer functions properly:

- II12091 for V4R4M0
- II11752 for V4R3M0
- II11081 for V4R2M0

To support multiple users establishing sessions from the same workstation, AS/400 NetServer requires additional tables and locking constructs to store and track multiple AS/400 NetServer session activity associated with one NetBIOS over TCP/IP (NBT) connection. For a better understanding, see Figure 76 on page 123. This figure demonstrates that although there are four Network Station users with AS/400 NetServer sessions, the Windows NT server, Terminal Server Edition server generates only one PC client connection. The AS/400 NetServer now has the ability to handle more than one client session with the same name from the TSE server.



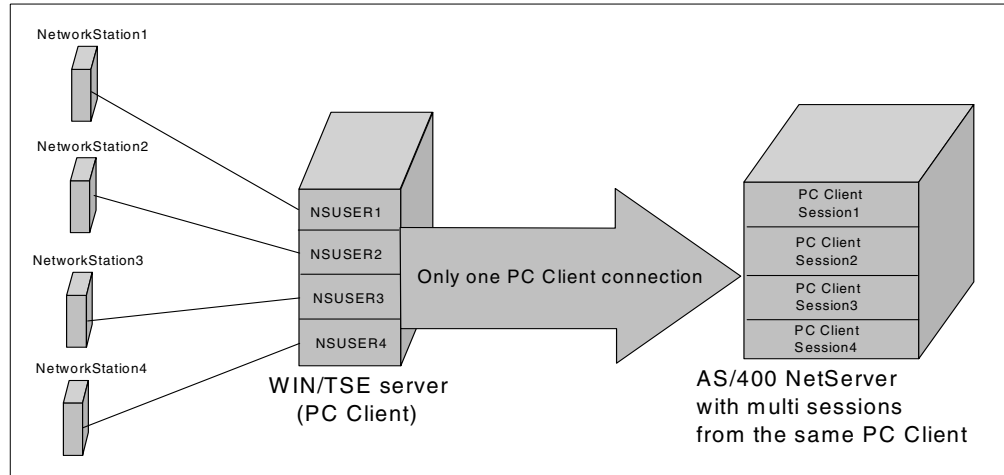


Figure 76. Multiple session support

After you have established two or more Network Station sessions to the AS/400 NetServer, the AS/400 NetServer administration window in the Operations Navigator program appears similar to the example in Figure 77.

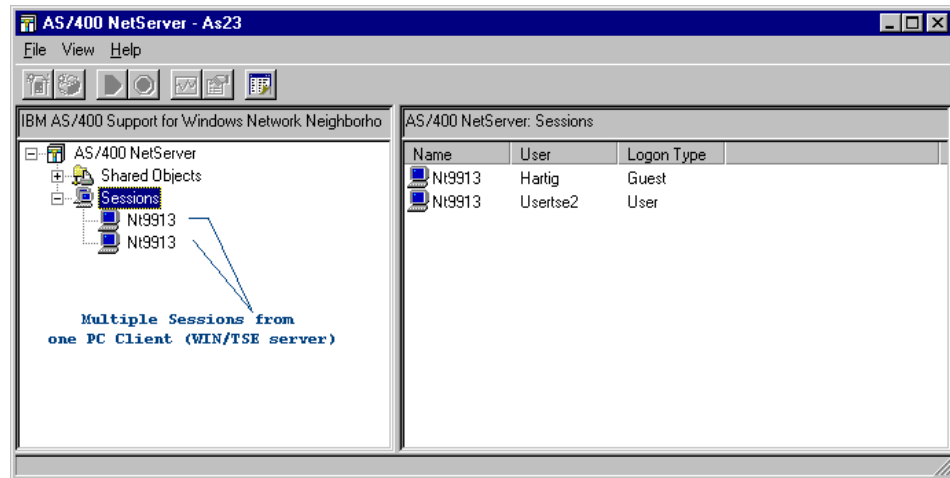


Figure 77. Operations Navigator - Multiple session support

For more information about multiple session support, please refer to the related PTF cover letters listed in Table 4 on page 122.

### 8.5.2 File shares with Network Stations

When using Network Stations, the Windows NT server, Terminal Server Edition server is the application server. We do not recommend that it is also the file server because there can be performance problems. This is the job of AS/400 NetServer. AS/400 NetServer allows us to access IFS directories with the Network Stations. We do not need extra hardware for a file server PC. However, there is an administration difference when using file access, if the application server is installed on the Integrated Netfinity Server or on an external server. For detailed information about this, refer to 8.6, "Windows NT Terminal Server Edition on external or internal servers" on page 125.

### 8.5.2.1 Creating file shares with Network Stations

Fortunately there are no differences between creating a file share for a normal Windows NT Client and a Network Station. Therefore, this point does not need to be covered in great detail.

To create a file share, perform the following tasks:

1. Log on to the Windows NT server, Terminal Server Edition server with administrator authority.
2. Use Operations Navigator to create a file share. For detailed information, refer to 3.1, "AS/400 NetServer file shares" on page 26.

### 8.5.2.2 Accessing file shares with Network Stations

For accessing file shares, you must perform the same steps as you would for a Windows NT PC. Perform the following tasks:

1. Log on to the Windows NT server, Terminal Server Edition server with the user who requires the file share.
2. The file share can be accessed directly, or a network drive can be mapped by using the normal functions of a Windows NT Client. For more information, refer to 3.1, "AS/400 NetServer file shares" on page 26, or to *AS/400 Client Access Express for Windows: Implementing V4R4M0*, SG24-5191.

## 8.5.3 Print shares with Network Stations

This section explains what to do if a printer is locally attached to a Network Station and you want to share these printers using AS/400 NetServer.

### 8.5.3.1 Creating printer shares with Network Stations

AS/400 NetServer supports sharing the output queues of the AS/400 system with PC clients. The following tasks must be done so that a locally attached Network Station printer can be shared by AS/400 NetServer:

1. Configure the local printer of the Network Station using the Network Station Manager. For detailed information, please refer to *IBM Network Station Printing Guide*, SG24-5212.
2. Create a remote output queue on the AS/400 system that is pointing to the locally attached printer created in step 1. For detailed information, please refer to *IBM Network Station Printing Guide*, SG24-5212.
3. Share the remote output queue using AS/400 NetServer. For more information, refer to 3.3, "AS/400 NetServer print shares" on page 34.

Now the local attached Network Station printer is available for all other users if they have the authority to use this output queue and printer.

### 8.5.3.2 Accessing printer shares with Network Stations

For accessing print shares, you must perform the same steps as you would for a Windows NT PC. Perform the following tasks:

1. Log on to the Windows NT server, Terminal Server Edition server as the user who requires the print share.
2. Select **Find-> Computer** to find the AS/400 NetServer. When the Computer is found, double-click on it. The printer share for the local attached Network Station printer, created in 8.5.3.1, "Creating printer shares with Network

Stations” on page 124, is seen. This printer can now be configured as a network printer on a client. For detailed information, please refer to 3.3, “AS/400 NetServer print shares” on page 34.

---

## 8.6 Windows NT Terminal Server Edition on external or internal servers

An important decision for each customer is to decide which kind of server they should install the Windows NT Server 4.0, Terminal Server Edition operating system: external or internal (Integrated Netfinity Servers). This section helps you to make the right decision for your environment.

### 8.6.1 External servers

If you are installing the Windows NT server, Terminal Server Edition operating system on an external server, you have the following two options:

- If you want to have full security on your integrated file system, you have to create all existing AS/400 NetServer users on the external Windows NT server, Terminal Server Edition server. The Windows NT server, Terminal Server Edition user should have the same password as the AS/400 user to avoid prompting for the AS/400 password. Having matching passwords ensures login scripts, and network connections to AS/400 NetServer do not require user interaction to be successful. Then, you can apply restricted access to the directories of the integrated file system because all users are known AS/400 users.
- A simple approach, but one that gives you less granular security on your integrated file system, is when all Windows NT server, Terminal Server Edition users access the file shares with the guest profile from the AS/400 NetServer. In this case, you do not have to create all existing AS/400 NetServer users as described in the previous point, just a single AS/400 NetServer guest user. You can use your normal Windows NT server, Terminal Server Edition user, but you must give them access to the directories of the integrated file system by using the AS/400 NetServer guest profile. In our example, shown in Figure 78 on page 126, we give the AS/400 NetServer guest user *netguest* full access to the directory *worddocs*. In this case, all Windows NT server, Terminal Server Edition users will have the same level of authority when they use the AS/400 NetServer shares.

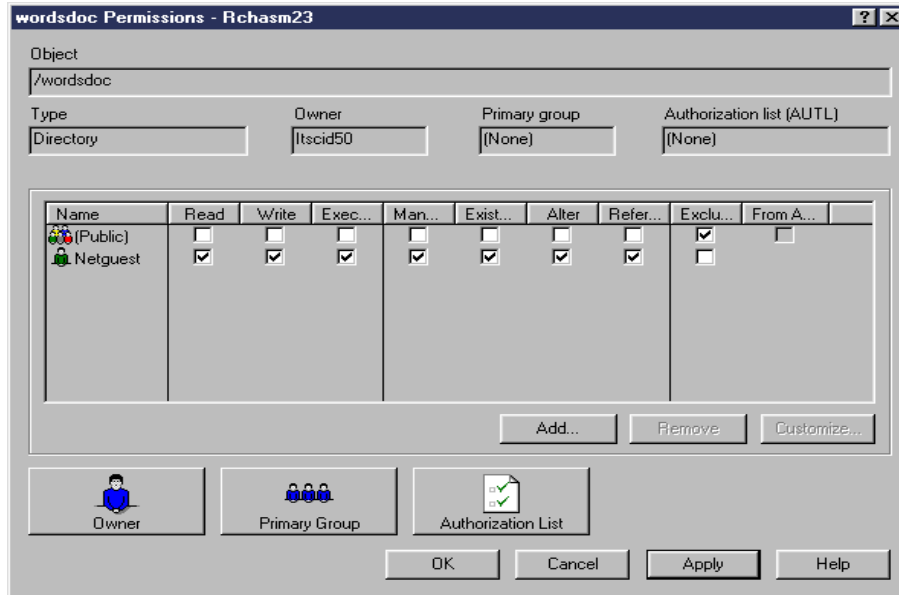


Figure 78. Directory permissions when using guest profile

In an environment with a small number of Windows NT server, Terminal Server Edition users who use AS/400 NetServer, the second solution can be practical. Otherwise, you have to do a great amount of user administration work.

## 8.6.2 Integrated Netfinity Servers

If you want to have the best security and the easiest user administration on both operating systems, install the Windows NT server, Terminal Server Edition operating system on the Integrated Netfinity Server. The following advantages make it easy to manage your environment:

- You can propagate the AS/400 users to the Windows NT server, Terminal Server Edition server. They will automatically have the same password. If the AS/400 password is changed, it is changed on both sides. For more information how to propagate users, refer to *AS/400 - Implementing Windows NT on the Integrated Netfinity Server*, SG24-2164. In Figure 79 on page 127, we show an example. User Benjoe and user Alex are propagated users. Now you can give each or both users full or limited access to one or more directories of the integrated file system, without using the AS/400 NetServer guest user profile. This allows more granularity in security. In our example, user Benjoe has full access to the directory *wordsdoc* and the user Alex has only read and execute authority to the directory.

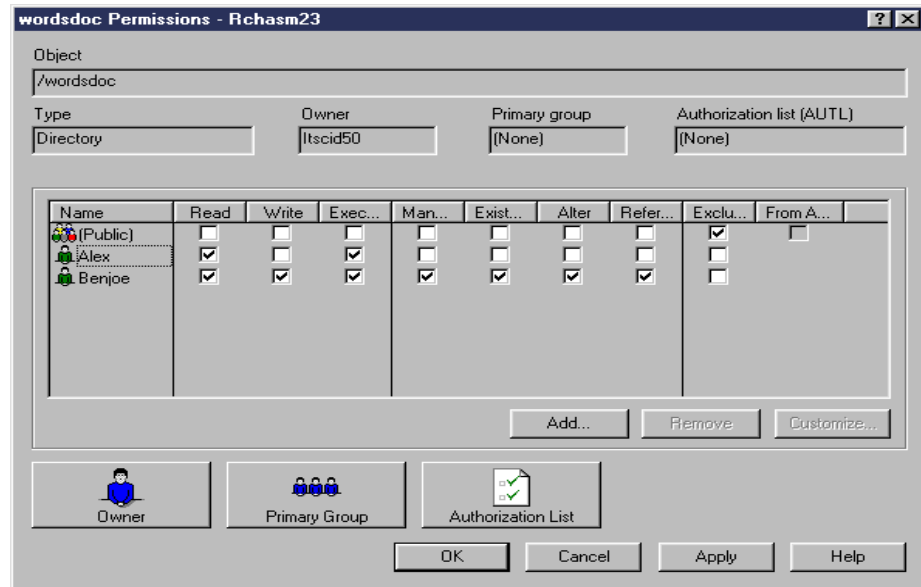


Figure 79. Directory permissions without using guest profile

- You can use the backup and restore routines of the AS/400 system not only for your file and print served data (AS/400 NetServer). You can also save your application server (Windows NT server, Terminal Server Edition server on the Integrated Netfinity Server) with these routines. For detailed information on how to save the Integrated Netfinity Server data, please refer to *AS/400 - Implementing Windows NT on the Integrated Netfinity Server*, SG24-2164.

Considering all these factors, when you want to have an environment with Network Stations using Windows NT server, Terminal Server Edition server and AS/400 NetServer, we recommend that you install your application server (Windows NT server, Terminal Server Edition server) on the Integrated Netfinity Server.

## 8.7 Practical example

In this section, we look at a practical example for using Network Stations with AS/400 NetServer in a mid-size company. The company wants to bring their IT environment up to date. The environment they are using has:

- A mix between 15 old and new PCs
- Two Windows NT servers
- One AS/400 system
- PC-attached printers
- LAN-attached printers
- All devices attached by Token Ring using TCP/IP

The old PCs use 5250 sessions to connect to the AS/400 system, Lotus Notes, and Microsoft Office. The newer PCs use the same software as well, but they are also using a program that must be installed locally on the workstations. This will guarantee a better performance for this program. One Windows NT server is newer and is used as the Primary Domain Controller (PDC) and file server. The other Windows NT server is old and is used as the Backup Domain Controller (BDC) and print server, but the server is not powerful enough to manage these

two jobs. The AS/400 system is used for the main business applications and is running a native Lotus Domino server. All printers are used as PC printers and AS/400 printers as well. The actual configuration is shown in Figure 80.

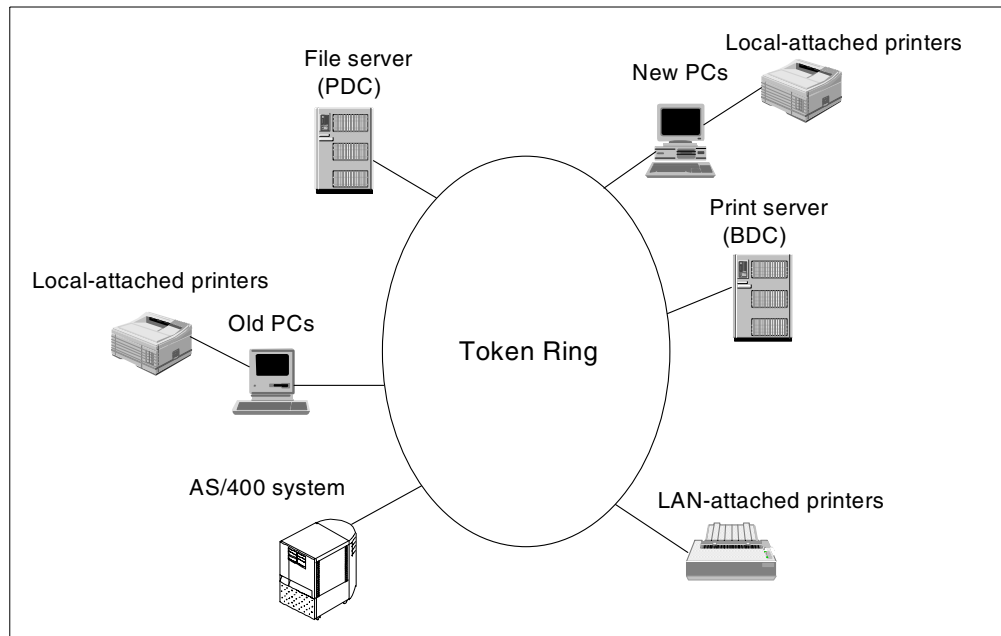


Figure 80. Example company without using AS/400 NetServer

The company wants to use the most cost effective method to modernize their environment. They decide to use AS/400 NetServer with Network Stations.

First, they must complete the following hardware configuration:

1. Replace the old PCs with Network Stations.
2. Remove the print server (BDC).
3. Install a Integrated Netfinity Server in the AS/400 system.

Then, they must complete the following software configuration:

1. Install and configure the no-charge Network Station Manager program on the AS/400 system.
2. Configure the Network Stations to use the AS/400 system as a boot server.
3. Install and configure the Windows NT server, Terminal Server Edition operating system on the Integrated Netfinity Server.
4. Install and configure the Citrix Metaframe program on the Windows NT server, Terminal Server Edition server.
5. Start and configure the AS/400 NetServer on the AS/400 system.

After these configuration steps are done, the environment appears like the diagram shown in Figure 81 on page 129.

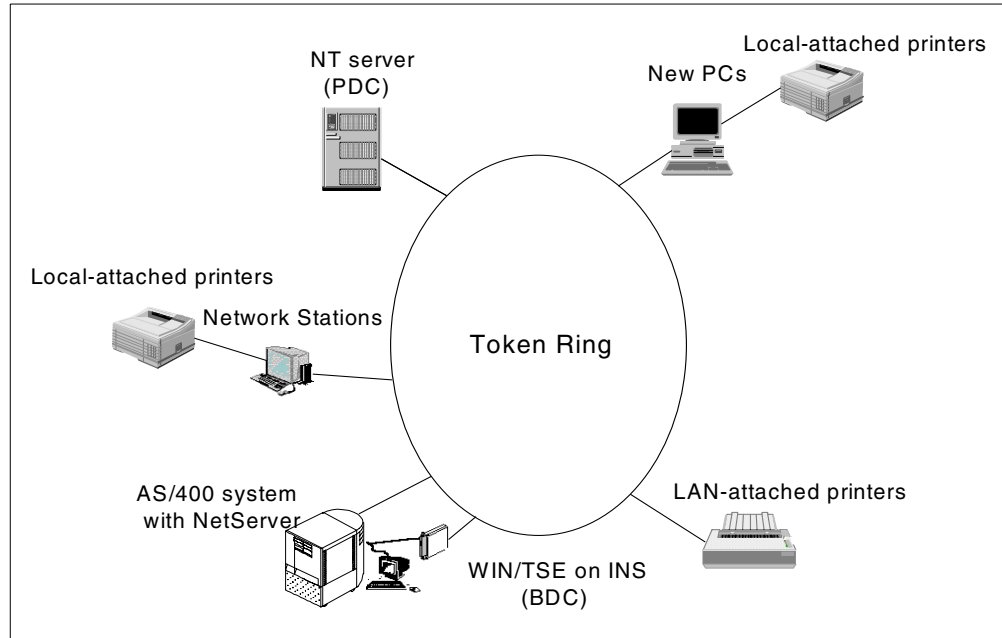


Figure 81. Example company with AS/400 NetServer

Now let us look at the separate components, their job in the newly configured environment, and the benefits that the company has achieved, with the new environment.

- The AS/400 NetServer has to perform two jobs: file serving and print serving. The advantage of using AS/400 NetServer for these jobs is that the external Windows NT server now only has to manage the security of the Windows NT domain. This will result in better login performance. The old Windows NT server was removed. There is no need to buy a new print server because AS/400 NetServer covers this job.
- The Windows NT server, Terminal Server Edition server has also two jobs: application server for the Network Stations and Backup Domain Controller. In this case, there is now one focal point of administration for the Network Stations applications. The complete server can be saved by using the AS/400 utilities.
- The PCs have their applications installed locally, but also use AS/400 NetServer as a file server.
- All printers are managed by AS/400 NetServer, and they have output queues on the AS/400 system. These queues can be managed and saved by the standard AS/400 utilities.
- The company can save all production data with the normal AS/400 utilities because they are all stored in the integrated file system of the AS/400 system.

All-in-all, the company achieves:

- Better workstation performance because all old components are removed
- Easier administration of the server
- An easier backup and restore strategy





---

## Part 4. Appendixes

This part includes appendixes on:

- Configuring AS/400 NetServer with commands rather than using the Operations Navigator interface
- An example on using AS/400 NetServer with applications
- An example of an Exit program that can be used for debugging AS/400 NetServer problems



---

## Appendix A. Setting up AS/400 NetServer without Operations Navigator

If you do not have Operations Navigator support, you can set up your AS/400 system to use AS/400 NetServer with AS/400 APIs. A full list of APIs is given in 3.11, “AS/400 NetServer administration using AS/400 APIs” on page 49.

You must have \*IOSYSCFG special authority to alter any part of AS/400 NetServer configuration. Follow these steps to set up AS/400 NetServer:

1. Verify that TCP/IP support is configured on your AS/400 system. You must have at least one external TCP/IP interface configured and active to use AS/400 NetServer. Use the Configure TCP/IP (`CFGTCP`) command to check or change interfaces, routes, the host table, and domain name services. Once the configuration is complete, use the Start TCP/IP (`STRTCP`) command to activate the support.
2. Use the Work with Subsystems (`WRKSBS`) command to verify that the QSERVER subsystem has started.
3. Verify that the AS/400 NetServer server name is unique on the network. To change the default AS/400 NetServer default server and domain name, use the following command:

```
CALL QZLSCHSN PARM (server-name domain-name 'text description or comment' X
'00000000')
```

Once you change the AS/400 NetServer server name, you should add it to the WINS), or your PC client LMHOST file.

4. Users who require the file and print sharing capabilities of AS/400 NetServer, but do not have an AS/400 user profile, need a guest user profile. AS/400 NetServer does not automatically configure guest support. Users without AS/400 user profiles will not be able to access AS/400 NetServer. However, the guest user profile must have a password but no special authority. To change AS/400 NetServer guest support, use the following command:

```
CALL QZLSCHSG (guest-user-profile X'00000000')
```

For more information on guest user profiles, see 4.1.1, “Considerations for using the guest user profile” on page 51.

5. All changes to your AS/400 NetServer configuration, with the exception of share and session administration, do not take effect until you stop and start the server. To stop and start AS/400 NetServer at V4R4, use the following commands:

```
ENDTCPSVR *NETSVR
STRTCPSVR *NETSVR
```

If you are using V4R2 or V4R3 of OS/400, use the following commands to respectively stop and start AS/400 NetServer:

```
CALL QZLSENDP PARM(X'00000000')
CALL QZLSSTRS PARM('0' X'00000000')
```

6. Use the Work with Active Job (`WRKACTJOB`) command to verify that there is a QZLSSERVER job running under the QSERVER subsystem. If the QZLSSERVER job is not active, you must restart AS/400 NetServer.
7. Using the Work with TCP/IP Status (`NETSTAT *CNN`) command, verify that the following entries appear in the NETSTAT output file. If you cannot find these entries, you must restart AS/400 NetServer.

```
** netbios>001:27:44 Listen
** netbios>000:00:01 *UDP
** netbios>000:00:00 *UDP
** netbios>000:30:57 Listen
```

8. Use the `WRKACTJOB` command to ensure that there is a QNPSEVD job active in the QSYSWRK subsystem. If there is no QNPSEVD job, then you must use the Start Host Server (`STRHOSTSVR *NETPRT`) CL command to start the Network Print Server. Starting the Network Print Server ensures that AS/400 NetServer print shares function properly.
9. Verify that the QUSRWRK subsystem is started for V4R4 because QNPSEVS jobs are configured to run there by default.
10. Make sure the LOOPBACK TCP/IP interface is active.

---

## Appendix B. Using applications with AS/400 NetServer

It is possible to install and run applications from an AS/400 NetServer share. This may be beneficial for those who want to centrally administer applications and keep local PC hard drive usage to a minimum. The details that follow demonstrate how you can take advantage of this functionality.

You may decide to create a new AS/400 file share to hold any applications that you choose to share. If necessary, review 3.1, "AS/400 NetServer file shares" on page 26.

### Note

It is important to understand that the following examples demonstrate file serving and not application serving. Although the application files are stored on the AS/400 NetServer share, they are not run there. Required files are downloaded to the PC client and run locally.

---

## B.1 Preparation

This section shows the considerations that administrators need to be aware of before attempting any application installation.

### B.1.1 Creating file shares

The AS/400 NetServer administrator must create a file share to the directory on the AS/400 system in which the application will reside. All users who will use this application must have a mapped network drive to this file share.

The user installing this software on the AS/400 NetServer file share needs all data and object authorities. Since users will be using these files as well, the correct authority must be defined for them. The authority for these users must be considered carefully so that unauthorized actions are not performed. In most cases, \*RX data authority is sufficient, but this depends on the application that is being installed.

### B.1.2 User directory considerations

Most applications that permit a multi-user installation, provide the possibility to copy shared application files to the following locations:

- **In a sub-directory on the same share in which the core application files reside.** This is the default install option for the software tested in this appendix. The advantage of this installation is that there is less space used on the PC local hard drive and the installation files reside in one area on the AS/400 NetServer.
- **On a user's own file share on the AS/400 NetServer.** This also keeps the PC hard drive usage to a minimum and also makes authority administration easier since appropriate levels of authority have already been defined.
- **PC local hard drive.** The advantage with this installation option is that there may be better performance, but PC hard drive space is used.

---

## B.2 Installing the applications

In this section, we demonstrate how to install Lotus SmartSuite and Microsoft Office into an AS/400 NetServer environment.

### B.2.1 Lotus SmartSuite

The following example demonstrates the main steps in the installation of Lotus SmartSuite to an AS/400 NetServer share and subsequent installation to the PC client.

#### Note

This example does not detail an entire Lotus SmartSuite installation. Refer to your supporting Lotus documentation for further information.

#### B.2.1.1 Installing Lotus SmartSuite on an AS/400 NetServer share

The following example represents a typical Lotus SmartSuite installation on a network using the command `install`. At a point during the installation, the window shown in Figure 82 is displayed.



Figure 82. Lotus SmartSuite installation

To install the Lotus SmartSuite code to the AS/400 NetServer file share, the box labelled **Install to a file server** must be checked as shown in Figure 82. This allows the installation program to copy the files to the network drive, rather than to a local hard disk drive.

Continue to follow the normal installation procedure until the window shown in Figure 83 on page 137 is displayed.

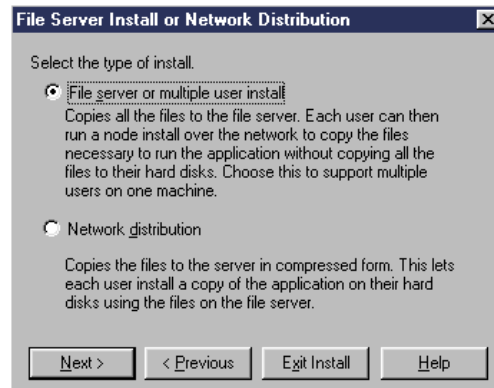


Figure 83. Lotus file server installation

The two options shown in Figure 83 are defined here:

- **File server or multiple user install.** Copies all files to the AS/400 NetServer share and allows a node (PC client) installation. This effectively limits the size of the code present on the PC local hard drives because the Lotus applications are run from the AS/400 NetServer share and downloaded into the PC memory when needed.
- **Network distribution.** Copies all files to the AS/400 NetServer share and allows users to install the applications to their PC hard drives using a network drive rather than the installation CD.

Make your selection, and click **Next**. In our environment, the **File server or multiple user install** option is selected.

Now continue to follow the normal installation procedures. During these procedures, we advise that you take time to read the NETWORK ADMINISTRATORS GUIDE when you are prompted. Also ensure that when you are prompted, you enter the drive letter of the AS/400 NetServer share so that the files are copied to the correct location.

#### B.2.1.2 Setting up your PC client

Once you finish installing your Lotus SmartSuite software to your AS/400 NetServer share, you can consider setting up individual PC clients. In conjunction with the supporting Lotus documentation, perform the following steps:

1. Map a network drive to the AS/400 NetServer share that has the Lotus SmartSuite software on it.
2. Run the `install.exe` file.
3. Follow the instructions contained within your supporting Lotus documentation.

During the node (PC client) installation, there is an option provided that allows the user to specify where the user-specific files are located. It is possible to specify either local hard drive or network drive. In our test environment, the AS/400 NetServer share was specified. This minimizes the number of files copied to the PC local hard drives.

## B.2.2 Microsoft Office

The following example demonstrates the main steps in the installation of Microsoft Office to the AS/400 NetServer share and subsequent installation to the PC client.

### Note

This example does not detail an entire Microsoft Office installation. Refer to your supporting Microsoft documentation for further information.

### B.2.2.1 Installing Microsoft Office on an AS/400 NetServer share

The following example represents a Microsoft Office installation on a network using the command `setup /a`, where `/a` indicates a server installation.

At some point during the installation, you are presented with the window shown in Figure 84.

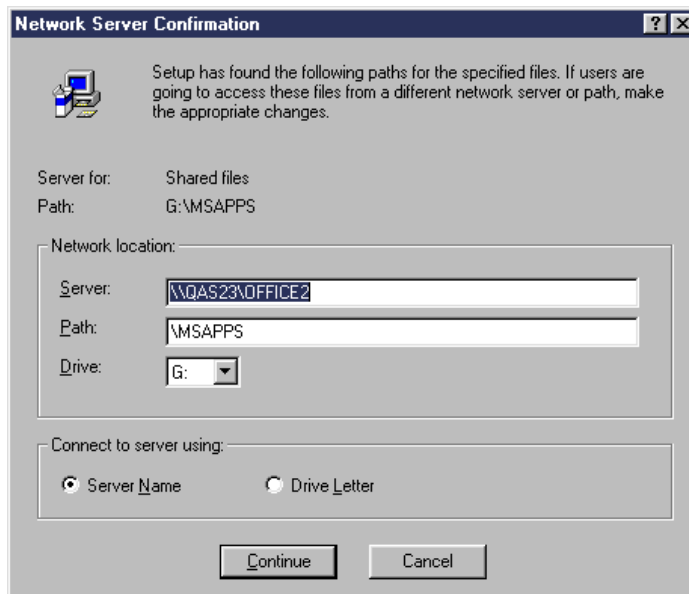


Figure 84. Network Server Confirmation screen

To allow users to access these files from the AS/400 NetServer share, you must specify the directory path to that share in the Server field. In the example in Figure 84, we specified the path as: `\\QAS23\OFFICE2`, where `QAS23` is the name of the AS/400 NetServer and `OFFICE2` represents a specific shared directory where the Microsoft Office files will be stored.

Select **Continue**. Then, you are prompted with the display shown in Figure 85 on page 139.



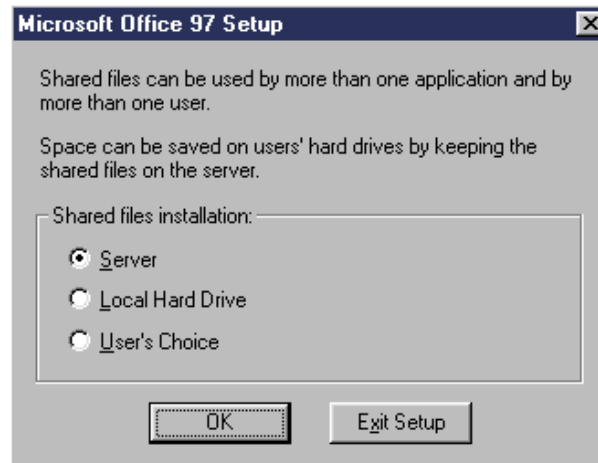


Figure 85. Microsoft Office setup

This step determines where shared application files will be stored:

- **Server:** Shared application files are stored on the server.
- **Local Hard Drive:** Shared application files are stored to the clients individual hard drive.
- **User's Choice:** During the individual client installation, the user can choose to store the shared application files on the server or on the client's individual hard drive.

Make your decision based on where you want your user's shared application files to reside. Then, click **OK** to continue.

Follow the remainder of the Microsoft documentation to continue with your installation.

#### **B.2.2.2 Setting up your PC client**

Once you finish installing your Microsoft Office software to your AS/400 NetServer share, you can consider setting up individual PC clients. In conjunction with the supporting Microsoft documentation, perform the following steps:

1. Map a network drive to the AS/400 NetServer share that has the Microsoft Office software on it.
2. Run the `SETUP.EXE` file.
3. Follow the instructions contained within your supporting Microsoft documentation until the window shown in Figure 86 on page 140 appears.

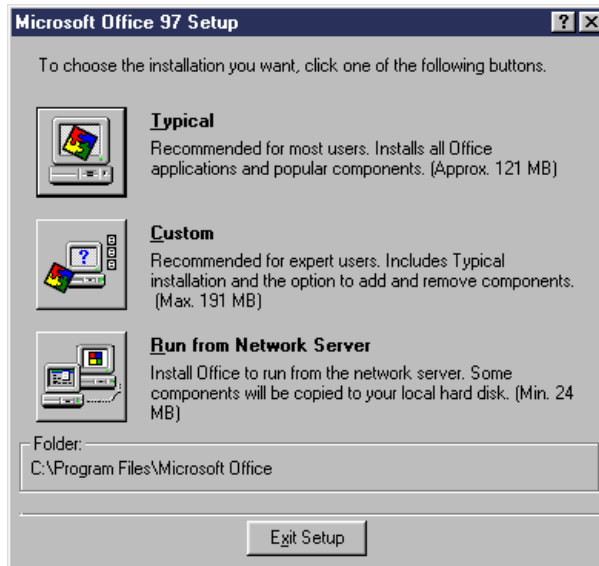


Figure 86. Setup from Network Server

4. If you want to run Microsoft Office from the AS/400 NetServer file share, select the **Run from Network Server** option.
5. Continue with the installation using the Microsoft documentation.

---

## B.3 Using the applications

This section displays the default setups for Lotus SmartSuite and Microsoft Office. It also discusses the possibilities of using AS/400 NetServer further in this environment.

### B.3.1 Lotus SmartSuite

The example used here covers only the Lotus WordPro product. Other applications within Lotus SmartSuite may not necessarily have the same displays. The same considerations apply for the other applications. Therefore, the supporting Lotus documentation should be referenced.

#### B.3.1.1 Default file locations

After the installation of Lotus SmartSuite from the AS/400 NetServer file share, Lotus Wordpro uses default file locations, which are shown in Figure 87 on page 141.

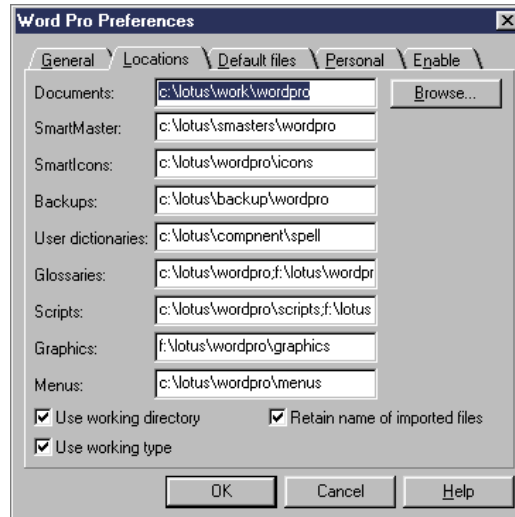


Figure 87. WordPro file locations

Most files are located on the local PC hard drive and some on the AS/400 NetServer file share. This is the default configuration, but it is not always what you want. You can change it by selecting **Files-> User Setup-> WordPro Preferences** and clicking the **Locations** tab.

### B.3.2 Microsoft Office

The example used here covers only the Microsoft Word product. Other applications within Microsoft Office may not necessarily have the same windows. The same considerations apply for the other applications. Therefore, the supporting Microsoft documentation should be referenced.

#### B.3.2.1 Default file locations

After the installation of Microsoft Office from the AS/400 NetServer file share, Microsoft Word uses default file locations, which are shown in Figure 88 on page 142.

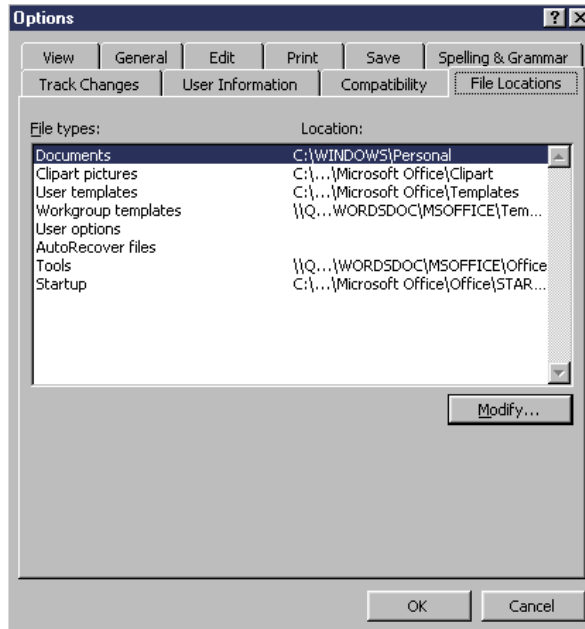


Figure 88. Word default file locations

Some files are located on the local PC hard drive, and others are located on the AS/400 NetServer file shares. This is the default configuration, but it is not always what you want. You can change the configuration by selecting **Tools -> Options**, and clicking on the **File Locations** tab.

### B.3.2.2 Optimizing for use with AS/400 NetServer

By using the **Modify** button as shown in Figure 88, it is possible to define where these file types (for example, *Documents*) are located.

If you want to use an AS/400 NetServer file share as a location for your file types, you must grant the correct authority to the IFS directory. You must also make it available by sharing it using AS/400 NetServer. Once available, you can access the IFS directory by mapping a network drive to the AS/400 NetServer file share.

Using this method has the following advantages:

- The AS/400 system is the central point for all Microsoft Office files. All application maintenance can be done at one location.
- You can use the AS/400 system save and restore functions for backup and recovery of your Microsoft Office environment.
- Reduced space is required on the local PC hard drives.

#### Note

This method increases the amount of network traffic, and therefore, may have a detrimental effect on performance.

### B.3.2.3 Optimizing for use with AS/400 NetServer

By selecting the current path of the file type you want to change and clicking **Browse** (shown in Figure 87 on page 141), it is possible to define where these file types are located.

If you want to use an AS/400 NetServer file share as a location for your file types, you must grant the correct authority to the IFS directory and make it available by sharing it using AS/400 NetServer. Once available, you can access the IFS directory by mapping a network drive to the AS/400 NetServer file share.

Using this method has the following advantages:

- The AS/400 system is the central point for all Lotus SmartSuite files. All application maintenance can be done at one location.
- You can use the AS/400 system save and restore functions for backup and recovery of your Lotus SmartSuite environment.
- Reduced space is required on the local PC hard drives.

#### Note

This method increases the amount of network traffic, and therefore, may have a detrimental effect on performance.

---

## B.4 Performance considerations

Installing and running applications from an AS/400 NetServer may not necessarily perform well in all environments. There are a number of reasons why this may be the case and causes may include network-related issues or AS/400 utilization.

There is a new parameter, *TCP/IP only*, on the line description for a 10/100 Ethernet Adapter at V4R4. This parameter applies if the adapter is on a dedicated Input Output Processor (IOP), that is, not on the multi-function input/output processor (MFIOP). Using this parameter enhances AS/400 NetServer and other TCP/IP application throughput. Make sure you apply PTF MF22323 before setting this parameter. AS/400 NetServer fails when this parameter is set and the PTF is not applied.

We advise that you monitor the situation closely. If performance is affected, install the software on another file server, for example, Windows NT Server 4.0 on the Integrated Netfinity Server.



## Appendix C. Exit program

The following CL program captures the \*FILESERVER exit points and reports them to a message queue. This can be a useful debug tool.

```

/*****
/* THIS IS AN EXIT PROGRAM FOR THE FILE SERVER. IT NEEDS TO BE          */
/* REGISTERED USING THE WRKREGINF COMMAND.                               */
/*
/* THIS PROGRAM IS BASED ON THE SAMPLE IN THE "CLIENT ACCESS/400 HOST   */
/* SERVERS" BOOK                                                         */
/*
/* THIS EXIT PROGRAM SENDS A TRACE OF ALL CALLS TO THE QUSRSYS/FSEXIT   */
/* MESSAGE QUEUE (WHICH NEEDS TO BE CREATED OUTSIDE THIS PROGRAM)      */
/*****
PGM PARM(&STATUS &REQUEST)
  DCL VAR(&STATUS) TYPE(*CHAR) LEN(1) /* ACCEPT/REJECT INDICATOR */
  DCL VAR(&REQUEST) TYPE(*CHAR) LEN(2000) /* PARAMETER STRUCTURE */

/*****
/* DECLARES                                                              */
/*****
/* COMMON TO ALL EXIT PROGRAMS */
DCL VAR(&USER) TYPE(*CHAR) LEN(10)
DCL VAR(&APPLIC) TYPE(*CHAR) LEN(10)

/* FILE SERVER DECLARES */
DCL VAR(&FSFID) TYPE(*CHAR) LEN(4) /* FUNCTION IDENTIFIER */
DCL VAR(&FSFMT) TYPE(*CHAR) LEN(8) /* PARAMETER FORMAT */
DCL VAR(&FSREAD) TYPE(*CHAR) LEN(1) /* OPEN FOR READ */
DCL VAR(&FSWRITE) TYPE(*CHAR) LEN(1) /* OPEN FOR WRITE */
DCL VAR(&FSRDWRT) TYPE(*CHAR) LEN(1) /* OPEN FOR READ/WRITE */
DCL VAR(&FSDLT) TYPE(*CHAR) LEN(1) /* OPEN FOR DELETE */
DCL VAR(&FSFLG) TYPE(*CHAR) LEN(4) /* ALL OPEN FLAGS */
DCL VAR(&FSLLEN) TYPE(*CHAR) LEN(4) /* FDAME LENGTH */
DCL VAR(&FSNAME) TYPE(*CHAR) LEN(2000) /* QUALIFIED FILE NAME */
DCL VAR(&DECLLEN) TYPE(*DEC) LEN(8 0)

/* OUTPUT MESSAGE */
DCL VAR(&OUTMSG) TYPE(*CHAR) LEN(512) +
  VALUE('User xxxxxxxxxxxx Function xxxxxxxxxxxx Path')
DCL VAR(&FUNC) TYPE(*CHAR) LEN(10)
DCL VAR(&ECFNAME) TYPE(*CHAR) LEN(400)

/* MISC VALUES FOR PLAYING WITH BINARY NUMBERS */
DCL VAR(&BIN0) TYPE(*CHAR) LEN(4) VALUE(X'00000000')
DCL VAR(&BIN1) TYPE(*CHAR) LEN(4) VALUE(X'00000001')
DCL VAR(&BIN2) TYPE(*CHAR) LEN(4) VALUE(X'00000002')
DCL VAR(&BIN3) TYPE(*CHAR) LEN(4) VALUE(X'00000003')
DCL VAR(&BIN4) TYPE(*CHAR) LEN(4) VALUE(X'00000004')
DCL VAR(&BIN5) TYPE(*CHAR) LEN(4) VALUE(X'00000005')
DCL VAR(&BIN6) TYPE(*CHAR) LEN(4) VALUE(X'00000006')

DCL VAR(&UCCCSID) TYPE(*CHAR) LEN(4) VALUE(X'0000F200')
DCL VAR(&ECCCSID) TYPE(*CHAR) LEN(4) VALUE(X'00000025')
DCL VAR(&BIN400) TYPE(*CHAR) LEN(4) VALUE(X'00000190')

/* MISC VARS FOR CALLING THE CONVERSION ROUTINE */
DCL VAR(&FEEDBACK) TYPE(*CHAR) LEN(12)
DCL VAR(&TEMP1) TYPE(*CHAR) LEN(4)
DCL VAR(&TEMP2) TYPE(*CHAR) LEN(4)

/*****
/* PROGRAM                                                                */
/*****
/* RETRIEVE HEADER VALUES */
CHGVAR VAR(&USER) VALUE(%SST(&REQUEST 1 10))
CHGVAR VAR(&APPLIC) VALUE(%SST(&REQUEST 11 10))

/* RETRIEVE FILE SERVER VALUES */
CHGVAR VAR(&FSFID) VALUE(%SST(&REQUEST 21 4))
CHGVAR VAR(&FSFMT) VALUE(%SST(&REQUEST 25 8))
CHGVAR VAR(&FSREAD) VALUE(%SST(&REQUEST 33 1))
CHGVAR VAR(&FSWRITE) VALUE(%SST(&REQUEST 34 1))

```

```

CHGVAR VAR(&FSRDWRT) VALUE(%SST(&REQUEST 35 1))
CHGVAR VAR(&FSDLT) VALUE(%SST(&REQUEST 36 1))
CHGVAR VAR(&FSFLG) VALUE(%SST(&REQUEST 33 4))
CHGVAR VAR(&FSLEN) VALUE(%SST(&REQUEST 37 4))
CHGVAR VAR(&DECLEN) VALUE(%BINARY(&FSLEN 1 4))
CHGVAR VAR(&FSNAME) VALUE(%SST(&REQUEST 41 &DECLEN))

CHGVAR VAR(&STATUS) VALUE('1') /* INITIALIZE RETURN VALUE TO ACCEPT REQ */

IF COND(&APPLIC *NE 'FILESRV') THEN(GOTO DONE) /* ONLY LOOK AT FILESVR */

/* SET USER NAME IN OUTPUT MESSAGE */
CHGVAR VAR(%SST(&OUTMSG 6 10)) VALUE(&USER)

/* FIGURE OUT WHAT FUNCTION IS BEING PERFORMED */
IF COND(&FSFID *EQ &BIN0) THEN(CHGVAR &FUNC 'CHANGE ')
ELSE IF COND(&FSFID *EQ &BIN1) THEN(CHGVAR &FUNC 'CREATE ')
ELSE IF COND(&FSFID *EQ &BIN2) THEN(CHGVAR &FUNC 'DELETE ')
ELSE IF COND(&FSFID *EQ &BIN3) THEN(CHGVAR &FUNC 'LIST ')
ELSE IF COND(&FSFID *EQ &BIN4) THEN(CHGVAR &FUNC 'MOVE ')
ELSE IF COND(&FSFID *EQ &BIN5) THEN(CHGVAR &FUNC 'OPEN(XXXX) ')
ELSE IF COND(&FSFID *EQ &BIN6) THEN(CHGVAR &FUNC 'RENAME ')
ELSE CHGVAR &FUNC 'UNKNOWN '

/* FOR OPEN FUNCTION, COPY OPEN FLAGS TO FUNCTION NAME */
IF COND(&FSFID *EQ &BIN5) THEN(CHGVAR %SST(&FUNC 6 4) &FSFLG)

/* NOW SET FUNCTION IN OUTPUT MESSAGE */
CHGVAR VAR(%SST(&OUTMSG 26 10)) VALUE(&FUNC)

/* ANNOYINGLY, THE FILE NAME PASSED INTO THE EXIT PROGRAM IS IN */
/* UNICODE. CONVERT IT TO CODEPAGE 37 */
CALL CDRCVRT (&UCCSID /* INPUT CCSID */ +
&BIN0 /* NULL TERM INPUT */ +
&FSNAME /* INPUT STRING */ +
&FSLEN /* INPUT LENGTH */ +
&ECCSID /* OUTPUT CCSID */ +
&BIN2 /* SPACE PAD OUTPUT */ +
&BIN0 /* DEFAULT CONVERT */ +
&BIN400 /* OUTPUT LEN */ +
&ECFNAME /* OUTPUT */ +
&TEMP1 /* RETURNED LEN */ +
&TEMP2 /* RESERVED */ +
&FEEDBACK)

/* AND COPY THE CONVERTED PATH TO THE OUTPUT MESSAGE */
CHGVAR VAR(%SST(&OUTMSG 42 400)) VALUE(&ECFNAME)

/* FINALLY, SEND THE MESSAGE */
SNDPGMSG MSGID(CPF9898) MSGF(QSYS/QCPFMSG) +
MSGDTA(&OUTMSG) TOMSGQ(QUSRSYS/FSEXIT)
DONE:
/* RETURN. STATUS IS ALWAYS 1 (INDICATING THAT IT IS OK TO PROCEED */
ENDPGM

```



---

## Appendix D. Special notices

This publication is intended to help AS/400 system administrators and implementors configure and use AS/400 NetServer. The information in this publication is not intended as the specification of any programming interfaces that are provided by the Operating System/400. See the PUBLICATIONS section of the IBM Programming Announcement for Operating System/400 for more information about what publications are considered to be product documentation.

References in this publication to IBM products, programs or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM product, program, or service is not intended to state or imply that only IBM's product, program, or service may be used. Any functionally equivalent program that does not infringe any of IBM's intellectual property rights may be used instead of the IBM product, program or service.

Information in this book was developed in conjunction with use of the equipment specified, and is limited in application to those specific hardware and software products and levels.

IBM may have patents or pending patent applications covering subject matter in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to the IBM Director of Licensing, IBM Corporation, North Castle Drive, Armonk, NY 10504-1785.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact IBM Corporation, Dept. 600A, Mail Drop 1329, Somers, NY 10589 USA.

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The information contained in this document has not been submitted to any formal IBM test and is distributed AS IS. The information about non-IBM ("vendor") products in this manual has been supplied by the vendor and IBM assumes no responsibility for its accuracy or completeness. The use of this information or the implementation of any of these techniques is a customer responsibility and depends on the customer's ability to evaluate and integrate them into the customer's operational environment. While each item may have been reviewed by IBM for accuracy in a specific situation, there is no guarantee that the same or similar results will be obtained elsewhere. Customers attempting to adapt these techniques to their own environments do so at their own risk.

Any pointers in this publication to external Web sites are provided for convenience only and do not in any manner serve as an endorsement of these Web sites.

Any performance data contained in this document was determined in a controlled environment, and therefore, the results that may be obtained in other operating environments may vary significantly. Users of this document should verify the applicable data for their specific environment.

This document contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples contain the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

Reference to PTF numbers that have not been released through the normal distribution process does not imply general availability. The purpose of including these reference numbers is to alert IBM customers to specific information relative to the implementation of the PTF when it becomes available to each customer according to the normal IBM PTF distribution process.

The following terms are trademarks of the International Business Machines Corporation in the United States and/or other countries:

Advanced Function Printing	AFP
APPN	AS/400
AT	Client Access
Client Access/400	Client Access Express
CT	DB2
IBM ®	Netfinity
Network Station	OS/400
Operating System/400	OS/2
RS/6000	SP
System/390	XT
400	

The following terms are trademarks of other companies:

Tivoli, Manage. Anything. Anywhere., The Power To Manage., Anything. Anywhere., TME, NetView, Cross-Site, Tivoli Ready, Tivoli Certified, Planet Tivoli, and Tivoli Enterprise are trademarks or registered trademarks of Tivoli Systems Inc., an IBM company, in the United States, other countries, or both. In Denmark, Tivoli is a trademark licensed from Kjøbenhavns Sommer - Tivoli A/S.

C-bus is a trademark of Corollary, Inc. in the United States and/or other countries.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States and/or other countries.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States and/or other countries.

PC Direct is a trademark of Ziff Communications Company in the United States and/or other countries and is used by IBM Corporation under license.

ActionMedia, LANDesk, MMX, Pentium and ProShare are trademarks of Intel Corporation in the United States and/or other countries.

UNIX is a registered trademark in the United States and other countries licensed exclusively through The Open Group.

SET and the SET logo are trademarks owned by SET Secure Electronic Transaction LLC.

Other company, product, and service names may be trademarks or service marks of others.

---

## Appendix E. Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

---

### E.1 International Technical Support Organization publications

For information on ordering these ITSO publications see “How to get ITSO Redbooks” on page 151.

- *AS/400 - IBM Network Station - Getting Started*, SG24-2153
- *AS/400 Printing V*, SG24-2160
- *AS/400 - Implementing Windows NT on the Integrated Netfinity Server*, SG24-2164
- *Inside Client Access for Windows 95/NT*, SG24-4748
- *AS/400 Client Access Express for Windows: Implementing V4R4M0*, SG24-5191
- *IBM Network Station Printing Guide*, SG24-5212

---

### E.2 Redbooks on CD-ROM

Redbooks are also available on the following CD-ROMs. Click the CD-ROMs button at <http://www.redbooks.ibm.com/> for information about all the CD-ROMs offered, updates and formats.

<b>CD-ROM Title</b>	<b>Collection Kit Number</b>
System/390 Redbooks Collection	SK2T-2177
Networking and Systems Management Redbooks Collection	SK2T-6022
Transaction Processing and Data Management Redbooks Collection	SK2T-8038
Lotus Redbooks Collection	SK2T-8039
Tivoli Redbooks Collection	SK2T-8044
AS/400 Redbooks Collection	SK2T-2849
Netfinity Hardware and Software Redbooks Collection	SK2T-8046
RS/6000 Redbooks Collection (BkMgr Format)	SK2T-8040
RS/6000 Redbooks Collection (PDF Format)	SK2T-8043
Application Development Redbooks Collection	SK2T-8037
IBM Enterprise Storage and Systems Management Solutions	SK3T-3694

---

### E.3 Other publications

These publications are also relevant as further information sources:

- *IBM Network Station Manager Installation and Use*, SC41-0664
- *OS/400 Integration Services for the Integrated PC Server*, SC41-5123
- *OS/400 Integrating AS/400 with Novell NetWare*, SC41-5124
- *OS/400 Security*, SC41-5302
- *OS/400 Backup and Recovery*, SC41-5304
- *Work Management*, SC41-5306
- *TCP/IP Configuration and Reference*, SC41-5420

- *OS/2 Warp Server for AS/400 Administration*, SC41-5423
- *AS/400 System API Reference*, SC41-5801

---

## E.4 Resources on the Web

These Web pages are referenced in the redbook:

- IBM home page: <http://www.ibm.com>
- Lotus home page: <http://www.lotus.com>
- Infocenter: <http://www.as400.ibm.com/infocenter>
- AS/400 NetServer home page:  
<http://www.as400.ibm.com/netserver/welcome.htm>
- IBM Printer Company home page: <http://www.printers.ibm.com>
- AS/400 service: <http://as400service.ibm.com>

---

## How to get ITSO Redbooks

This section explains how both customers and IBM employees can find out about ITSO redbooks, redpieces, and CD-ROMs. A form for ordering books and CD-ROMs by fax or e-mail is also provided.

- **Redbooks Web Site** <http://www.redbooks.ibm.com/>

Search for, view, download, or order hardcopy/CD-ROM redbooks from the redbooks Web site. Also read redpieces and download additional materials (code samples or diskette/CD-ROM images) from this redbooks site.

Redpieces are redbooks in progress; not all redbooks become redpieces and sometimes just a few chapters will be published this way. The intent is to get the information out much quicker than the formal publishing process allows.

- **E-mail Orders**

Send orders by e-mail including information from the redbooks fax order form to:

	<b>e-mail address</b>
In United States	usib6fpl@ibmmail.com
Outside North America	Contact information is in the "How to Order" section at this site: <a href="http://www.elink.ibm.ibm.com/pbl/pbl">http://www.elink.ibm.ibm.com/pbl/pbl</a>

- **Telephone Orders**

United States (toll free)	1-800-879-2755
Canada (toll free)	1-800-IBM-4YOU
Outside North America	Country coordinator phone number is in the "How to Order" section at this site: <a href="http://www.elink.ibm.ibm.com/pbl/pbl">http://www.elink.ibm.ibm.com/pbl/pbl</a>

- **Fax Orders**

United States (toll free)	1-800-445-9269
Canada	1-403-267-4455
Outside North America	Fax phone number is in the "How to Order" section at this site: <a href="http://www.elink.ibm.ibm.com/pbl/pbl">http://www.elink.ibm.ibm.com/pbl/pbl</a>

This information was current at the time of publication, but is continually subject to change. The latest information may be found at the redbooks Web site.

### IBM Intranet for Employees

IBM employees may register for information on workshops, residencies, and redbooks by accessing the IBM Intranet Web site at <http://w3.itso.ibm.com/> and clicking the ITSO Mailing List button. Look in the Materials repository for workshops, presentations, papers, and Web pages developed and written by the ITSO technical professionals; click the Additional Materials button. Employees may access MyNews at <http://w3.ibm.com/> for redbook, residency, and workshop announcements.



---

## Index

### Symbols

\*IOSYSCFG 25, 51

### A

ADSM 83  
application serving 3  
ARCserve 105  
AS/400 NetServer  
  changing 14  
  example 135  
  finding 21, 56  
  hiding 54  
  positioning 8  
  requirements 11  
  starting 12, 23  
authority considerations  
  NetWare 96  
  Warp Server 74

### B

backup 48  
browsing announcement interval 8, 16

### C

case sensitivity 63  
changing AS/400 NetServer 14  
Citrix MetaFrame  
  configuring 120  
Client Access Express 7  
Client Access for Windows 95/NT 7  
commands 42  
copy a single file 70, 92  
copy multiple files 70, 92  
CPIB682 55  
CPIB683 56  
creating file share 26, 29  
CRTDIR 68, 90  
cwbunzls.dll 62

### D

disabling WINS 17  
DNS 19  
domain name 15  
Domain Name Service 19  
DOS LAN Services 80

### E

exit program 49, 145

### F

file migration 72  
  NetWare 90  
  Warp Server 67

file name length 63  
File Server Input Output Processor (FSIOP) 1  
file serving xi, 3, 4  
file share 26  
  creating 26, 29  
  stopping 27  
finding AS/400 NetServer 21, 56  
FSIOP 1

### G

guest support 53  
guest user profile 15, 20, 53  
  when migrating from NetWare 103  
  when migrating from Warp Server 81

### H

hiding  
  AS/400 NetServer 54  
  shared resources 7, 54  
host printers 80, 102

### I

ICA 113  
ICACLNT 121  
Independent Computing Architecture (ICA) 113  
Informational APARs 11  
integrated file system (IFS) 4  
Integrated Netfinity Server 1  
Integrated PC Server 1  
IPCS 1

### L

LMHOSTS 20, 58  
Lotus SmartSuite 136

### M

mapping network drives 31  
Microsoft Office 138  
migrating clients  
  NetWare 103  
  Warp Server 80  
migrating printers  
  NetWare 101  
  Warp Server 79  
migration backup  
  NetWare 105  
  Warp Server 83  
MKDIR 68, 90  
multiple user support 44

### N

name resolution 6  
NBTSTAT 57  
net use 42

NetBEUI 5  
NetBIOS 3  
NetServer 3  
NETSTAT 56  
Network Print Server 34  
network printer 36, 80, 102  
Next Start 14  
numeric password 53

## O

opportunistic lock time-out 16

## P

password, numeric 53  
positioning AS/400 NetServer 8  
prerequisites 11  
print serving xi, 4  
print share 34  
properties 14

## Q

Qazlscfg 48  
Qazlsextxxx 48  
Qazlsshr 48  
QLANSRv 68  
QNETWARE 90  
QNPSERVD 34  
QNPSERVS 34, 62  
QSERVER 12, 23  
QSTRUPPGM 23  
QZLSFILE 55

## R

requirements 11

## S

SAV 83, 105  
SBACKUP 105  
Scope ID 17  
security 51  
Server Message Block 4  
server name 14  
session statistics 42  
shared objects 25  
shortcut 14  
SMB 4  
spooled file types 36  
starting AS/400 NetServer 12, 23  
start-up program 23  
stopping file share 27

## T

TCP/IP only parameter 143  
Terminal Server Edition  
    installing applications 114  
    local login 117

prerequisites 113  
text conversion 27, 29

## U

UDP 6, 18  
UNC 59  
UNICODE 16  
Universal Naming Convention (UNC) 32, 59  
User Datagram Protocol (UDP) 6  
user migration  
    NetWare 103  
    Warp Server 81  
user profile disabled 53, 55  
using client 72

## W

Windows 95 PC 3  
Windows Internet Name Service 16, 19  
Windows Network Neighborhood 3  
WINS 6, 16, 19  
WINS server, setting up 119



---

## ITSO Redbook evaluation

The AS/400 NetServer Advantage  
SG24-5196-00

Your feedback is very important to help us maintain the quality of ITSO redbooks. **Please complete this questionnaire and return it using one of the following methods:**

- Use the online evaluation form found at <http://www.redbooks.ibm.com/>
- Fax this form to: USA International Access Code + 1 914 432 8264
- Send your comments in an Internet note to [redbook@us.ibm.com](mailto:redbook@us.ibm.com)

Which of the following best describes you?

**Customer**    **Business Partner**    **Solution Developer**    **IBM employee**  
 **None of the above**

**Please rate your overall satisfaction** with this book using the scale:  
(1 = very good, 2 = good, 3 = average, 4 = poor, 5 = very poor)

Overall Satisfaction \_\_\_\_\_

**Please answer the following questions:**

Was this redbook published in time for your needs?      Yes\_\_\_ No\_\_\_

If no, please explain:

---

---

---

---

What other redbooks would you like to see published?

---

---

---

**Comments/Suggestions:      (THANK YOU FOR YOUR FEEDBACK!)**

---

---

---

---

---

**SG24-5196-00**

**Printed in the U.S.A.**

**The AS/400 NetServer Advantage**

**SG24-5196-00**

