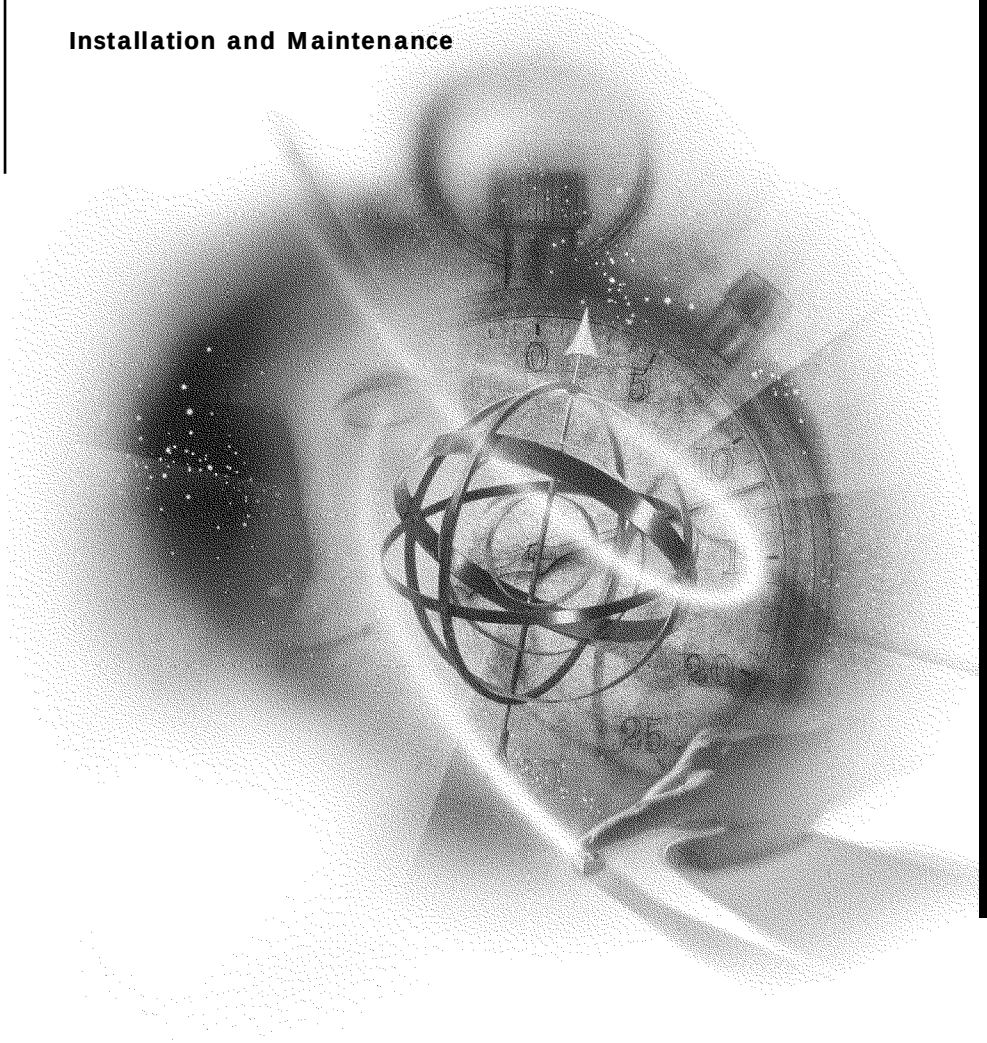
NetWare® 3.12

NETWORKING SOFTWARE

NetWare for Macintosh

Installation and Maintenance



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Contents

About This Guide

This guide explains how to install and maintain NetWare for Macintosh on a file server running NetWare v3.12.

This guide does not explain the full procedures for installing NetWare v3.12 or configuring the many NetWare features. These procedures are described in NetWare v3.12 *Installation*.

Who Should Read This Guide

This guide is for the network administrator responsible for setting up and maintaining AppleTalk networks and for managing file and print services on NetWare networks.

As the network administrator, you must plan and implement the physical internet; this task involves laying the network cables, installing network interface boards, adding and removing nodes, and placing bridges and routers. In addition, you are responsible for installing and configuring network software and services. To perform these tasks, you should have technical knowledge of protocols, network addressing, routing, and operational issues.

For information on basic NetWare for Macintosh operations such as logging in to a NetWare file server and using the NetWare Tools software from a Macintosh system, please see *Using the NetWare for Macintosh Client*.

Before you install NetWare for Macintosh, be sure to read the READ_ME.1ST file on either the *NW_MAC* diskette or *MAC UTILITIES* diskette. This file contains vital information about the NetWare for Macintosh software and issues of which you should be aware.

How to Use This Guide

This guide provides the information you need to carry out the following tasks:

- Install NetWare for Macintosh
- Configure AppleTalk networks and zones
- Set up the user login environment and login accounts
- Establish the security environment for Macintosh clients
- Set up AppleTalk Print Services for Macintosh and DOS users
- Print to NetWare print queues
- Troubleshoot the environment and AppleTalk network
- Maintain the NetWare for Macintosh environment
- Maintain AppleTalk networks and zones

As the network administrator, your focus usually shifts between two distinct interests: installing NetWare for Macintosh, and maintaining the network after the product is installed. The following two sections offer suggestions on how to make best use of this manual, depending on the nature of your interest.

When You Install NetWare for Macintosh

When you install NetWare for Macintosh on a NetWare v3.12 file server, use this guide as follows:

1. Read Chapter 1, “Before You Begin,” on page 17 for an introduction to the product and a discussion of system requirements. “A Note about AppleTalk Networks” on page 23 introduces AppleTalk terms and concepts that will be helpful while configuring the product. “AppleTalk Configuration in NetWare for Macintosh” on page 31 describes the syntax you need to use to configure AppleTalk on the server.
2. Look at the examples in Chapter 3, “Simple Network Configurations,” on page 43 and Chapter 4, “More Complex Network Configurations,” on page 81 to find an example network that is close to the one you are installing. Then, substitute the proper data for your site, and follow the step-by-step instructions to install and configure the product.
3. Refer to Chapter 6, “Managing AppleTalk File Services,” on page 139 for information on options in setting up file services.

4. Refer to Chapter 7, “Managing AppleTalk Print Services,” on page 155 for information on options in setting up print services.
5. Read Appendix A, “AppleTalk Configuration Concepts,” on page 243 if you need more technical information about the router configuration.
6. Read Appendix B, “Transition Mode Routing,” on page 263 if you need to configure the router on an internet that contains AppleTalk Phase 1 routers.
7. After you log in as a supervisor from a Macintosh client, you can use the NetWare workstation software to create login accounts, set security, and so forth.

   NOTE: Logging in to a NetWare server from a Macintosh client requires that the NetWare workstation software be installed on the Macintosh system. For information about installing that software and using it to log in and to perform many other tasks, refer to the *Using the NetWare for Macintosh Client* manual, which is included with NetWare v3.12.
8. If the environment or the network do not work as you expected, see Chapter 9, “Troubleshooting,” on page 215, Appendix C, “Using ATCON,” on page 275, and Appendix D, “System Messages,” on page 293.

When You Maintain NetWare for Macintosh

After you install and configure NetWare for Macintosh, you can perform most routine maintenance tasks (such as backing up the server) by using standard NetWare utilities. These utilities are documented in NetWare v3.12 *System Administration* and NetWare v3.12 *Utilities Reference*.

In addition to standard NetWare system maintenance tasks, this guide describes specific Macintosh issues:

- Chapter 5, “Changing the Configuration,” on page 129 explains how to modify the NetWare for Macintosh configuration.
- Chapter 6, “Managing AppleTalk File Services,” on page 139 describes how to clear, rebuild, and maintain the desktop. It also describes the NetWare for Macintosh Client software to change the NetWare environment.
- Chapter 7, “Managing AppleTalk Print Services,” on page 155 describes how to configure and manage print queues that are advertised on the AppleTalk network or serviced by an AppleTalk printer, or both.

Managing PostScript fonts and Laser Prep files is also described in this chapter.

- Chapter 9, "Troubleshooting," on page 215 describes error conditions you might see, and provides solutions.
- Appendix A, "AppleTalk Configuration Concepts," on page 243 provides background information about the AppleTalk configuration required in NetWare for Macintosh. It also introduces general AppleTalk network and zone information.
- Appendix C, "Using ATCON," on page 275 describes each of the functions provided in the AppleTalk server console utility and how to use them to check AppleTalk conditions on your network.
- The system messages that can be generated at the console or in the system log are listed in Appendix D, "System Messages," on page 293.

At the back of this guide, you will find a "Glossary" on page 339.

Standards and Conventions Used in This Guide

This guide uses *italic* type to introduce new terms. *Italics* also indicate emphasis, and are used to highlight the names of products, diskettes, and manuals.

When a word appears in **bold** font (in any type face), you should type that word at a command line, either at a DOS workstation or at the console. If this font is followed by a word in *italics*, the italicized word is a parameter that you must substitute with a real value. Consider, for example, this command line:

load *NLM*

You must replace the word *NLM* with the name of the module you wish to load.

Additional Reading

These publications provide detailed information about AppleTalk protocols, standards, and uses:

- *AppleTalk Network System Overview*, Addison-Wesley Publishing Company, Inc. This book provides a comprehensive introduction to AppleTalk. It is available at book stores or from the publisher.

- *Planning and Managing AppleTalk Networks*, Addison-Wesley Publishing Company, Inc. This book provides a comprehensive introduction to AppleTalk. It is available at book stores or from the publisher.
- *Inside AppleTalk*, Second Edition, Addison-Wesley Publishing Company, Inc. This book is available in book stores, from Apple Computer, and from the publisher. It provides the complete AppleTalk Phase 2 network specification. The Routing Table Maintenance Protocol (RTMP) and Zone Information Protocol (ZIP) chapters provide detailed technical information about AppleTalk routers and different internet configurations.
- *Inside Macintosh*, Second Edition, Addison-Wesley Publishing Company, Inc. All five volumes are available in book stores, from Apple Computer, and from the publisher. Chapter 28 in Volume V, "The AppleTalk Manager," provides detailed information about programming the Macintosh to work in AppleTalk networks. It also provides background information about the AppleTalk architecture.

1 Before You Begin

This chapter introduces NetWare for Macintosh and provides background information to assist you in carrying out the installation and configuration procedures. This chapter also presents system requirements and trouble-saving recommendations to help ensure a smooth installation and configuration process.

About NetWare for Macintosh

NetWare for Macintosh includes NetWare Loadable Modules (NLMs) that provide these services:

- NetWare file services for Macintosh clients
- NetWare print services for Macintosh clients as well as for DOS or other clients that send print jobs to PostScript and QuickDraw printers
- AppleTalk network protocols and an AppleTalk router
- ATCON console utility for monitoring AppleTalk networks

NetWare for Macintosh also includes utilities that run on Macintosh workstations, described in the *Using the NetWare for Macintosh Client* manual, included with NetWare v3.12.

NetWare Loadable Modules (NLMs)

The NLMs shown in Table 1 and Table 2 are included in NetWare for Macintosh. With the exception of the product installation module, these NLMs are copied to SYS:SYSTEM during installation.

Table 1 NetWare for Macintosh NLMs

Module	Description
APPLETLK.NLM	(AppleTalk protocol stack and router). This manual frequently refers to this module as the "AppleTalk module." It contains the AppleTalk stack and router. The AppleTalk router must be configured to enable file and print services. See “AppleTalk Configuration in NetWare for Macintosh” on page 31
AFP.NLM	(AppleTalk Filing Protocol 2.0). The AFP module allows Macintosh workstations running the AppleShare Workstation software to log in to and work on the file server. It provides configuration options for customizing the file service environment, described in “Setting Up a Specialized Environment” on page 148.
ATPS.NLM	(AppleTalk Print Services). The ATPS module provides NetWare print services on the AppleTalk network. You can use this NLM to send print jobs from NetWare print queues to an AppleTalk printer, to advertise NetWare print queues to Macintosh clients, or both. Both Macintosh and DOS clients can access queues serviced by the ATPS NLM. See Chapter 7, “Managing AppleTalk Print Services,” on page 155 for more information.
ATCON.NLM	(AppleTalk console utility). The ATCON NLM is a console utility for diagnosing AppleTalk network conditions. ATCON provides information about the file server's AppleTalk stack and router, about any networks on each of the file server's interfaces, and about other AppleTalk networks on the internet. This utility is described in Appendix C, “Using ATCON,” on page 275.

NOTE: If you intend to support Macintosh clients on Token Ring, you must manually copy an additional NLM, named ATTOKLLC.NLM, from the NW-MAC diskette to the server's SYS:SYSTEM directory. See “Example 7 Configuration Procedure” on page 97 for instructions on loading this NLM.

The NLMs in Table 2 are provided to install, configure, or remove NetWare for Macintosh. These NLMs are loaded by the INSTALL module. They will not load if DOS has been removed, if the NetWare server is running a version of NetWare earlier than 3.12, or if the SYS volume has not been mounted.

Table 2 Installation and Configuration NLMs

Module	Description
ATCFG.NLM	(Product reconfiguration module). The ATCFG module allows you to configure . The INSTALL module loads this NLM when you press <Enter> in the "Product Options" window.

Module	Description
ATREM.NLM	(Product removal module). The ATREM module allows you to remove . The INSTALL module loads this NLM when you press <Del> in the "Product Options" window.
PINSTALL.NLM	(Product installation module). The PINSTALL module is used to install . It is not copied to SYS:SYSTEM and cannot be loaded from SYS:SYSTEM. The INSTALL module loads this NLM when you press <Ins> in the "Product Options" window.

Macintosh Utilities

In addition to NetWare for Macintosh software that you install and configure on the NetWare v3.12 file server, you must also install special software onto each Macintosh workstation that will take advantage of its connection to NetWare. For information about the Macintosh workstation software, refer to the *Using the NetWare for Macintosh Client* manual, which accompanies NetWare v3.12.

Hardware and Software Requirements

This section describes the NetWare for Macintosh system requirements for file servers, Macintosh clients, and Apple printers.

Server Software Requirements

Before you install NetWare for Macintosh, the NetWare file server must meet these conditions:

- *The file server must be running NetWare v3.12 or higher.*Please see NetWare v3.12 *Installation* if the file server is not yet running NetWare v3.12.
- *DOS must be present in memory.* The installation procedure can transfer files from the *NW-MAC* diskette in a floppy drive, from a DOS partition, or from a NetWare volume directly attached to the local server. However, STARTUP.NCF must be accessible in the file server's DOS boot directory. When the installation is complete and you reboot, you can remove DOS from memory. Please see NetWare v3.12 *Installation* for information about why and how to remove DOS from server memory.

- *The SYS volume must be mounted.* NetWare for Macintosh must be installed in SYS:SYSTEM. The installation procedure then creates or modifies configuration files in SYS:SYSTEM (see Table 4 for details).
- *The modules shown in Table 3 must be installed on the server.* When you follow the instructions in NetWare v3.12 *Installation* and install the System Files, all of these modules are installed. Make sure that the latest versions of these modules are present before installing NetWare for Macintosh.

Table 3 Required Server Modules

Module	Description
STREAMS.NLM	The STREAMS module provides the AT&T STREAMS environment for network protocol modules. This environment is required by the AppleTalk module. The STREAMS module resides in SYS:SYSTEM.
BTRIEVE.NLM	The BTRIEVE module allows access to the database of installed products created by INSTALL. The BTRIEVE module is required to run INSTALL.
CLIB.NLM	The CLIB module provides the interface between the STREAMS module and application NLMs (such as AFP.NLM). The CLIB module is required by the AFP and ATPS modules. This module should reside in SYS:SYSTEM.
NUT.NLM	The NUT module provides a graphical user interface to the NetWare operating system. This module is required to run PINSTALL.
MAC.NAM	This name space support module must be loaded to support the Macintosh name space on the file server's volumes. You must add the Macintosh name space to all volumes that support Macintosh clients. After you add the name space to the volumes, you must load the name space support module, or the volumes will not mount.
V_MAC	This VREPAIR module handles the Macintosh name space. It must be present in the file server's DOS boot directory.

System Files Created or Modified During Installation

While installing and configuring NetWare for Macintosh, the files shown in Table 4 are created or modified:

Table 4 Installation and Configuration Files

Filename	Description
STARTUP.NCF	This file resides in the NetWare server's DOS boot directory. It is the first file to be read after SERVER is executed at boot time. It must contain all parameters required to access the server's SYS volume; typically, these include a disk driver and any name spaces used on the SYS volume. You will modify this file when configuring NetWare for Macintosh.
AUTOEXEC.NCF	This file resides in the NetWare server's SYS:SYSTEM directory. It is read after STARTUP.NCF at boot time. It contains parameters that load and configure the server. NLMs that are loaded in this file should reside in SYS:SYSTEM. You modify this file when configuring NetWare for Macintosh.
DESKTOP.AFP	This is a hidden directory created in the root directory of each server volume that supports the Macintosh name space. It contains three hidden files: APPLDATA.AFP, ICONDATA.AFP, and ICONINDX.AFP. These files store information used to describe the Macintosh desktop, including icons, document-to-application mappings, and icon mappings to various documents and applications.
VOLNAMES.AFP	This is a hidden file created in the NetWare server's SYS:SYSTEM directory. It stores the name of the server and volume that will be mounted on the Macintosh desktop. If this file does not already exist, it is created when the AFP NLM is loaded. In most cases, you do not need to use this file at all. However, if you change the name of a volume after it has been mounted by a Macintosh workstation, you need to manually edit this file to reflect the change. Otherwise, the new names will not show up on the Macintosh desktop.
VOLICON.AFP	This is a hidden file created in the NetWare server's SYS:SYSTEM directory. It contains information about the volume icon displayed on the Macintosh desktop. If this file does not already exist, it is created when the AFP NLM is loaded.
ATZONES.CFG (optional)	If you configure zones that would result in a BIND command line exceeding 82 characters, you must specify the zones in SYS:SYSTEM\ATZONES.CFG. If you create this file and load the AppleTalk module with the `-z` option, the zone configurations in this file can replace the zone specification on AppleTalk LOAD and BIND command lines. You can create it from the INSTALL utility.
ATPS	By default, this directory is created within the server's SYS:SYSTEM directory when the ATPS NLM is loaded. It will contain directories for all NetWare print queues that will be advertised or serviced by the ATPS NLM, as well as the ATPS.CFG file, described immediately below. If you wish, you can specify a different location for the ATPS directory by using the `-d` option when loading the ATPS module.

Filename	Description
ATPS.CFG	This optional file typically resides in the ATPS subdirectory of the NetWare server's SYS:SYSTEM directory. If you create NetWare print queues that will be advertised or serviced by the ATPS NLM, ATPS.CFG contains an entry for each of these queues.

In addition to these system files, several print-related files are created within the ATPS directory or its print queue subdirectories when print services start up. These are described in "Files and Directories Used by ATPS" on page 190.

Server Memory Requirements

NetWare for Macintosh requires that the server support a total of at least 4 Mbytes of memory. If the demand on the server is heavy and you are running additional NLMs, or if you are supporting more than 20 AFP (Macintosh) connections as well as IPX (DOS) connections and AppleTalk print queues, you might need to supplement this recommendation with more server memory. Please see "AppleTalk Stack/Router Memory Requirements" on page 253 for more details.

Macintosh Workstation Requirements

All Apple Macintosh computers developed after the 128K and 512K systems can be used as NetWare for Macintosh clients. No additional memory is required in Macintosh clients.

Macintosh Network Requirements

Please refer to "Macintosh Network Connection Software" in the *Using the NetWare for Macintosh Client* manual for information about the Macintosh network software that is required for the following types of network connections:

LocalTalk

ARCnet

Ethernet

Token Ring

NOTE: If you intend to support Macintosh clients on Token Ring, you must load and configure the ATTOKLLC NLM. See "Example 7 Configuration Procedure" on page 97 for instructions.

Apple Printer Requirements

NetWare for Macintosh supports PostScript, PostText, and Diablo 630 mode printing to Apple LaserWriter printers as well as printing to the Apple ImageWriter printers listed below.

LaserWriter
LaserWriter Plus
LaserWriter II NT
LaserWriter II NTX
LaserWriter II SC
Personal LaserWriter LS
Personal LaserWriter NT
ImageWriter
ImageWriter LQ
ImageWriter II

Please see "Options for Non-Apple Printers: -t, -s, -f, and -l" on page 172 for information about using non-Apple printers.

A Note about AppleTalk Networks

This section introduces the AppleTalk networking issues you should be aware of when installing NetWare for Macintosh. It does not provide a comprehensive introduction to AppleTalk. Please see "Additional Reading" on page 14 for introductory books on AppleTalk networking.

This section introduces these topics:

- AppleTalk routers: how they work on the internal AppleTalk network as well as on external AppleTalk networks
- AppleTalk Phase 2 networks and zones
- AppleTalk protocols and packet frames

See "Managing AppleTalk File Services" on page 139 and Chapter 7, "Managing AppleTalk Print Services," on page 155 for an introduction to NetWare for Macintosh file services and print services, respectively.

Definition of Terms

Before you begin reading about AppleTalk routers, you should know the following terms:

- *AppleTalk* is Apple Computer's suite of protocols that enables the hardware and software on an AppleTalk network to interact.
- *AppleTalk Phase 2*is the latest version of AppleTalk. Apple Computer introduced AppleTalk Phase 2 in 1989 to provide support for AppleTalk networks with thousands of nodes, support for multiple AppleTalk zones on a network, support for Token Ring, and more efficient routing techniques that improve performance in multi-protocol environments.
- An *AppleTalk network* is a collection of interconnected, individually controlled computers, together with the hardware and software used to connect them.
- An *extended AppleTalk network* is an AppleTalk Phase 2 network on media such as Ethernet or Token Ring. An extended network is capable of supporting the Phase 2 addressing extensions of a network range and zones list.
- A *nonextended AppleTalk network* is an AppleTalk Phase 2 network on LocalTalk or ARCnet. Ethernet also supports nonextended networks, called "EtherTalk 1.0." A nonextended network is *not* capable of supporting the Phase 2 addressing extensions of a network range and zones list.
- An*AppleTalk node* is a connection point between the AppleTalk software and a network.
- An *AppleTalk packet* is a unit of information that has been formatted for transmission on a network.
- An*AppleTalk router*connects multiple networks so that all the nodes on each network can access services and nodes on any other network. It receives and forwards AppleTalk packets on the networks to which it is directly connected.
- An *AppleTalk internet* is a group of AppleTalk networks interconnected by one or more AppleTalk routers. Network users in an internet can share information and network devices.
- An *AppleTalk zone* is a logical grouping of shared devices, such as file servers and printers. You create zones by associating a name (or list of names) with a network.

- The *AppleTalk module* is the NLM in NetWare for Macintosh v3.12 that includes the complete suite of AppleTalk Phase 2 protocols, including all the layers required to handle transmission and receipt of packets, and an AppleTalk Phase 2 router.
- The *AppleTalk stack* is the complete suite of AppleTalk Phase 2 protocols in the AppleTalk module.

The AppleTalk Router in NetWare for Macintosh

The AppleTalk router in NetWare for Macintosh enables all of the nodes on multiple networks to communicate and to access services on other networks, as well as on their own "local" network. A correctly configured AppleTalk router enables Macintosh clients in the internet to take full advantage of all available NetWare resources.

Do You Need to Configure the AppleTalk Router in NetWare for Macintosh?

Yes. You always need to configure the AppleTalk router, even if the file server is connected to a single AppleTalk network.

NetWare for Macintosh includes an internal "virtual" network, which is required to support future NetWare architectures. Therefore, with even one AppleTalk network connection, the router always sees at least two networks—the internal "virtual" network and the external "physical" network.

The AppleTalk configuration on the internal network must always be unique to the file server, so you must always supply a unique internal network configuration in each file server that supports NetWare for Macintosh.

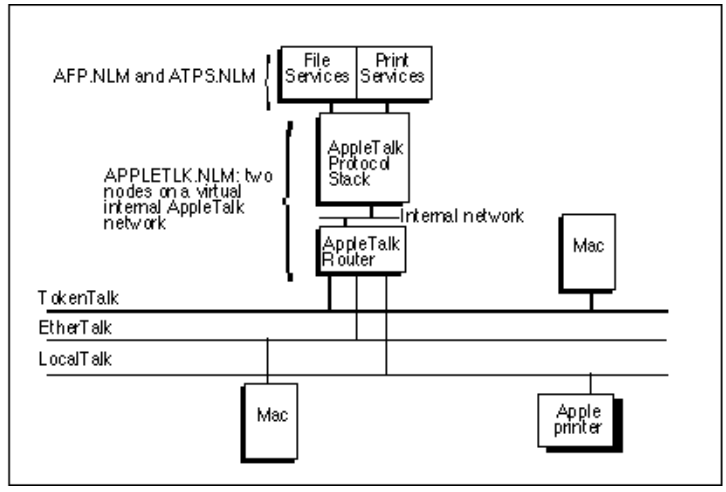
If there is a configured AppleTalk router on one or more of the external networks connected to the file server, you can allow the AppleTalk router in NetWare for Macintosh to "learn" its configuration from that router. This is described in "Learning Network and Zone Configurations from Seed Routers" on page 34.

How the Router Works on the Internal Network

The *internal network* is a virtual network; it has no physical components, but is entirely contained within the AppleTalk module. As far as the router is concerned, the internal network is just one of a number of networks to which the router is connected. The internal network is configured with an AppleTalk network number and zone name, following exactly the same configuration rules as an external, physical network.

When the router receives AppleTalk packets that have a destination address for the file server itself (for example, during a login session with a Macintosh user), the router forwards the packets internally to the AppleTalk protocol stack, where the file services module can access them (see Figure 1).

Figure 1 The Internal AppleTalk Network



The internal network always supports two nodes, the AppleTalk stack (node 1 on the internal network) and the AppleTalk router (node 2 on the internal network).

NOTE: Nodes on the internal network are connection points between the AppleTalk software and the internal network. They do not represent physical devices.

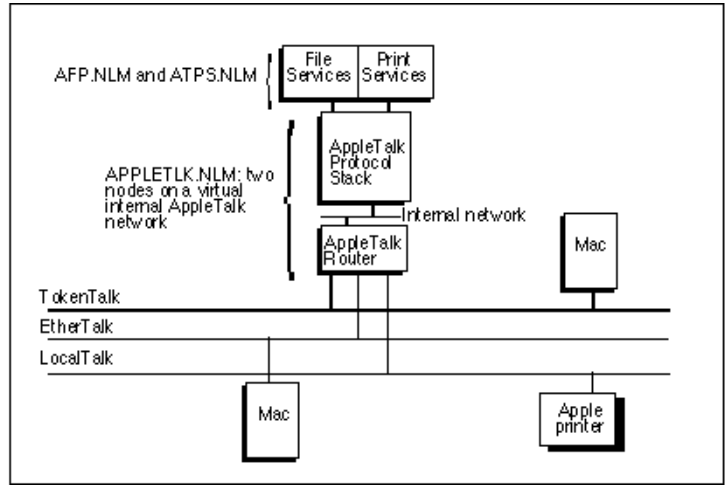
How AppleTalk Routers Work on External Networks

When the AppleTalk router is connected to two or more network cables (like SERVER-2 in Figure 2), it receives packets from a node on one cable and forwards them to a node on another cable.

Each network in an internet is assigned a unique identifier (a number or range of numbers), and every AppleTalk packet that is sent out on the internet includes the network number of its destination. The router is a forwarding device; it receives packets on one of its networks, consults the destination network number, and forwards the packet out to the proper network.

When the router receives an AppleTalk packet that has a destination address for a node other than itself or the protocol stack on its own internal network, it forwards the packet out to the node whose address is contained in the packet or to another router that is closer to the destination node (Figure 2).

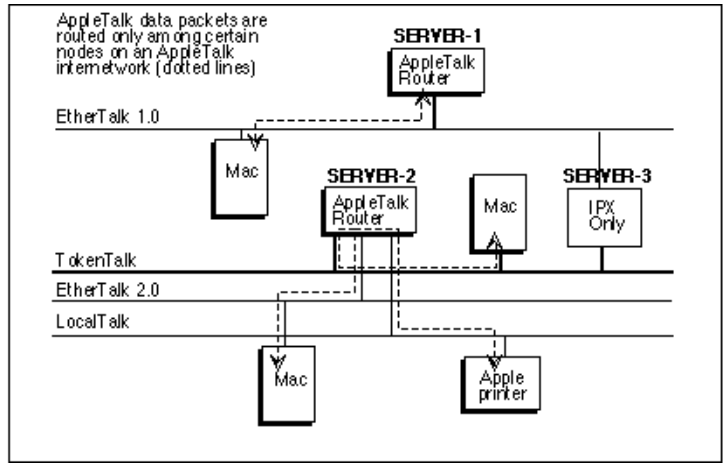
Figure 2 External AppleTalk Networks



In Figure 2, the AppleTalk routers in SERVER-1, SERVER-2, and SERVER-3 allow full intercommunication between AppleTalk nodes on all AppleTalk networks. This means that all four networks shown in Figure 2 are connected to form an AppleTalk internet.

Figure 3 shows how internet connectivity is affected if SERVER-3 does not support AppleTalk routing.

Figure 3 AppleTalk Networks without Full Connectivity



In Figure 3, SERVER-3 does not support an AppleTalk router. This means that the Macintosh on the EtherTalk 1.0 network can access only the services provided by SERVER-1, and none of the other Macintosh workstations can access SERVER-1.

AppleTalk Phase 2 Networks and Zones

The principal administrative features in AppleTalk Phase 2 include an extended network addressing scheme to support thousands (or theoretically, up to 16 million) nodes per network, and zones lists to support multiple zones per network.

AppleTalk networks that make use of the extended network addressing scheme are called *extended networks*, and those that cannot support the extended scheme are called *nonextended networks*.

Nonextended Networks

Some AppleTalk networks do not require, and cannot support, extended Phase 2 network addressing. In NetWare for Macintosh, these networks include LocalTalk, ARCnet, and EtherTalk 1.0.

On nonextended networks, each network is assigned one unique 16-bit network number (an integer between 1 and 62,579) and one zone name. Each AppleTalk node is identified by an 8-bit node number. This limits the total

number of nodes per network to 254 (256 is the highest number that can be represented in 8 bits, and two numbers are reserved by AppleTalk).

The node acquires its unique 8-bit node number dynamically when it connects to the network. It "remembers" its node number when it is turned off, and tries to use that address again when it connects to the network the next time. If it finds that its previous number is already in use, it tries again until it finds a unique node address.

Extended Networks

AppleTalk networks that support extended Phase 2 network addressing include EtherTalk 2.0 and Token Ring.

On an extended Phase 2 network, a contiguous *range* of unique 16-bit network numbers can be assigned to each network. For example, a network can be assigned the range 1-10. In addition, each extended network can be assigned multiple zone names.

Each of the nodes on an extended network uses the full 24-bit combination of network and node number as its unique identifier. This increases the theoretical limit of the number of nodes per network to greater than 16 million.

NOTE: The size of the network range you assign determines the maximum number of AppleTalk devices on the physical cable; for example, an extended network with the range 1-10 could support up to 10 x 253, or 2,530 nodes. (On extended networks, three 8-bit node numbers are reserved by AppleTalk.) Although there is no hard-coded limit to the size of a network range, you should specify the smallest range that suits your needs.

On extended networks, the node acquires a full 24-bit number by choosing a network number from a reserved "startup range" and a random node number to allow it to communicate with the router. It then acquires a valid network number from the assigned range, and finds an unused node number for the network number it acquired. As on nonextended networks, the node "remembers" its address when it is turned off, and uses the same address when it connects to the network again unless another node has obtainedthat address.

Multiple Zones on a Network

An AppleTalk zone is a logical grouping of devices that enables users to locate and access network services in the Chooser. Network administrators define zone names in a router configuration.

On nonextended networks, where only one zone name is assigned to a network, all nodes on that network belong to the same zone.

On extended networks, each network can be a member of up to 255 zones. When a network is a member of multiple zones, it is configured with a *zones list*, which contains the names of its zones. A node on an extended network can belong to any zone in that list.

When a node first starts up, it is always placed in the *default zone.* The default zone is defined by the router. Each type of router might use its own method of defining which zone in the list is the default zone. *The AppleTalk router in NetWare for Macintosh uses the first zone in a zones list as the default zone.*

NOTE: All AppleTalk routers on a network must agree about which zone name is the default zone.

Administrators can group devices in a zone by informing certain devices that they belong in a zone other than the default.

AppleTalk Protocols and Packet Frames for LAN Drivers

The LocalTalk hardware was designed for AppleTalk, so no packet frame configuration is required for LocalTalk LAN drivers in the NetWare for Macintosh server.

Apple Computer initially made AppleTalk available on Ethernet by embedding AppleTalk packets in an Ethernet Type II packet frame. (The Ethernet Type II frame was commonly in use by most Ethernet devices at that time, including TCP/IP hosts.) EtherTalk 1.0 uses the ETHERNET_II packet frame.

When AppleTalk Phase 2 was introduced, the Ethernet 802.2 Type 1 SNAP packet frame was adopted to handle extended AppleTalk networks. EtherTalk 2.0 uses the ETHERNET_SNAP packet frame.

Token Ring support for AppleTalk was developed as part of AppleTalk Phase 2, so TokenTalk does not (and never did) support nonextended networks. TokenTalk uses the 802.2 SNAP frame (TOKEN-RING_SNAP).

AppleTalk on ARCnet (nonextended) networks uses the NOVELL_RXNET packet frame type. This is the same packet frame used by the IPX protocols on ARCnet.

AppleTalk Configuration in NetWare for Macintosh

This section describes the syntax of the commands you will use to configure networks and zones in the AppleTalk router in NetWare for Macintosh. It also explains the general AppleTalk rules for network numbers, zone names, and the default zone on extended networks.

How to Use This Information

This information should be used as a reference when you are installing and configuring NetWare for Macintosh.

NOTE: Remember that you can press <F1> for on-line help when using the INSTALL module during the configuration procedure. The on-line help screens provide command-line syntax and other useful information for setting up your server.

Nonextended Network and Zone Configuration

EtherTalk 1.0, LocalTalk, and ARCnet networks are nonextended networks that can support a maximum of 254 node addresses. Configuration data and syntax for nonextended networks is shown in Table 5.

Table 5 Configuring Nonextended Networks (EtherTalk 1.0, LocalTalk, and ARCnet)

Configurable Component	Explanation
Network number	All nonextended AppleTalk networks require a valid network number. The number must be specified on the BIND command line, using this syntax: `net=1000`
Zone name	All nonextended AppleTalk networks require a valid zone name. The name may be specified on the BIND command line or in a global file named "ATZONES.CFG." Zones must be specified using this syntax: `zone={"Zone 1"}`Note that the braces ({ }) and double-quotes (") are required.

- A valid AppleTalk network number is any integer between 1 and 65,279. *All AppleTalk routers connected to a network must use the same number for that network, and no other network can use that number.*

  NOTE: NetWare for Macintosh uses base-10 (decimal) numbers to define AppleTalk network numbers. Some third-party routers may use base-16 (hexadecimal) numbers instead.

- A valid zone name is a string of up to 32 characters, which can include embedded spaces. All of the characters must be legal printing characters, and they can include the Macintosh control characters shown in Table 27 on page 226. In NetWare for Macintosh, zone names are case-insensitive. *All AppleTalk routers connected to a network must agree about the zone name assigned to it.*

  NOTE: All AppleTalk routers keep track of zones once the zones have been established, and it is not a straightforward task to change zone names once you have defined them on a large AppleTalk internet. Please see "How Zone Information Is Maintained on an Internet" on page 260 for information about changing zone names.

Extended Network and Zone Configuration

Ethernet and Token Ring networks are extended networks. Configuration data and syntax for extended networks is shown in Table 6.

Table 6 Configuring Extended Networks (EtherTalk 2.0 and TokenTalk)

Configurable Component	Explanation
Network range	Both EtherTalk 2.0 and TokenTalk require a network range that includes one or more valid AppleTalk network numbers separated by a hyphen. The range must be specified on the BIND command line, using this syntax: `net=1-10`
Zones list	Both EtherTalk 2.0 and TokenTalk require a list of AppleTalk zones, which can include up to 255 valid zone names. These may be specified on the BIND command line or in a global file named "ATZONES.CFG." Zones must be specified using this syntax: `zone={"Zone 1","Zone 2","Zone 3"}` Note that the braces ({ }), double-quotes (") and commas (,) are all significant.

- A *network range* is a contiguous range of valid network numbers. The size of the network range you assign determines the maximum number of AppleTalk devices on the network; for example, an extended network with the range 1-10 could support up to 10 x 253, or 2,530 nodes. Although there is no hard-coded limit to the size of a network range, you should specify the smallest range that suits your needs. *A range of one, such as 10-10, is acceptable and is required if there are Phase 1 routers present on the internet. All AppleTalk routers connected to that network*

must use the same range for that network, and no other network can use that range or any number contained within it.

- A zones list can contain up to 255 zone names, and the first name you enter is the default zone. *All AppleTalk routers connected to that network must agree about the zones list and about which zone is the default zone.*

Internal Network and Zone Configuration

The internal network is an extended network, and the general rules for extended networks apply. However, because the internal network can never support more than two nodes (the router and the protocol stack), there are some special conditions to consider.

Table 7 Configuring the Internal Network

Configurable Component	Explanation

Network number	The internal network requires a valid network number. The number must be specified on the LOAD command line, using this syntax:
	`net=10`
	or
	`net=10-10`

Zone name or zones list	The internal network requires a valid zone name, and can support multiple zone names. The name(s) may be specified on the LOAD command line or in a global file named "ATZONES.CFG." Zones must be specified using this syntax:
	`zone={"Zone 1"}`
	or
	`zone={"Zone 1","Zone 2","Zone 3"}`

NOTE: The purpose of configuring multiple zones on the internal network is to allow print queues to be advertised in any one of these AppleTalk zones. AFP file services are always advertised in the first zone entered for the internal network, which is the default zone for the internal network.

- Although a range of one (such as 10-10) is accepted on the internal network configuration, a single network number (such as 10) is allowed. However, even if the internal network is configured with a single network number, the router sees it as an extended network. See "What Is

Transition Mode?" on page 263 for information about how this affects Phase 1 networks and transition routing internets.

- When multiple zones are specified for the internal network, you can choose one of the specified zones as the zone in which an AppleTalk spooler will appear in the Chooser. This is described in "Advertising a Queue in a Specified Zone: -o" on page 170.

  NOTE: You cannot—*under any circumstances*—specify multiple zones for the internal network of a server that performs transition routing. See Appendix B, "Transition Mode Routing," on page 263 for more information.

Important Note about Phase 1 Environments

Because the internal network is an *extended* Phase 2 network, you must always use the `-t`Transition Mode option if you are using NetWare for Macintosh in an AppleTalk Phase 1 environment. Please see Appendix B, "Transition Mode Routing," on page 263 for a full explanation of Transition Mode and Phase 2 extended networks.

NOTE: NetWare print queues advertised in extended zones do not appear with any reliability on AppleTalk internets that contain Phase 1 routers.

Learning Network and Zone Configurations from Seed Routers

In NetWare for Macintosh, the AppleTalk router can be configured to "learn" its network and zone configuration for one or more interfaces automatically by "listening" for packets from another AppleTalk router connected to that network interface. This ability to learn a complete configuration is called *seeding*. A network interface that is not explicitly configured is called a *non-seed interface*. A router that has a network configuration on a particular interface is called a *seed router*. A seed router can be explicitly configured or can have a configuration that was obtained by seeding.

NOTE: If you configure an AppleTalk router interface as a non-seed interface and there is no seed router on that cable, the AppleTalk router remains inactive on the non-seed interface until it receives a configuration from a seed router on that network.

Benefits of the Seeding Feature

When you configure a non-seed interface in an AppleTalk router, the router obtains a network configuration that is consistent with other routers connected to that network. Provided that the network is correctly configured to start with,

you can add other AppleTalk routers with non-seed interfaces without introducing inconsistent configurations.

If you use one seed router and configure non-seed interfaces in all other AppleTalk routers connected to that network, it is much easier to change the network or zone configuration if you should need to do so in the future. Instead of reconfiguring all routers on a network, you can down all routers and reconfigure only the seed router.

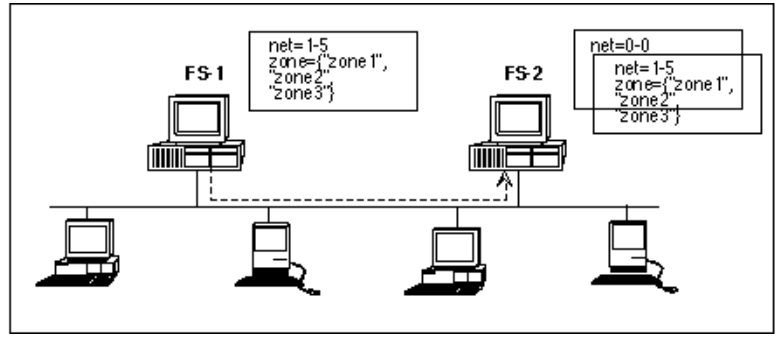
How the Seeding Feature Works

The AppleTalk Routing Table Maintenance Protocol (RTMP) is the protocol used by AppleTalk routers to distribute network configuration information. Every ten seconds, each AppleTalk router broadcasts RTMP packets containing information about networks. Other AppleTalk routers receive the RTMP packets and use the information to build and maintain a complete view of the AppleTalk internet. Please see Appendix B, "Transition Mode Routing," on page 263 if you would like more information about RTMP.

When the AppleTalk router in NetWare for Macintosh is configured with one or more non-seed interfaces, it uses information received in the RTMP packets to acquire the network number on a non-seed interface. It then sends a request to learn the zone information for that network. "How Seeding Works" on page 35 shows a router configured with a non-seed interface (that is, **`net=0-0`**), acquiring its configuration from a seed router on an extended network.

"Example 5: Learning from Other Routers" on page 76 provides a step-by-step example of how to use non-seed interfaces in NetWare for Macintosh.

Figure 4 How Seeding Works



A non-seed interface remains inactive until another router is heard from and a network number obtained. If you suspect a non-seed interface was configured on a network that does not have any seed routers, load the ATCON utility and check View RTMP Table. The address field is network number `0` while the router is acquiring its network configuration on a non-seed interface. On a Phase 2 interface, the node number is also `0`. If these conditions persist for longer than 20 seconds, then the router is not obtaining its network configuration for that interface.

2 Installing NetWare for Macintosh

This chapter shows how to install the NetWare for Macintosh software by using the INSTALL utility or Remote Console. It also gives instructions for upgrading the product if you already have a previous version of NetWare for Macintosh installed and configured.

NOTE: NetWare for Macintosh will not be usable until you have completed the configuration procedure shown in Chapter 3, “Simple Network Configurations,” on page 43 and Chapter 4, “More Complex Network Configurations,” on page 81. If you wish, you can prepare your configuration data first and complete the installation and configuration in one session.

Installing the NetWare for Macintosh Software

To install the Macintosh NLMs by using the INSTALL utility, follow these steps:

1. At the server console, add the Macintosh name space to all volumes that will support Macintosh clients by typing these commands:

   ```
   LOAD MAC <Enter>
   ADD NAME SPACE MACINTOSH TO VOLUME name <Enter>
   ```

   name is a single volume name. If you have already added the Macintosh name space to a volume, you do not need to add it again at this point, but it does no harm to do so.

   If the server supports Macintosh clients on multiple volumes, repeat the ADD NAME SPACE command for each volume. (You do not need to repeat the LOAD MAC command to add the name space to additional volumes.) See “The Macintosh Name Space” on page 140 if you would like more information.

2. Insert the *NW_MAC* diskette into the file server's floppy drive.

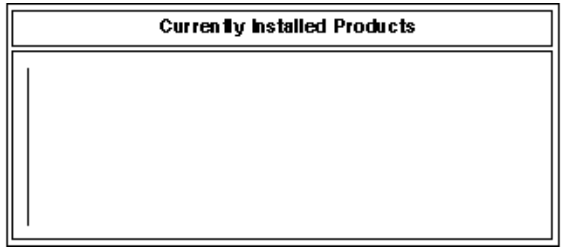
3 Load the INSTALL utility.

At the console prompt, type

```
LOAD INSTALL <Enter>
```

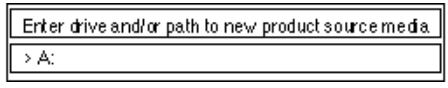
4 Select Product Options in the main INSTALL menu.

5 Press <Ins> to install NetWare for Macintosh.



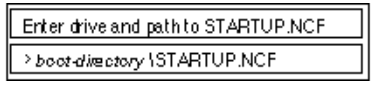
The installation procedure prompts you for the location of the product's source.

6 If the *NW_MAC* diskette is in the A drive, press <Enter>.



If you are using a different floppy drive, or if you copied the installation files to another DOS drive, delete the characters "A:" and enter the drive letter (and path, if applicable) before pressing <Enter>.

7 To confirm the use of the current STARTUP.NCF, press <Enter>.



If you do not wish to edit the current STARTUP.NCF file, delete the characters following the ">" prompt, enter a drive, path, and the filename STARTUP.NCF, and then press <Enter>. If you edit a STARTUP.NCF file other than the current one, you must copy it to the directory containing SERVER.EXE. Otherwise, when you later boot the server to activate AppleTalk, the system will use the wrong STARTUP.NCF file.

8 To begin the file transfer, select Install NW-MAC and press <Enter>.

If you choose "Cancel installation," you return to the "Currently Installed Products" window.

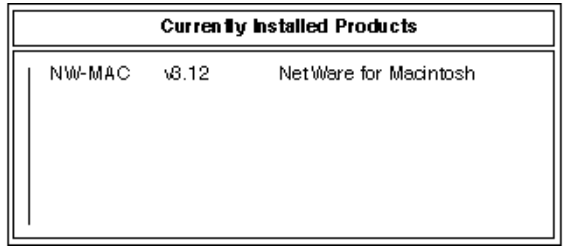
Press <Enter> to begin the installation. A window displays messages indicating that files are being transferred. When the file transfer is complete, the "Editable Configuration Files" menu appears.

9 If you have prepared the configuration data you need, configure NetWare for Macintosh; otherwise, go to Step 10.

Please see the examples in Chapter 3, "Simple Network Configurations," on page 43 or Chapter 4, "More Complex Network Configurations," on page 81 for step-by-step instructions.

NOTE: Before you begin configuring NetWare for Macintosh, please be sure to read the READ_ME.1ST file on the *NW_MAC* diskette or *MAC UTILITIES* diskette. (The file contents are the same on either diskette.) This file contains vital information about the NetWare for Macintosh software and specific issues of which you should be aware before you install the software on your NetWare v3.12 server.

10 Press <Esc>.



11 Exit the INSTALL utility, saving your changes.

If the Server Has Macintosh Clients on Token Ring

If the file server will support Macintosh clients connected to Token Ring, you must manually copy the ATTOKLLC NLM a from the *NW_MAC* diskette to the SYS:SYSTEM directory of the server(s) on which you install NetWare for Macintosh. For example, use this command:

```
NCOPY A:ATTOKLLC.NLM SYS:SYSTEM <Enter>
```

See "Using Token Ring with Macintosh Clients" on page 104 and the configuration procedure that follows that section for instructions on configuring the ATTOKLLC NLM in the server.

Using Remote Console to Install NetWare for Macintosh

If you want to use Remote Console (RCONSOLE) to install NetWare for Macintosh, follow these steps:

1. At a DOS workstation, map a drive to the target server's SYS volume.

   For example, use this command to map the "Y" drive to the target server's SYS volume:

   ```
   MAP Y:=SERVER:SYS <Enter>
   ```

2. Insert the *NW_MAC* diskette in the workstation's floppy drive.

3. Create a new directory on the remote target server.

   For example, use this command to create the \NW-MAC directory on the target server's SYS volume:

   ```
   MKDIR Y:\NW-MAC <Enter>
   ```

4. Copy all files from the *NW_MAC* diskette to the directory you created on the target server.

   For example, use this command:

   ```
   NCOPY A:*.* Y:\NW-MAC <Enter>
   ```

5. Invoke the Remote Console program by typing:

   ```
   RCONSOLE <Enter>
   ```

6. Follow the installation instructions beginning in "Installing the NetWare for Macintosh Software" on page 37.

Use the Remote Console utility to install the product as if you were at the server console, but specify the directory you created (SYS:\NW-MAC in this example) as the location of the product source media.

Upgrading a Previous Version of NetWare for Macintosh

If you are upgrading a previous version of NetWare for Macintosh to Version 3.12 and you do not wish to change the configuration, follow these steps:

1. At the server console, UNLOAD the NetWare for Macintosh NLMs by typing these commands:

   ```
   UNLOAD ATPS <Enter>
   UNLOAD AFP <Enter>
   UNLOAD APPLETLK <Enter>
   ```

   NOTE: These commands break all of the server's AppleTalk connections.

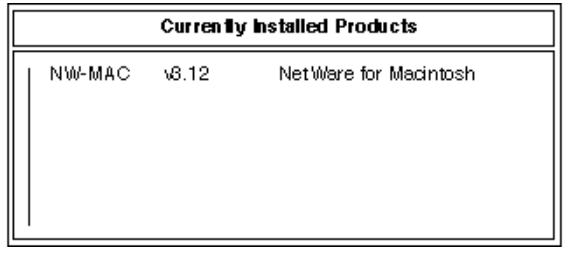
   AppleTalk automatically unbinds itself from all network boards before unloading.

2. Follow the installation instructions beginning in "Installing the NetWare for Macintosh Software" on page 37.

   When you get to Step 8, the PINSTALL window asks you to confirm that you wish to Update (rather than install) the product:

3. Select "Update NW-MAC" and then press <Enter>.

   When the update procedure is complete, the "Currently Installed Products" window opens again.



4 Exit the INSTALL utility, saving your changes.

NOTE: Please see "Modifying Configuration Files" on page 129 if you wish to modify the NetWare for Macintosh configuration at this point.

5 LOAD the NetWare for Macintosh NLMs by typing these commands:

```
LOAD ATPS <Enter>
LOAD AFP<Enter>
LOAD APPLETLK <Enter>
```

3 Simple Network Configurations

This chapter describes how to configure NetWare for Macintosh for several simple AppleTalk network environments. See "More Complex Network Configurations" on page 81 if your network is more complex than these examples:

- "Example 1: Adding NetWare for Macintosh to Ethernet" on page 46 shows how to add NetWare for Macintosh to a file server connected to Ethernet.
- "Example 2: Adding NetWare for Macintosh to ARCnet" on page 53 shows how to add NetWare for Macintosh to a file server connected to ARCnet.
- "Example 3: Creating a LocalTalk Network" on page 59 shows how to add a LocalTalk network for AppleTalk services.
- "Example 4: EtherTalk 2.0 with Other AppleTalk Routers" on page 69 shows a file server on Ethernet where another AppleTalk router already exists on that network.
- "Example 5: Learning from Other Routers" on page 76 shows an easier way to configure a server when another AppleTalk router already exists on a network.

NOTE: The procedures described in this chapter specify that you must down the file server and bring it up again to activate AppleTalk with the most current configuration specifications. This requirement is based on the recommendation that you configure your networks and zones in the server's STARTUP.NCF and AUTOEXEC.NCF files. An alternative to this approach is to type the commands at the server console. If you type the commands at the console instead of entering them in the server's STARTUP.NCF and AUTOEXEC.NCF files, you do not need to down the file server to activate AppleTalk.

See Chapter 6, "Managing AppleTalk File Services," on page 139 and Chapter 7, "Managing AppleTalk Print Services," on page 155 for important information about your options in AFP and print service configurations.

Quick Overview of the Configuration Procedure

These steps show a broad overview of the configuration process. The examples beginning with "Example 1: Adding NetWare for Macintosh to Ethernet" on page 46 provide complete instructions.

NOTE: If you have just completed the installation and are running INSTALL, skip the first two steps.

1. Load INSTALL.
2. Select Product Options and press <Enter> on the line specifying NW-MAC v3.01.
3. Edit the file server's STARTUP.NCF file to specify these commands:

   ```
   load mac
   set minimum packet receive buffers=100
   ```

4. Edit SYS:\SYSTEM\AUTOEXEC.NCF to specify commands that accomplish these tasks:

   4a. LOAD the AppleTalk module and configure the internal AppleTalk network.

   4b. LOAD LAN drivers for AppleTalk networks and specify the appropriate AppleTalk frame types.

   4c. BIND AppleTalk to the appropriate LAN drivers and configure AppleTalk networks on those interfaces.

   4d. LOAD the AFP file service module (optional), specifying configuration options if appropriate.

   4e. LOAD the ATPS print module (optional).

5. If ATPS is loaded, edit ATPS.CFG to configure print queues.
6. Exit the INSTALL utility, saving your changes.
7. Down the file server and bring it back up.

   NOTE: If you don't wish to down the file server at this time, re-enter at the console prompt all configuration commands specified in the STARTUP.NCF and AUTOEXEC.NCF files. This action brings up NetWare for Macintosh for the current

server session. The next time you down the server, the specifications in STARTUP.NCF and AUTOEXEC.NCF will apply.

Preparing the Configuration Data You Need

The AppleTalk network configuration affects not only the file server and its Macintosh clients but also all AppleTalk networks with which the router can communicate.

NOTE: It is very important that you check your router configuration data before you carry out your configuration tasks. If you are part of a large organization where networks are managed by internet administrators, make sure that you obtain valid AppleTalk network addresses before you configure the AppleTalk router.

- If you are installing NetWare for Macintosh on an existing AppleTalk internet, determine whether the network(s) to which you will connect the router support an AppleTalk router already. If so, you must configure the new router in accordance with the configuration of the existing router, or allow it to "learn" from other routers on its network(s).

  IMPORTANT: If you are configuring multiple zones on an extended network, and the total number of characters on the AppleTalk BIND command line will exceed 82 characters, you need to specify the zone configuration in the ATZONES.CFG file. See Appendix A, “AppleTalk Configuration Concepts,” on page 243 for details.

- Determine which file servers must support NetWare for Macintosh to make sure that Macintosh clients on different networks can log in to NetWare. See “The AppleTalk Router in NetWare for Macintosh” on page 25 for a quick overview.

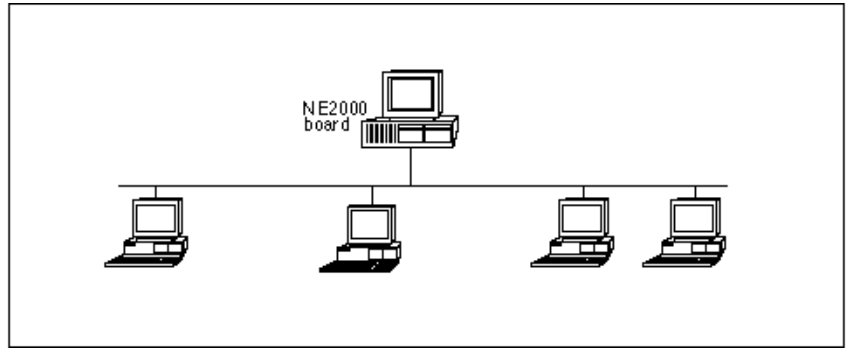
- If a network interface board will not be sending and receiving IPX packets, it is not necessary to bind IPX to that board and assign it an IPX network number. However, an IPX network number *is* necessary for the internal network.

  NOTE: Please refer to Appendix B, “Transition Mode Routing,” on page 263 if you must accommodate Phase 1 routers by using Transition Mode.

Example 1: Adding NetWare for Macintosh to Ethernet

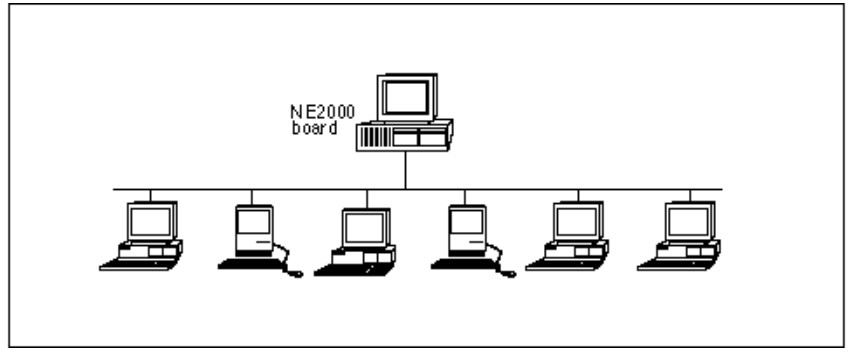
This example shows how to add NetWare for Macintosh to a NetWare v3.12 server connected to Ethernet. The server already supports DOS clients via IPX, as shown in Figure 5.

Figure 5 File Server on Ethernet



In this example, you will add an AppleTalk network with Macintosh workstations to the existing Ethernet cable. The resulting network is shown in Figure 6.

Figure 6 Adding Macintosh Clients on Ethernet



Example 1 Configuration Data

The router in this example uses the configuration data in Table 8.

Table 8 Example 1 Configuration

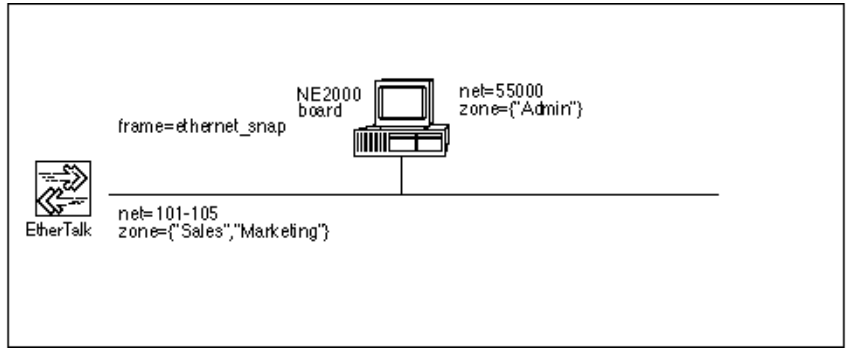
Configurable Component	Example Data	
Internal AppleTalk network	`net=55000 zone={"Admin"}`	Use a unique network number. *Use a valid zone name.*
EtherTalk 2.0	`net=101-105 zone={"Sales","Marketing"}`	*Use a valid network range. Use a list of at least one zone name.*
NE2000 LAN driver	`frame=ETHERNET_SNAP`	
AFP file services	*Installed (no options used)*	
ATPS print services	*Not installed on this server*	

See "AppleTalk Configuration in NetWare for Macintosh" on page 31 for information about the configuration data and syntax.

NOTE: This example shows how to add NetWare for Macintosh file services only. Adding ATPS print services is not shown. See Chapter 7, "Managing AppleTalk Print Services," on page 155 for information on print services.

Figure 7 shows the AppleTalk network configuration when the installation is complete. No clients are shown, to enable you to see the actual networks more clearly.

Figure 7 Example of EtherTalk 2.0 Configuration



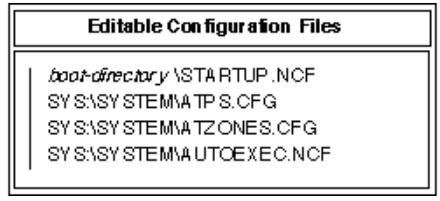
Example 1 Configuration Procedure

To enter a configuration that will be in effect when you bring up the server, follow the steps in this section.

1. Load INSTALL, select Product Options in the main INSTALL menu, and then press <Enter> on the line specifying NW-MAC v3.12.

   If you have just finished installing the NetWare for Macintosh software and are running INSTALL, skip this first step.

   When you press <Enter>, the Editable Configuration Files menu opens.



2. Highlight STARTUP.NCF and press <Enter>.

   Add these to the existing commands in STARTUP.NCF:

   ```
   load mac
   set minimum packet receive buffers=100
   ```

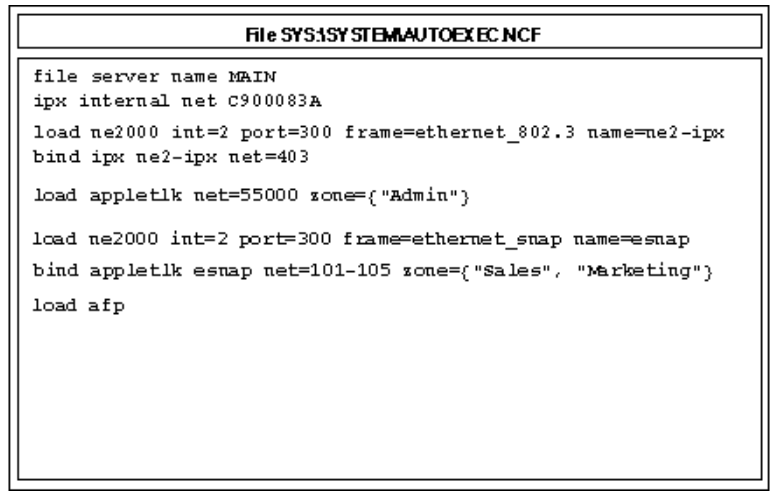
   See "The Macintosh Name Space" on page 140 and "AppleTalk Stack/ Router Memory Requirements" on page 253 if you would like an explanation of these commands.

   Press <Esc> and then <Enter> to save changes to STARTUP.NCF.

3. Use the arrow keys to highlight AUTOEXEC.NCF and then press <Enter>.

   Add the NetWare for Macintosh configuration commands to the existing commands in AUTOEXEC.NCF. The commands required for this example configuration appear in bold monospace type in Figure 16.

Figure 8 Example 1 AUTOEXEC.NCF



NOTE: Before loading the AFP or ATPS modules, you must load the AppleTalk module and bind AppleTalk to one or more LAN drivers, as shown in the steps below.

4 Load the AppleTalk module and configure the internal network:

```
load appletlk net=55000 zone={"Admin"}
```

If you would like more information, see "Loading the AppleTalk Module" on page 243.

5 Load the LAN driver with the ETHERNET_SNAP frame type:

```
load ne2000 int=2 port=300 frame=ethernet_snap
  name=esnap
```

The NAME option is a NetWare driver-naming feature that lets you specify a name for a specific configuration. This option is described in the NetWare v3.12 *System Administration* manual. For more information, see "Loading LAN Drivers with AppleTalk Frame Types" on page 245.

6 Bind AppleTalk to the LAN driver and configure the EtherTalk 2.0 network:

```
bind appletlk esnap net=101-105
  zone={"Sales","Marketing"}
```

The name **esnap** in this command refers to the NE2000 driver configuration name assigned above. See "Binding AppleTalk to a LAN

Driver" on page 247 if you need more information about BIND command lines.

7 Load AppleTalk file services:

```
load afp
```

For details about AFP configuration options, see "Setting Up a Specialized Environment" on page 148.

8 Exit INSTALL, saving your changes.

9 Down the file server and bring it back up.

If you don't wish to down the file server at this time, re-enter at the console prompt all configuration commands specified in the STARTUP.NCF and AUTOEXEC.NCF files. This action brings up NetWare for Macintosh for the current server session. The next time you down the server, the specifications in STARTUP.NCF and AUTOEXEC.NCF will apply.

If you *can* down the server at this time, follow your usual procedure, for example:

```
DOWN <Enter>
EXIT <Enter>
SERVER<Enter>
```

A series of messages appears, indicating that the system is loading the modules you specified. For this example, these messages appear:

```
Loading. . .
Minimum Packet Receive Buffers set to 100
Loading module ISADISK.DSK
Loading module MAC.NAM
Loading module NE2000.LAN
Loading module APPLETLK.NLM
APPLETALK LAN protocol bound to NE-2000 LAN Driver
Loading module AFP.NLM
Auto-loading module STREAMS.NLM
Auto-loading module CLIB.NLM
:
```

At this point, NetWare for Macintosh is up and running.

10 Verify that the modules have loaded.

When you see the console colon (:) prompt, type

MODULES <Enter>

You will see a list of NLMs such as this one:

```
APPLETLK.NLM NetWare AppleTalk Stack/Router
AFP.NLM NetWare AFP module
CLIB.NLM NetWare C Runtime Library
STREAMS.NLM NetWare STREAMS
NE2000.LAN NE-2000 LAN Driver
MAC.NAM Macintosh Name Space Support
ISADISK.DSK NetWare ISA Device Driver
```

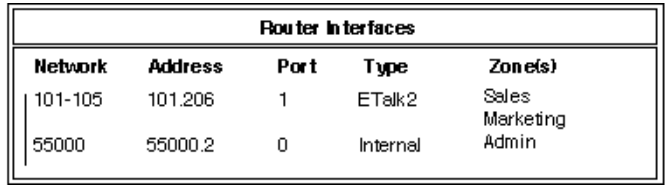
11 Check the AppleTalk configuration.

Now that the router is up and running, you should make sure that it is using the correct AppleTalk configuration. At the file server console, type

LOAD ATCON <Enter>

Then, choose View Router Interfaces in the main ATCON menu. A window opens, showing the interfaces you configured (Figure 9).

Figure 9 Checking the Configuration in ATCON



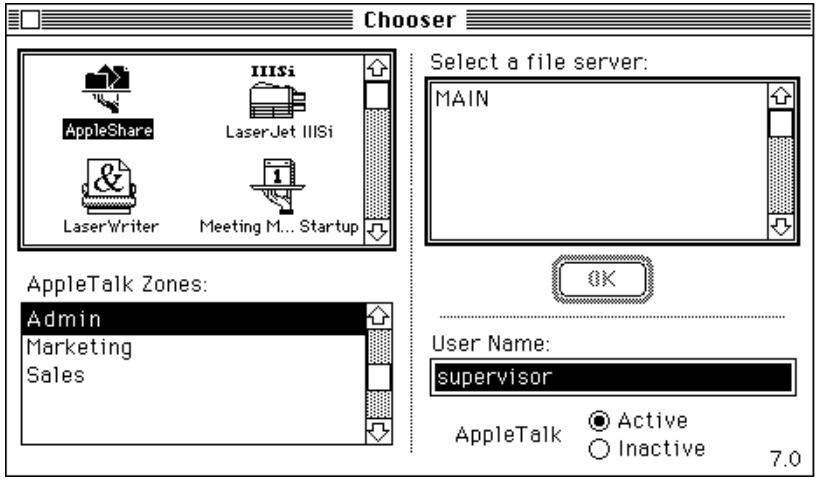
ATCON displays network numbers for the EtherTalk network (101-105) and the internal network (55000); it also provides the AppleTalk router's node address on the internal network (55000.2).

Check the network numbers and zones against your records to make sure they are correct. See "Checking the Router's Configuration and Function" on page 288 for an explanation of the fields in this window.

Verifying Services from a Macintosh Client

After you have configured NetWare for Macintosh and have installed the required Macintosh client software, you can follow the instructions in the *Using the NetWare for Macintosh Client* guide to check the configuration from a Macintosh client.

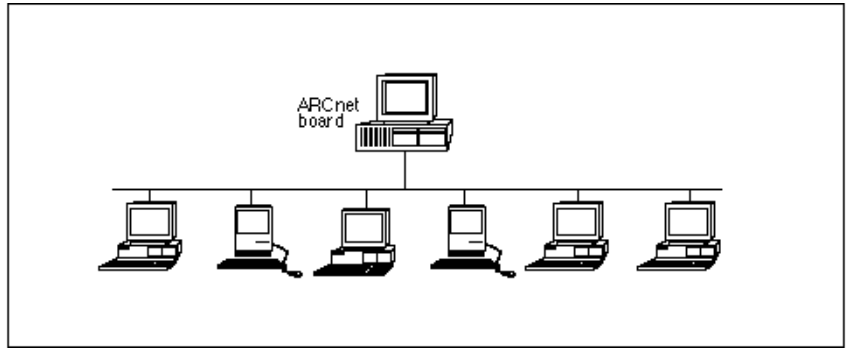
In this example, both the file server and its queues appear in the Admin zone, because this is the zone of the internal network.



Example 2: Adding NetWare for Macintosh to ARCnet

This example shows how to add NetWare for Macintosh to a NetWare v3.12 server connected to ARCnet.

Figure 10 File Server on ARCnet



Example 2 Configuration Data

In this example, you will configure the router with the data shown in Table 9.

Table 9 Example 2 Configuration

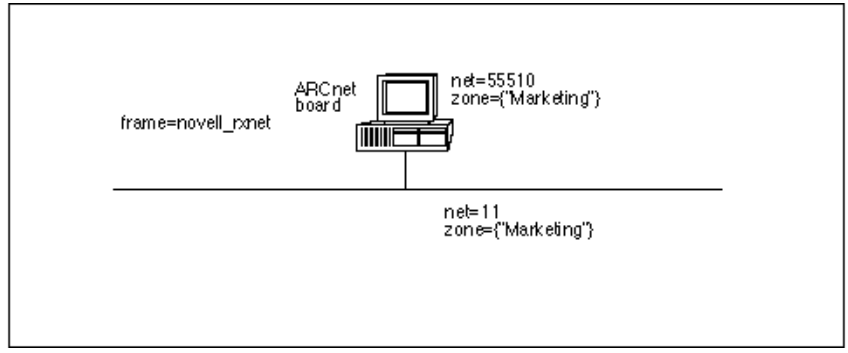
Configurable Component	Example Data	
Internal AppleTalk network	net=55510 zone={"Marketing"}	Use a unique network number. Use a valid zone name.
AppleTalk on ARCnet	net=11 zone={"Marketing"}	Use a valid network number. Use a valid zone name.
TRXNET LAN driver	frame=NOVELL_RXNET	The default frame type, also used by IPX.
AFP file services	Installed (no options used)	
ATPS print services	Not installed on this server	

See "AppleTalk Configuration in NetWare for Macintosh" on page 31 for information about the configuration data and syntax.

NOTE: This example shows how to add NetWare for Macintosh file services only. Adding ATPS print services is not shown. See Chapter 7, "Managing AppleTalk Print Services," on page 155 for information on print services.

Figure 11 shows the AppleTalk network configuration when the installation is complete. No clients are shown, to enable you to see the actual network more clearly.

Figure 11 Example of ARCnet Configuration



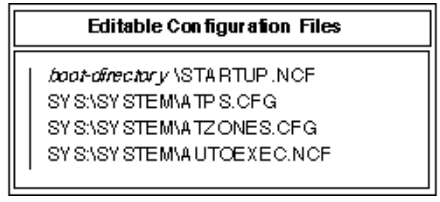
Example 2 Configuration Procedure

To enter a configuration that will be in effect when you bring up the server, follow the steps in this section.

1. Load INSTALL, select Product Options in the main INSTALL menu, and then press <Enter> on the line specifying NW-MAC v3.12.

   If you have just finished installing the NetWare for Macintosh software and are running INSTALL, skip this first step.

   When you press <Enter>, the Editable Configuration Files menu opens.



2 Highlight STARTUP.NCF and press <Enter>.

Add these to the existing commands in STARTUP.NCF:

```
load mac
set minimum packet receive buffers=100
```

See "The Macintosh Name Space" on page 140 and in "AppleTalk Stack/ Router Memory Requirements" on page 253 if you would like an explanation of these commands.

Press <Esc> and then <Enter> to save changes to STARTUP.NCF.

3 Use the arrow keys to highlight AUTOEXEC.NCF and then press <Enter>.

Add the NetWare for Macintosh configuration commands to the existing commands in AUTOEXEC.NCF. The commands required for this example configuration appear in bold monospace type in Figure 12.

Figure 12 Example 2 AUTOEXEC.NCF

FILE: SYS:SYSTEM\AUTOEXEC.NCF

```
file server name FS-1
ipx internal net C9008CCA
load trxnet int=2 port=300 name=arcnet
bind ipx arcnet net=40

load appletlk net=55510 zone={"Marketing"}

bind appletlk arcnet net=11 zone={"Marketing"}

load afp
```

NOTE: Before loading the AFP or ATPS modules, you must load the AppleTalk module and bind AppleTalk to one or more LAN drivers, as shown below.

4 Load the AppleTalk module and configure the internal network:

```
load appletlk net=55510 zone={"Marketing"}
```

If you would like more information, see "Loading the AppleTalk Module" on page 243.

5 Bind AppleTalk to the LAN driver and configure the AppleTalk network:

```
bind appletlk arcnet net=11 zone={"Marketing"}
```

The name **arcnet** in this command refers to the name assigned in the **load trxnet** command which appears before the NetWare for Macintosh configuration command lines in Figure 12. Because IPX and AppleTalk both use the same frame type on ARCnet, you do not need to reload the LAN driver.

6 Load AppleTalk file services:

```
load afp
```

For details on the AFP configuration options, see "Setting Up a Specialized Environment" on page 148.

7 Exit INSTALL, saving your changes.

8 Down the file server and bring it back up.

If you don't wish down the file server at this time, re-enter at the console prompt all configuration commands specified in the STARTUP.NCF and AUTOEXEC.NCF files. This action brings up NetWare for Macintosh for the current server session. The next time you down the server, the specifications in STARTUP.NCF and AUTOEXEC.NCF will apply.

If you *can* down the server at this time, follow your usual procedure, for example:

```
DOWN <Enter>
EXIT <Enter>
SERVER <Enter>
```

A series of messages appears, indicating that the system is loading the modules you specified. When the messages have completed, NetWare for Macintosh is up and running.

9 Verify that the modules have loaded.

When you see the console colon (:) prompt, type

```
MODULES <Enter>
```

You will see a list of NLMs such as this one:

```
APPLETLK.NLM NetWare AppleTalk Stack/Router

AFP.NLM NetWare AFP module

CLIB.NLM NetWare C Runtime Library

STREAMS.NLM NetWare STREAMS
```

```
TRXNET.LAN TRXNET LAN Driver

MAC.NAM Macintosh Name Space Support

ISADISK.DSK NetWare ISA Device Driver
```

10 Check the AppleTalk configuration.

Now that the router is up and running, you should make sure that it is using the correct AppleTalk configuration. At the file server console, type

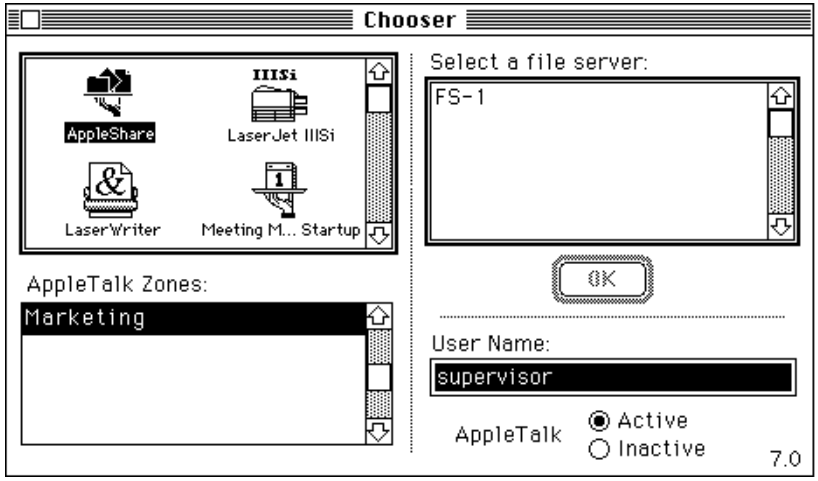
```
LOAD ATCON <Enter>
```

Then, choose View Router Interfaces in the main ATCON menu. Please see "Checking the Router's Configuration and Function" on page 288 for an explanation.

Verifying Services from a Macintosh Client

After you have configured NetWare for Macintosh and have installed the required Macintosh client software, you can follow the instructions in the *Using the NetWare for Macintosh Client* guide to check the configuration from a Macintosh client.

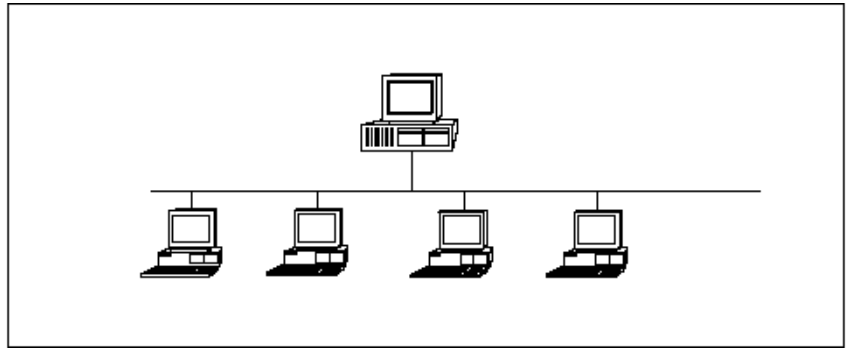
In this example, the file server appears in the "Marketing" zone, because this is the zone of the internal network.


Chooser
AppleShare
LaserJet IIISi
LaserWriter
Meeting M... Startup
Select a file server:
FS-1
OK
AppleTalk Zones:
Marketing
User Name:
supervisor
AppleTalk
Active
Inactive
7.0

Example 3: Creating a LocalTalk Network

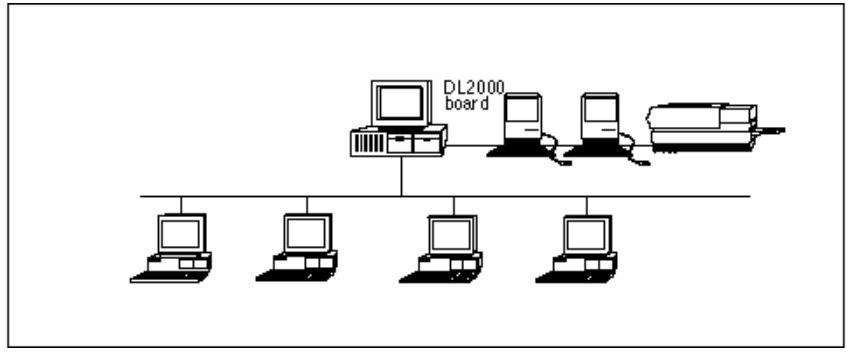
This example uses a file server that has an Ethernet connection, as shown in Figure 13.

Figure 13 File Server with DOS Clients on Ethernet



In this example, you will add an AppleTalk network with Macintosh workstations by installing a LocalTalk network board. The resulting networks are shown in Figure 14.

Figure 14 Adding a LocalTalk Network



Example 3 Configuration Data

In this example, you will configure the router with the information in Table 10.

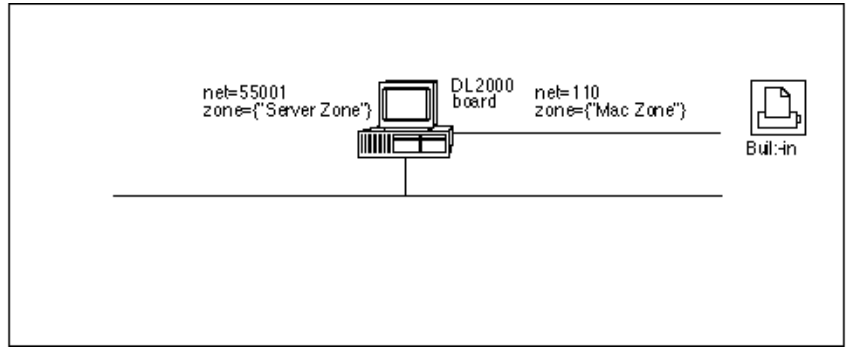
Table 10 Example 3 Configuration

Configurable Component	Example Data	
Internal AppleTalk network	`net=55001 zone={"Server zone"}`	Use a unique network number. Use a valid zone name.
LocalTalk	`net=110 zone={"Mac zone"}`	Use a valid network number. Use a valid zone name.
DL2000 LAN driver	Frame type not required	
AFP file services	Installed (no options used)	
ATPS print services	Installed, one NetWare print queue for LaserWriter (named "Laser")	

See "AppleTalk Configuration in NetWare for Macintosh" on page 31 for information about the configuration data and syntax.

Figure 15 shows the AppleTalk network configuration when the installation is complete. No clients are shown, to enable you to see the actual networks more clearly.

Figure 15 Example of a LocalTalk Configuration



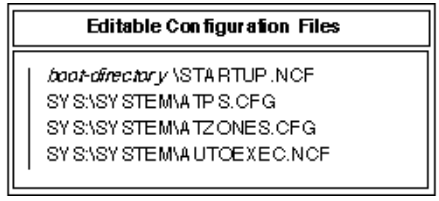
Example 3 Configuration Procedure

To enter a configuration that will be in effect when you bring up the server, follow the steps in this section.

1. Load INSTALL, select Product Options in the main INSTALL menu, and then press <Enter> on the line specifying NW-MAC v3.12.

   If you have just finished installing the NetWare for Macintosh software and are running INSTALL, skip this first step.

   When you press <Enter>, the Editable Configuration Files menu opens.



2. Highlight STARTUP.NCF and press <Enter>.

   Add these to the existing commands in STARTUP.NCF:

   ```
   load mac
   set minimum packet receive buffers=100
   ```

   See "The Macintosh Name Space" on page 140 and "AppleTalk Stack/ Router Memory Requirements" on page 253 if you would like an explanation of these commands.

   Press <Esc> and then <Enter> to save changes to STARTUP.NCF.

3. Use the arrow keys to highlight AUTOEXEC.NCF and then press <Enter>.

   Add the NetWare for Macintosh configuration commands to the existing commands in AUTOEXEC.NCF. The commands required for this example configuration appear in bold monospace type in Figure 16.

Figure 16 Example 3 AUTOEXEC.NCF

File SYS:SYSTEM\AUTOEXEC.NCF

```
file server name MERCURY
ipx internal net C9000555
load ne2000 int=2 port=300 frame=ethernet_802.3 name=ne2-ipx
bind ipx ne2-ipx net=50

load appletlk net=55001 zone={"Server zone"}
load dl2000 int=3 port=320 name=localtalk
bind appletlk localtalk net=110 zone={"Mac zone"}
load afp
load atps
```

NOTE: Before loading the AFP or ATPS modules, you must load the AppleTalk module and bind AppleTalk to one or more LAN drivers, as shown below.

4. Load the AppleTalk module and configure the internal network:

   `load appletlk net=55001 zone={"Server zone"}`

   For more information, see "Loading the AppleTalk Module" on page 243.

5. Load the LocalTalk LAN driver:

   `load dl2000 int=3 port=320 name=localtalk`

   The NAME option is a NetWare driver-naming feature that lets you specify a name for a specific configuration. This option is described in the NetWare v3.12 *System Administration* manual. For more details, see "Loading LAN Drivers with AppleTalk Frame Types" on page 245.

6. Bind AppleTalk to the LocalTalk LAN driver and configure an AppleTalk network:

   `bind appletlk localtalk net=110 zone={"Mac zone"}`

   The name **`localtalk`** refers to the driver configuration names assigned in Step 5. For more details, refer to "Binding AppleTalk to a LAN Driver" on page 247.

7 Load file and print services:

```
load afp
load atps
```

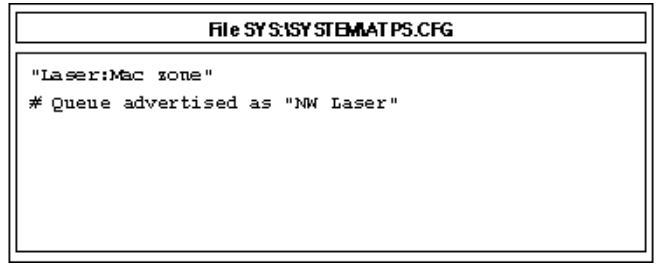
For details on the AFP configuration options, see “Setting Up a Specialized Environment” on page 148.

Press <Esc> and then <Enter> to save your changes and to return to the "Editable Configuration Files" menu.

8 If you are ready to enter a print queue configuration, highlight ATPS.CFG in the menu and then press <Enter>; otherwise, go to Step 9.

Add a queue configuration command line, such as the example queue shown in Figure 17.

Figure 17 A Queue Configuration Using the Default Syntax



This example uses the default "*printer-name:zone-name*" syntax, where *printer-name* is the name of the AppleTalk printer, and *zone-name* is the zone in which the printer resides.

This syntax creates a NetWare print queue and an AppleTalk print spooler that advertises the queue in the Chooser. The AppleTalk spooler will use the name "NW *printer-name*" (for example, "NW Laser"). The queue name will be derived from the spooler name; in this case, it will be "NW_LASER."

The AppleTalk spooler will be visible in the zone of the internal network. In this example, it will appear in "Server zone." The printer itself resides in "Mac zone."

See “Print Services Configuration” on page 159 for information about your options in configuring and naming queues.

9 Exit INSTALL, saving your changes.

Installing the Network Interface Board

In this example, you will install a DL2000 LocalTalk board in the file server to support the AppleTalk network. To install the network interface board, follow these steps:

1. Configure the network board hardware.

   Typically, you need to set the interrupt switch on the board before installing it. The interrupt and port you set on the DL2000 board must exactly match the interrupt and port you supplied as parameters to the LocalTalk LAN driver, and *must be unique within this file server*.

2. Use BROADCAST to inform the existing DOS clients on Ethernet that the file server is going down.

   At the console prompt, enter this command:

   ```
   BROADCAST "The file server is going down."
   ```

   You might want to specify a reasonable warning time, such as "The file server is going down in 2 minutes." When the time you specify has passed, go on to Step 3.

3. Down the file server.

   At the console prompt, type

   ```
   DOWN <Enter>
   EXIT <Enter>
   ```

   When the messages have printed and you have resolved any open file issues, go on to the next step.

4. Turn off the power on the file server system unit.

5. Install the board in the file server.

   Follow the instructions that accompany the network board to install it in the file server.

6. Turn on the power on the file server system unit.

Bringing Up the File Server

Follow the procedure you usually follow for downing and bringing up the file server.

1. Bring up the server by typing the SERVER command.

   For example, if there is no DOS partition on the file server, boot from the DOS diskette that contains SERVER.EXE by entering this command at the DOS prompt:

   ```
   SERVER
   ```

   Messages indicate that the system is loading the modules you specified.

2. Use the MODULES command to verify that the NLMs loaded.

   See Step 10 on page 51 if you would like an example.

3. Use ATCON to verify the configuration.

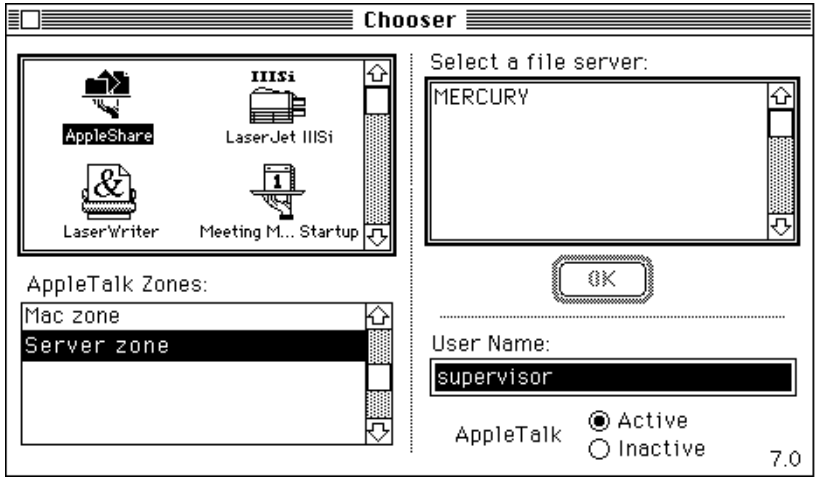
   Now that the router is up and running, you should make sure that it is using the correct AppleTalk configuration. At the file server console, type

   ```
   LOAD ATCON <Enter>
   ```

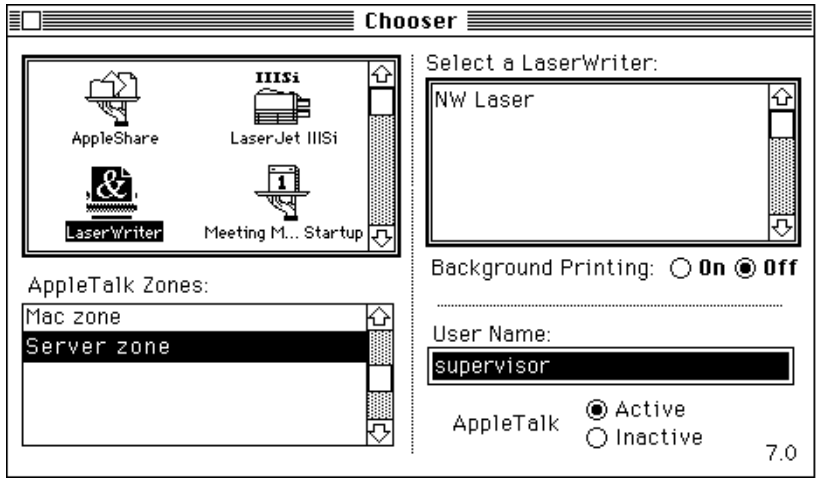
   Then, choose View Router Interfaces in the main ATCON menu. A window opens, showing the networks and zones you configured. Please see “Checking the Router's Configuration and Function” on page 288 for more information.

Verifying Services from a Macintosh Client

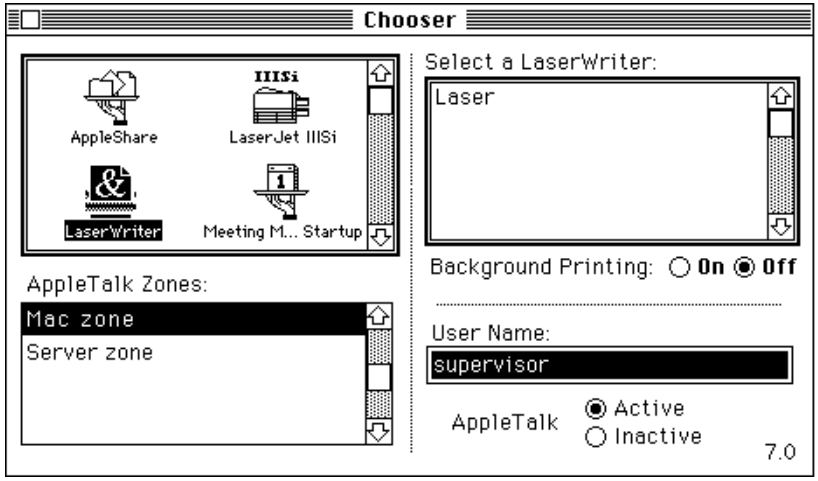
After you have configured NetWare for Macintosh and have installed the required Macintosh client software, you can follow the instructions in the *Using the NetWare for Macintosh Client* guide to check the configuration from a Macintosh client. In this example, both the file server and its print queue appear in "Server zone" (the zone of the internal network).



To see the print queue "NW Laser," click the LaserWriter icon while "Server zone" is selected.



In this example, you specified different zone names for the internal and LocalTalk interfaces, so the printer and print queue appear in different zones. The printer appears in the zone of the network to which it is connected.

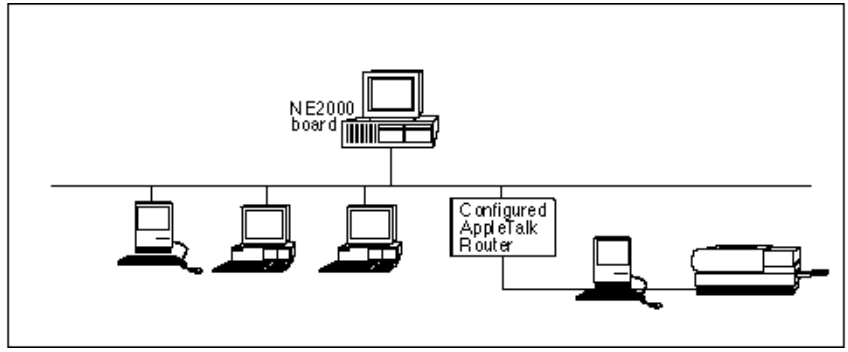


NOTE: You can enforce the use of NetWare queues by using the `-h` option when you configure the queue in ATPS.CFG. The `-h` option "hides" the LaserWriter. See "Enabling Printer Security: -h" on page 168 for details.

Example 4: EtherTalk 2.0 with Other AppleTalk Routers

This example shows how to configure NetWare for Macintosh for EtherTalk 2.0 when another AppleTalk router has already been configured on that Ethernet. The basic network is shown in Figure Figure 18.

Figure 18 An AppleTalk Network



NOTE: In this example, the configured AppleTalk router is a Phase 2 router. If there are AppleTalk Phase 1 routers on the network at your site, and you wish to maintain full internet connectivity, you must configure all Phase 2 routers in Transition Mode. This procedure is described in Appendix B, “Transition Mode Routing,” on page 263.

Example 4 Configuration Data

In this example, you will configure the router for EtherTalk 2.0 using the information in Table 11.

Table 11 Example 4 Configuration

Configurable Component	Example Data	
Internal AppleTalk network	`net=55002 zone={"Admin","Q zone"}`	Use a unique network number. *See Note below about multiple internal zones.
EtherTalk 2.0	`net=150-152 zone={"Sales","Marketing"}`	This network configuration must exactly match that of the existing router for this network.
NE2000 LAN driver	`frame=ETHERNET_SNAP`	

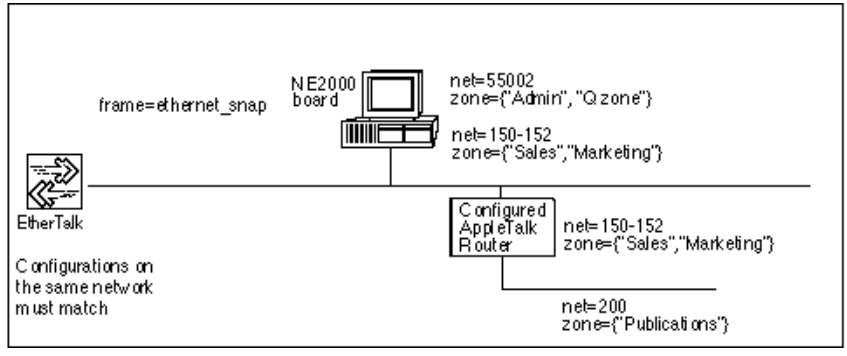
Configurable Component	Example Data
AFP file services	Installed (no options used)
ATPS print services	Installed, one print queue for LaserWriter (named "Pubs LW") on the LocalTalk network

NOTE: This example shows how to configure more than one zone on the internal network. The purpose of configuring multiple zones on the internal network is to advertise print queue in any one of these AppleTalk zones. (AFP file services are always advertised in the default zone of the internal network.) To configure multiple internal zones, you must be operating in a Phase 2 environment, where no Phase 1 routers are present.

See "AppleTalk Configuration in NetWare for Macintosh" on page 31 for information about the configuration data and syntax.

Figure 19 shows the AppleTalk network configuration when the installation is complete. No clients are shown, to enable you to see the actual networks more clearly.

Figure 19 Matching the Router Configurations



NOTE: You can allow the AppleTalk router to "learn" its configuration automatically from the configured AppleTalk router. This is shown in Figure 22 on page 77.

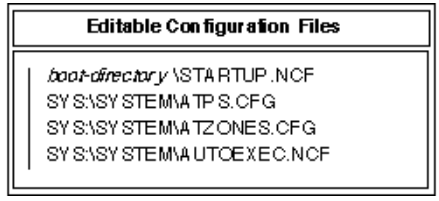
Example 4 Configuration Procedure

To enter a configuration that will be in effect when you bring up the server, follow the steps in this section.

1. Load INSTALL, select Product Options in the main INSTALL menu, and then press <Enter> on the line specifying NW-MAC v3.12.

   If you have just finished installing the NetWare for Macintosh software and are running INSTALL, skip this first step.

   When you press <Enter>, the Editable Configuration Files menu opens.



2. Highlight STARTUP.NCF and press <Enter>.

   Add these to the existing commands in STARTUP.NCF:

   ```
   load mac
   set minimum packet receive buffers=100
   ```

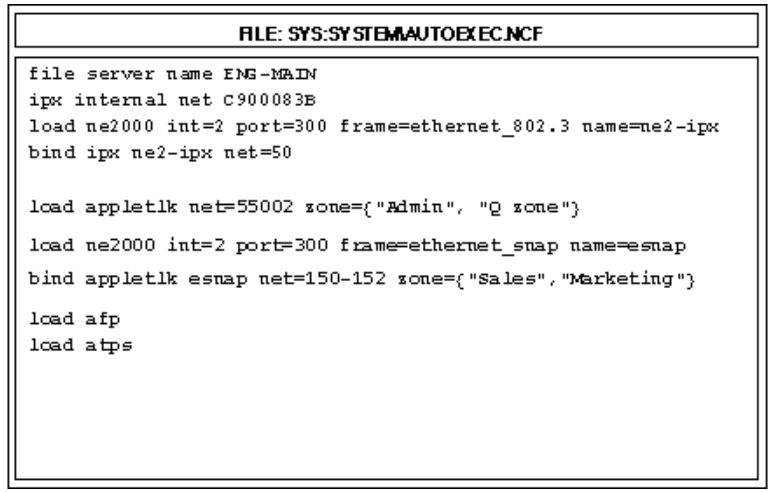
   See "The Macintosh Name Space" on page 140 and "AppleTalk Stack/ Router Memory Requirements" on page 253 if you would like an explanation of these commands.

   Press <Esc> and then <Enter> to save changes to STARTUP.NCF.

3. Use the arrow keys to highlight AUTOEXEC.NCF and then press <Enter>.

   Add the NetWare for Macintosh configuration commands to the existing commands in AUTOEXEC.NCF. The commands required for this example configuration appear in bold monospace type in Figure 20.

Figure 20 Example 4 AUTOEXEC.NCF



FILE: SYS:SYSTEM\AUTOEXEC.NCF

```
file server name ENG-MAIN
ipx internal net C900083B
load ne2000 int=2 port=300 frame=ethernet_802.3 name=ne2-ipx
bind ipx ne2-ipx net=50

load appletlk net=55002 zone={"Admin", "Q zone"}
load ne2000 int=2 port=300 frame=ethernet_snap name=esnap
bind appletlk esnap net=150-152 zone={"Sales","Marketing"}
load afp
load atps
```

NOTE: Before loading the AFP or ATPS modules, you must load the AppleTalk module and bind AppleTalk to one or more LAN drivers, as shown below.

4 Load the AppleTalk module and configure the internal network:

```
load appletlk net=55002 zone={"Admin","Q zone"}
```

If you would like more information about this command line, see "Loading the AppleTalk Module" on page 243.

5 Load the LAN driver and AppleTalk frame type:

```
load ne2000 int=2 port=300 frame=ethernet_snap
  name=esnap
```

The NAME option is a NetWare driver-naming feature that lets you specify a name for a specific configuration. This option is described in the NetWare v3.12 *System Administration* manual. For more information, see "Loading LAN Drivers with AppleTalk Frame Types" on page 245.

6 Bind AppleTalk to the LAN drivers and configure the AppleTalk networks:

```
bind appletlk esnap net=150-152
  zone={"Sales","Marketing"}
```

The name **esnap** is established with the NAME parameter on the LOAD command line, and it refers to the driver name assigned in Step 5. For

more information about BIND command lines, refer to “Binding AppleTalk to a LAN Driver” on page 247.

7 Load the file and print service modules:

```
load afpload atps
```

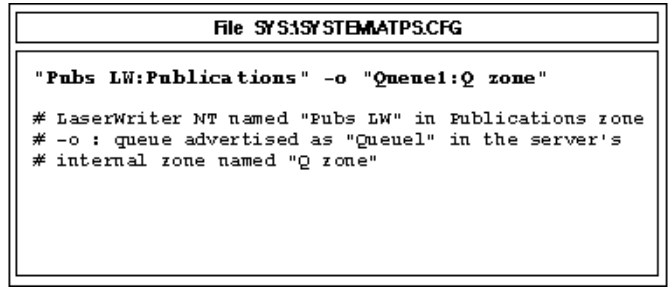
For details on the AFP configuration options, see “Setting Up a Specialized Environment” on page 148. See “Loading the ATPS Module” on page 158 for ATPS options.

Press <Esc> and then <Enter> to save your changes and to return to the "Editable Configuration Files" menu.

8 If you are ready to enter a print queue configuration, highlight ATPS.CFG in the menu and then press <Enter>; otherwise, go to Step 9.

Add a queue configuration command line, such as the example queue shown in Figure 21.

Figure 21 Creating and Naming a Print Queue That Will Be Visible in the "Q zone"



NOTE: When more than one zone name is specified for the internal network, the first name in the list is the default zone ("Admin" in this example). You can choose to advertise print queues in a zone other than the default zone of the internal network by using the `-o` option and specifying the queue name and zone name, as shown in Figure 21. See “Advertising a Queue in a Specified Zone: -o” on page 170 for details.

This example uses the default "*printer-name:zone-name*" syntax, where *printer-name* is the name of the AppleTalk printer, and *zone-name* is the zone in which the printer resides, and explicitly names the AppleTalk print spooler "Queue1." This is the name that will appear in the Macintosh Chooser.

The spooler will be visible in the specified zone of the internal network. In this example, it will appear in "Q zone." The printer itself resides in "Publications."

Please see "Print Services Configuration" on page 159 for a discussion of your options in configuring queues.

9 Exit INSTALL, saving your changes.

10 Down the file server and bring it back up.

If you don't wish to down the file server at this time, re-enter at the console prompt all configuration commands specified in the STARTUP.NCF and AUTOEXEC.NCF files. This action brings up NetWare for Macintosh for the current server session. The next time you down the server, the specifications in STARTUP.NCF and AUTOEXEC.NCF will apply.

If you *can* down the server at this time, follow your usual procedure, for example:

```
DOWN <Enter>
EXIT <Enter>
SERVER <Enter>
```

A series of messages appears, indicating that the system is loading the modules you specified.

11 Use the MODULES command to verify that the NLMs loaded.

See Step 10 on page 51 if you would like an example.

12 Use ATCON to verify the configuration.

Now that the router is up and running, you should make sure that it is using the correct AppleTalk configuration. At the file server console, type

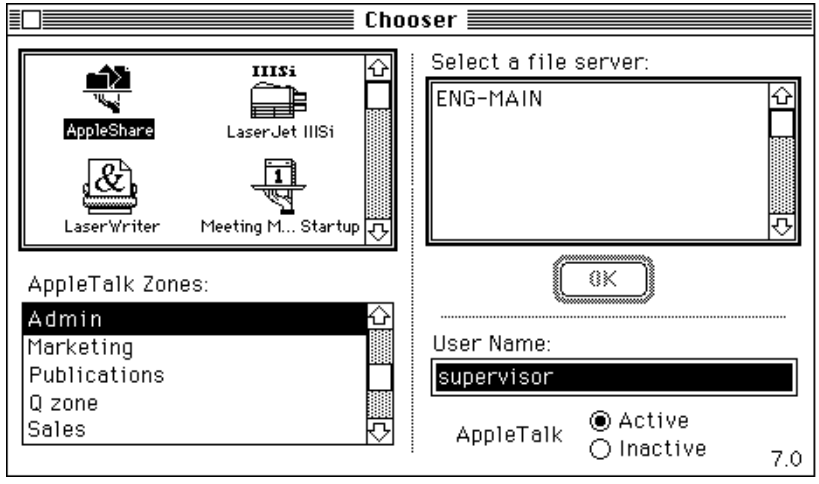
```
LOAD ATCON <Enter>
```

Then, choose View Router Interfaces in the main ATCON menu. A window opens, showing the networks and zones you configured. See "Checking the Router's Configuration and Function" on page 288 for more information.

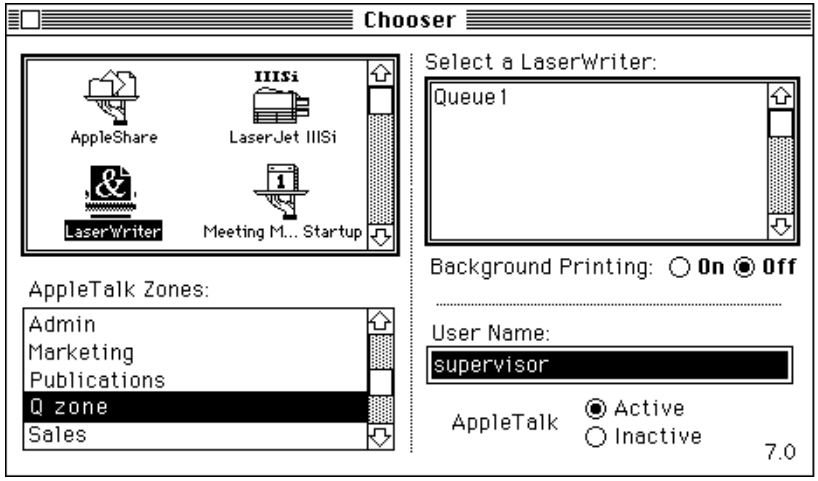
Verifying Services from a Macintosh Client

After you have configured NetWare for Macintosh and have installed the required Macintosh client software, you can follow the instructions in the *Using the NetWare for Macintosh Client* guide to check the configuration from a Macintosh client.

In this example, the file server appears in the "Admin" zone, because this is the default zone of the internal network.



The print queue appears in "Q zone," as you specified in ATPS.CFG.

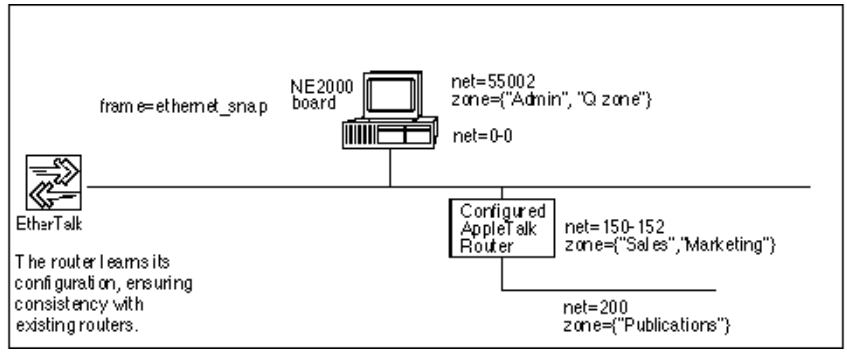


Example 5: Learning from Other Routers

This example provides an alternative way to configure the router when other AppleTalk routers are present on one or more of its networks. It uses exactly the same network setup as “Example 4: EtherTalk 2.0 with Other AppleTalk Routers” on page 69, but it allows the AppleTalk router to "learn" its network configuration automatically by "listening" to the other AppleTalk router.

The basic network in this example is the same one shown in Figure 18 on page 69. In this example, the EtherTalk 2.0 network will be configured as a "non-seed interface."

Figure 22 Configuring a Non-Seed Interface



NOTE: In this example, the EtherTalk 2.0 interface in the server is configured as a "non-seed interface" by assigning the network range "0-0." This instructs the router to obtain its configuration from existing routers on that network.

Example 5 Configuration Data

In this example, you will configure the router using this data:

Table 12 Example 5 Configuration

Configurable Component	Example Data	
Internal AppleTalk network	`net=55002` `zone={"Admin","Q zone"}`	Use a unique network number. See Note below about multiple internal zones.
EtherTalk 2.0	`net=0-0`	Non-seed interface
NE2000 LAN driver	`frame=ETHERNET_SNAP`	
AFP file services	Installed (no options used)	
ATPS print services	Installed, one print queue for LaserWriter (named "Pubs LW") on the LocalTalk network	

NOTE: This example shows how to configure more than one zone on the internal network. The purpose of configuring multiple zones on the internal network is to allow print queues to be advertised in any one of these AppleTalk zones. (AFP file services are always advertised in the first zone entered for the internal network, which is the default zone for the internal network.) To configure multiple internal

zones, you must be operating in a Phase 2 environment, where no Phase 1 routers are present.

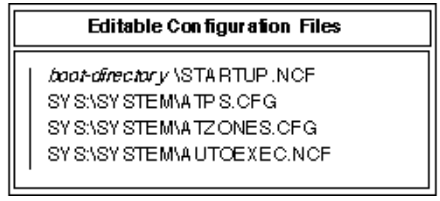
Example 5 Configuration Procedure

To enter a configuration that will be in effect when you bring up the server, follow the steps in this section.

1. Load INSTALL, select Product Options in the main INSTALL menu, and then press <Enter> on the line specifying NW-MAC v3.12.

   If you have just finished installing the NetWare for Macintosh software and are running INSTALL, skip this first step.

   When you press <Enter>, the Editable Configuration Files menu opens.



2. Highlight STARTUP.NCF and press <Enter>.

   Add these to the existing commands in STARTUP.NCF:

   ```
   load mac
   set minimum packet receive buffers=100
   ```

   See "The Macintosh Name Space" on page 140 and "AppleTalk Stack/ Router Memory Requirements" on page 253 if you would like an explanation of these commands.

   Press <Esc> and then <Enter> to save changes to STARTUP.NCF.

3. Use the arrow keys to highlight AUTOEXEC.NCF and then press <Enter>.

   Add the NetWare for Macintosh configuration commands to the existing commands in AUTOEXEC.NCF. The commands required for this example configuration appear in bold monospace type in Figure 23.

Figure 23 Example 5 AUTOEXEC.NCF

FILE: SYS:SYSTEM\AUTOEXEC.NCF

```
file server name ENG-MAIN
ipx internal net C900083B
load ne2000 int=2 port=300 frame=ethernet_802.3 name=ne2-ipx
bind ipx ne2-ipx net=50

load appletlk net=55002 zone={"Admin", "Q zone"}

load ne2000 int=2 port=300 frame=ethernet_snap name=esnap

bind appletlk esnap net=0-0

load afp
load atps
```

NOTE: Before loading the AFP or ATPS modules, you must load the AppleTalk module and bind AppleTalk to one or more LAN drivers, as shown below.

4 Load the AppleTalk module and configure the internal network:

```
load appletlk net=55002 zone={"Admin","Q zone"}
```

If you would like more information about this command line, see "Loading the AppleTalk Module" on page 243.

5 Load the LAN driver and AppleTalk frame type:

```
load ne2000 int=2 port=300 frame=ethernet_snap
  name=esnap
```

The NAME option is a NetWare driver-naming feature that lets you specify a name for a specific configuration. This option is described in the NetWare v3.11 *System Administration* manual. For more information, see "Loading LAN Drivers with AppleTalk Frame Types" on page 245.

6. Bind AppleTalk to the LAN drivers and configure the AppleTalk networks:

   ```
   bind appletlk esnap net=0-0
   ```

   The name **esnap** is specified in Step 5 and refers to the driver name assigned in the LOAD command.

   The parameter **net=0-0** creates a non-seed interface. The router will listen for information from other routers on that network for its own configuration data.

7. Load the file and print service modules:

   ```
   load afpload atps
   ```

   For details on the AFP configuration options you can specify on the LOAD command line, see "Setting Up a Specialized Environment" on page 148.

   Press <Esc> and then <Enter> to save your changes and to return to the "Editable Configuration Files" menu.

8. If you are ready to enter a print queue configuration, highlight ATPS.CFG in the menu and then press <Enter>.

   See Step 8 on page 63 for instructions on creating a print queue for the LaserWriter shown in this example.

9. Exit INSTALL, saving your changes.

You can now complete the configuration procedure by downing the server or by re-entering the STARTUP.NCF and AUTOEXEC.NCF commands at the server console. Please see Step 10 on page 74 for instructions.

4 More Complex Network Configurations

This chapter describes how to configure NetWare for Macintosh for network environments that are more complex than those covered in Chapter 3, “Simple Network Configurations,” on page 43. This chapter includes these examples:

- “Example 6: EtherTalk 2.0 and LocalTalk” on page 84 shows how to add a LocalTalk network and install NetWare for Macintosh on a file server connected to Ethernet.
- “Example 7: An EtherTalk 1.0 and EtherTalk 2.0 Network” on page 95 shows how to use both EtherTalk 1.0 and EtherTalk 2.0 on a single Ethernet cable.
- “Example 8: TokenTalk, EtherTalk 1.0, and LocalTalk” on page 104shows how to use configure a server with three AppleTalk interfaces.
- “Example 9: Learning from Routers on an Internet” on page 111 shows how to use AppleTalk "seeding" when configuring three routers to form a five-network AppleTalk internet.

NOTE: The procedures described in this chapter specify that you must down the file server and bring it up again to activate AppleTalk with the most current configuration specifications. This requirement is based on the recommendation that you configure your networks and zones in the server's STARTUP.NCF and AUTOEXEC.NCF files. An alternative to this approach is to type the commands at the server console. If you type the commands at the console instead of entering them in the server's STARTUP.NCF and AUTOEXEC.NCF files, you do not need to down the file server to activate AppleTalk.

See Chapter 6, “Managing AppleTalk File Services,” on page 139 and Chapter 7, “Managing AppleTalk Print Services,” on page 155 for important information about your options in AFP and print service configurations.

Quick Overview of the Configuration Procedure

These steps show a broad overview of the configuration process. The examples in "Example 6: EtherTalk 2.0 and LocalTalk" on page 84 provide complete instructions.

1. Load INSTALL.
2. Select Product Options and press <Enter> on the line specifying NW-MAC to open the Editable Configuration Files menu.
3. Edit the file server's STARTUP.NCF file to specify these commands:

   ```
   load mac
   set minimum packet receive buffers=100
   ```

4. Edit SYS:\SYSTEM\AUTOEXEC.NCF to specify commands that accomplish these tasks:

   4a. LOAD the AppleTalk module and configure the internal AppleTalk network.

   4b. LOAD LAN drivers for AppleTalk networks and specify the appropriate AppleTalk frame types.

   4c. BIND AppleTalk to the appropriate LAN drivers and configure AppleTalk networks on those interfaces.

   4d. LOAD the AFP file service module (optional), specifying configuration options if appropriate.

   4e. LOAD the ATPS print module (optional).

5. If ATPS is loaded, edit ATPS.CFG to configure print queues.
6. Exit the INSTALL utility, saving your changes.
7. Down the file server and bring it back up.

   NOTE: If you don't wish to down the file server at this time, re-enter at the console prompt all configuration commands specified in the STARTUP.NCF and AUTOEXEC.NCF files. This action brings up NetWare for Macintosh for the current server session. The next time you down the server, the specifications in STARTUP.NCF and AUTOEXEC.NCF will apply.

Preparing the Configuration Data You Need

The AppleTalk network configuration affects not only the file server and its Macintosh clients, but also all AppleTalk networks with which the router can communicate.

WARNING: It is very important that you check your router configuration data before you carry out your configuration tasks. If you are part of a large organization where networks are managed by internet administrators, make sure that you obtain valid AppleTalk network addresses before you configure the AppleTalk router.

- If you are installing NetWare for Macintosh on an existing AppleTalk internet, determine whether the network(s) to which you will connect the router support an AppleTalk router already. If so, you must configure the new router in accordance with the configuration of the existing router, or allow it to "learn" from other routers on its network(s).

  NOTE: If you are configuring multiple zones on an extended network, and the total number of characters on the AppleTalk BIND command line will exceed 82 characters, you need to specify the zone configuration in the ATZONES.CFG file. See "Using the ATZONES.CFG Configuration File" on page 249 for details.

- Determine which file servers must support NetWare for Macintosh to make sure that Macintosh clients on different networks can log in to NetWare. See "The AppleTalk Router in NetWare for Macintosh" on page 25 for a quick overview.

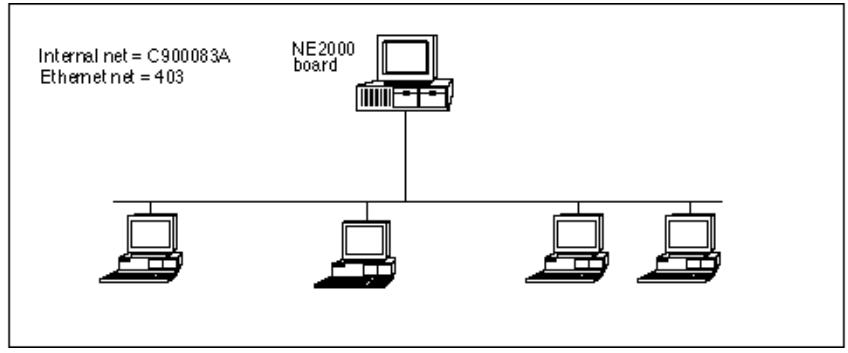
- If a network interface board will not be sending and receiving IPX packets, it is not necessary to bind IPX to that board and assign it an IPX network number. However, an IPX network number *is* necessary for the internal network.

  NOTE: Please refer to Appendix B, "Transition Mode Routing," on page 263 if you must accommodate Phase 1 routers by using Transition Mode.

Example 6: EtherTalk 2.0 and LocalTalk

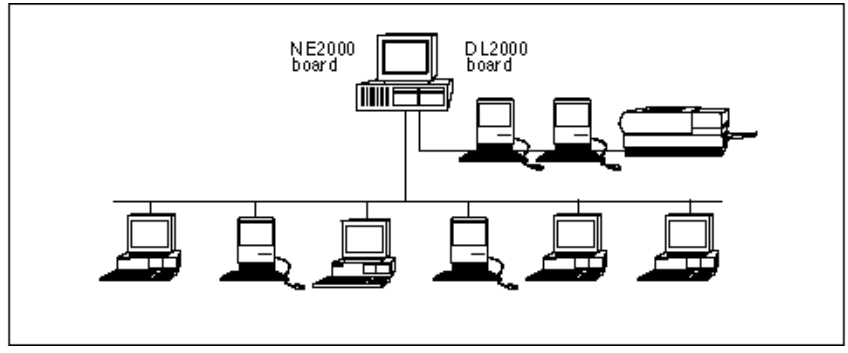
This example shows how to add NetWare for Macintosh to a NetWare v3.12 server connected to Ethernet. The server already supports DOS clients via IPX, as shown in Figure 24.

Figure 24 File Server with an IPX Network on Ethernet



In this example, you will add a LocalTalk network for Macintosh workstations and an Apple printer; you will also add an AppleTalk network and Macintosh workstations to the existing Ethernet cable. The resulting networks are shown in Figure 25.

Figure 25 Adding EtherTalk 2.0 and LocalTalk Networks



Example 6 Configuration Data

In this example, you will configure the router for EtherTalk 2.0 and LocalTalk, using the information in Table 13.

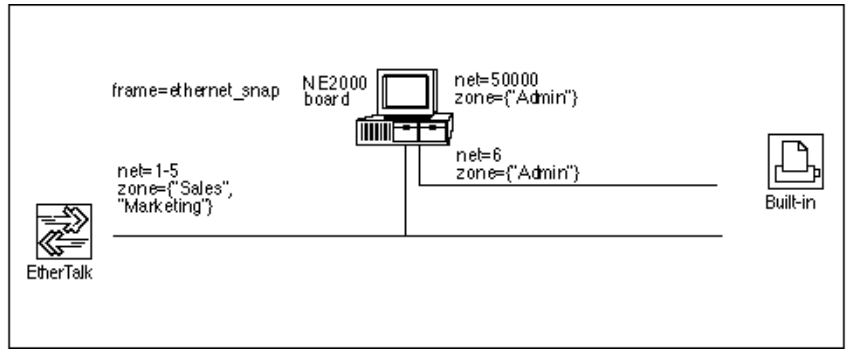
Table 13 Example 6 Configuration

Configurable Component	Example Data	
Internal AppleTalk network	`net=50000 zone={"Admin"}`	Use a unique network number. Use a valid zone name.
EtherTalk 2.0	`net=1-5 zone={"Sales","Marketing"}`	Use a valid network range. Use a list of at least one zone name.
LocalTalk	`net=6 zone={"Admin"}`	Use a valid network number. Use a valid zone name.
NE2000 LAN driver	`frame=ETHERNET_SNAP`	
DL2000 LAN driver	No frame required	
AFP file services	Installed (no options used)	
ATPS print services	Installed, one print queue for LaserWriter (named "Admin NT") on LocalTalk	

See "AppleTalk Configuration in NetWare for Macintosh" on page 31 for information about the configuration data and syntax.

Figure 26 shows the AppleTalk network configuration when the installation is complete. No clients are shown, to enable you to see the actual networks more clearly.

Figure 26 Example of EtherTalk 2.0 and LocalTalk Configuration



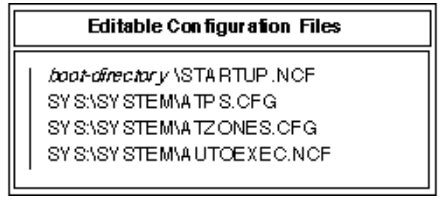
Example 6 Configuration Procedure

To enter a configuration that will be in effect when you bring up the server, follow the steps in this section.

1. Load INSTALL, select Product Options in the main INSTALL menu, and then press <Enter> on the line specifying NW-MAC v3.12.

   If you have just finished installing the NetWare for Macintosh software and are running INSTALL, skip this first step.

   When you press <Enter>, the Editable Configuration Files menu opens.



2. Highlight STARTUP.NCF and press <Enter>.

   Add these to the existing commands in STARTUP.NCF:

   ```
   load mac
   set minimum packet receive buffers=100
   ```

   See "The Macintosh Name Space" on page 140 and "AppleTalk Stack/ Router Memory Requirements" on page 253 if you would like an explanation of these commands.

Press <Esc> and then <Enter> to save changes to STARTUP.NCF.

3 Use the arrow keys to highlight AUTOEXEC.NCF and then press <Enter>.

Add the NetWare for Macintosh configuration commands to the existing commands in AUTOEXEC.NCF. The commands required for this example configuration appear in bold monospace type in Figure 27.

Figure 27 Example 6 AUTOEXEC.NCF

File SYS:SYSTEM\AUTOEXEC.NCF

```
file server name MAIN
ipx internal net C900083A

load ne2000 int=2 port=300 frame=ethernet_802.3 name=ne2-ipx
bind ipx ne2-ipx net=403

load appletlk net=50000 zone={"Admin"}

load ne2000 int=2 port=300 frame=ethernet_snap name=esnap
load dl2000 int=3 port=200 name=ltalk

bind appletlk esnap net=1-5 zone={"Sales", "Marketing"}
bind appletlk ltalk net=6 zone={"Admin"}

load afp
load atps
```

NOTE: Before loading the AFP or ATPS modules, you must load the AppleTalk module and bind AppleTalk to one or more LAN drivers, as shown below.

4 Load the AppleTalk module and configure the internal network:

```
load appletlk net=50000 zone={"Admin"}
```

If you would like more information, see “Loading the AppleTalk Module” on page 243.

5 Load LAN drivers (and AppleTalk frame types, if applicable):

```
load ne2000 int=2 port=300 frame=ethernet_snap
  name=esnap
load dl2000 int=3 port=200 name=ltalk
```

The NAME option is a NetWare driver-naming feature that lets you specify a name for a specific configuration. This option is described in the

NetWare v3.12 *System Administration* manual. For more information, see "Loading LAN Drivers with AppleTalk Frame Types" on page 245.

6 Bind AppleTalk to the LAN drivers and configure AppleTalk networks:

```
bind appletlk esnap net=1-5 zone={"Sales","Marketing"}
bind appletlk ltalk net=6 zone={"Admin"}
```

The names **esnap** and **ltalk** in these command lines refer to the NE2000 and DL2000 driver configuration names assigned above. See "Binding AppleTalk to a LAN Driver" on page 247 if you need more information about BIND command lines.

7 Load AppleTalk file and print services:

```
load afp
load atps
```

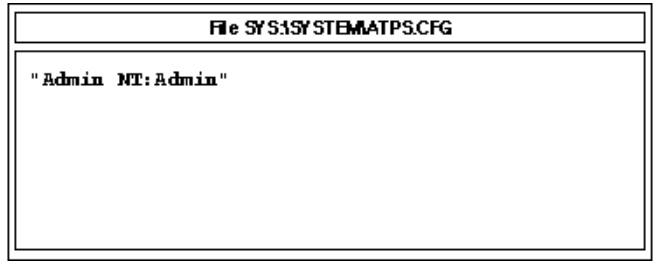
For details on the AFP configuration options, see "Setting Up a Specialized Environment" on page 148. See "Loading the ATPS Module" on page 158 for information about ATPS options.

Press <Esc> and then <Enter> to save your changes and to return to the "Editable Configuration Files" menu.

8 If you are ready to enter a print queue configuration, highlight ATPS.CFG in the menu and then press <Enter>; otherwise, go to Step 9.

Add a queue configuration command line, such as the example queue shown in Figure 28.

Figure 28 A Print Queue Using the Default Syntax



This example uses the default "*printer-name:zone-name*" syntax, where *printer-name* is the name of the AppleTalk printer, and *zone-name* is the zone in which the printer resides.

This syntax creates a NetWare print queue and an AppleTalk print spooler that advertises the queue in the Chooser. The AppleTalk spooler will use the name "NW *printer-name*" (for example, "NW Admin NT"). The queue name will be derived from the spooler name; in this case, the queue name will be "NW_ADMIN_NT."

The AppleTalk spooler will be visible in the zone of the internal network. In this example, it will appear in the "Admin" zone. The printer itself resides on LocalTalk, which in this example also uses the zone name "Admin."

See "Print Services Configuration" on page 159 for information about your options in configuring and naming queues.

9 Exit INSTALL, saving your changes.

Installing the Network Interface Board

In this example, you will install a DL2000 LocalTalk board in the file server to support the Apple printer. To install the network interface board, follow these steps:

1 Configure the network board hardware.

Typically, you need to set the interrupt switch on the board before installing it. The interrupt and port you set on the DL2000 board must exactly match the interrupt and port you supplied as parameters to the LocalTalk LAN driver, and must be unique within this file server.

2 Use BROADCAST to inform the existing DOS clients on Ethernet that the file server is going down.

At the console prompt, enter this command:

```
BROADCAST "The file server is going down."
```

You might want to specify a reasonable warning time, such as "The file server is going down in 2 minutes." When the time you specify has passed, go to Step 3.

3 Down the file server.

At the console prompt, type

```
DOWN <Enter>
EXIT <Enter>
```

When the messages have printed and you have resolved any open file issues, go on the next step.

4. Turn off the power on the file server system unit.
5. Install the board in the file server.

   Follow the instructions that accompany the network board to install it in the file server.
6. Turn on the power on the file server system unit.

Bringing Up the File Server

Follow the procedure you usually follow for downing and bringing up the file server.

1. Bring up the server by typing the SERVER command.

   For example, if there is no DOS partition on the file server, boot from the DOS diskette that contains SERVER.EXE by typing this command at the DOS prompt:

   ```
   SERVER <Enter>
   ```

   Messages indicate that the system is loading the modules you specified. For our example, these messages appear:

   ```
   Loading . . .Minimum Packet Receive Buffers set to 100
   Loading module ISADISK.DSK
   Loading module MAC.NAM
   Loading module NE2000.LAN
   Loading module DL2000.LAN
   Loading module APPLETLK.NLM
   APPLETALK LAN protocol bound to NE-2000 LAN Driver
   APPLETALK LAN protocol bound to DL-2000 LAN Driver
   Loading module AFP.NLM
   Loading module ATPS.NLM
   Auto-loading module STREAMS.NLM
   Auto-loading module CLIB.NLM
   :
   ```

   At this point, NetWare for Macintosh is up and running.
2. Verify that the modules have loaded.

When you see the console colon (:) prompt, type

MODULES <Enter>

You will see a list of NLMs such as this one:

```
APPLETLK.NLM
NetWare AppleTalk Stack/Router
AFP.NLM
NetWare AFP module
ATPS.NLM
Macintosh Print Services
CLIB.NLM
NetWare C Runtime Library
STREAMS.NLM
NetWare STREAMS
DL2000.LANDL-2000 LAN Driver
NE2000.LAN
NE-2000 LAN Driver
MAC.NAM
Macintosh Name Space Support
```

```
ISADISK.DSK

NetWare ISA Device Driver
```

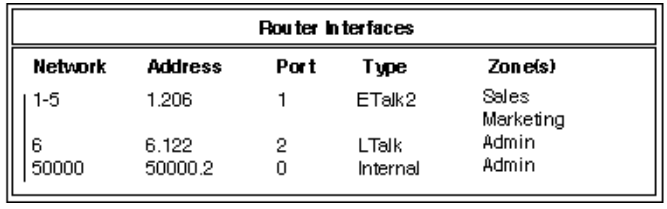
3 Check the AppleTalk configuration.

Now that the router is up and running, you should make sure that it is using the correct AppleTalk configuration. At the file server console, type

```
LOAD ATCON <Enter>
```

Then, choose View Router Interfaces in the main ATCON menu. A window opens, showing the interfaces you configured (Figure 29).

Figure 29 Checking the Configuration in ATCON



Router Interfaces

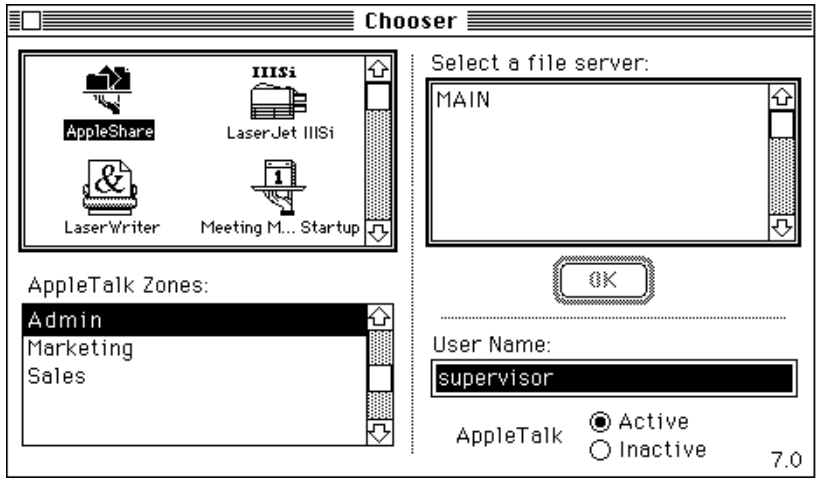
Network	Address	Port	Type	Zone(s)
1-5	1.206	1	ETalk2	Sales Marketing
6	6.122	2	LTalk	Admin
50000	50000.2	0	Internal	Admin

Check the network numbers and zones against your records to make sure they are correct. Please see "Checking the Router's Configuration and Function" on page 288 for an explanation of the fields in this window.

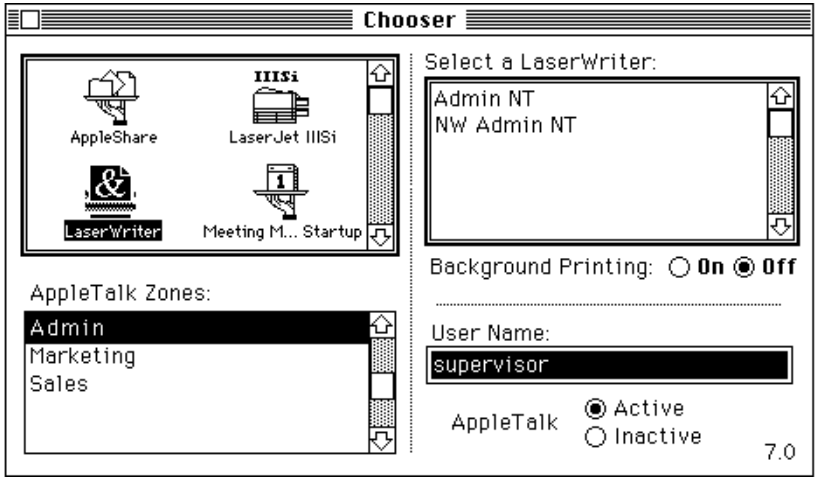
Verifying Services from a Macintosh Client

After you have configured NetWare for Macintosh and have installed the required Macintosh client software, you can follow the instructions in the *Using the NetWare for Macintosh Client* guide to check the configuration from a Macintosh client.

In this example, both the file server and its queues appear in the Admin zone, because this is the zone of the internal network.



To see the print queue "NW Admin NT," click the LaserWriter icon and choose the Admin zone.



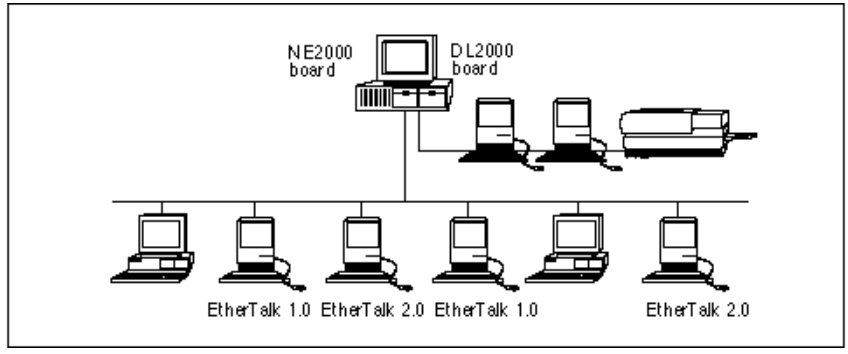
In this example, you specified the same zone name for both the internal and LocalTalk interfaces, so both the printer and print queue appear when a user selects the Admin zone.

NOTE: You can enforce the use of NetWare queues by using the `-h` option when you configure the queue in ATPS.CFG. The `-h` option "hides" the LaserWriter. See "Enabling Printer Security: -h" on page 168 for details.

Example 7: An EtherTalk 1.0 and EtherTalk 2.0 Network

This example uses a file server that has an Ethernet and a LocalTalk connection, as shown in Figure 30.

Figure 30 Network with Both EtherTalk 1.0 and EtherTalk 2.0 Clients



For the purposes of this example, assume that some of the Macintosh clients have been upgraded to EtherTalk 2.0, and that other Macintosh clients are running EtherTalk 1.0.

NOTE: To route both EtherTalk 2.0 and EtherTalk 1.0 packets on the same cable, you must configure the router for both EtherTalk 2.0 and 1.0 on the same LAN driver. The two versions of EtherTalk use different frame types, and as a result, AppleTalk sees EtherTalk 1.0 and EtherTalk 2.0 as two separate networks that happen to be running on the same Ethernet cable. See “AppleTalkPacket Frames” on page 245 for more information.

Example 7 Configuration Data

In this example, you will configure the router for EtherTalk 2.0, EtherTalk 1.0 and LocalTalk, using the information in Table 14.

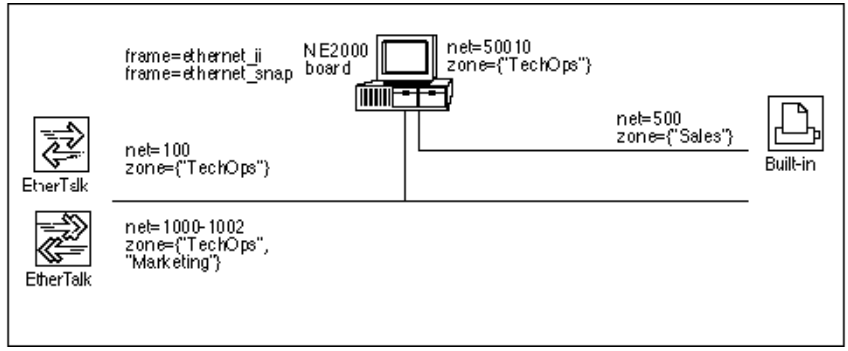
Table 14 Example 7 Configuration

Configurable Component	Example Data	
Internal AppleTalk network	`net=50010 zone={"TechOps"}`	Use a unique network number. Use a valid zone name.
LocalTalk	`net=500 zone={"Sales"}`	Use a valid network number. Use a valid zone name.
EtherTalk 2.0	`net=1000-1002 zone={"TechOps","Marketing"}`	Use a valid network range. Use a list of at least one zone name.
EtherTalk 1.0	`net=100 zone={"TechOps"}`	Use a valid network number. Use a valid zone name.
NE2000 LAN driver	`frame=ETHERNET_SNAP frame=ETHERNET_I`	For EtherTalk 2.0 For EtherTalk 1.0
AFP file services	Installed (no options used)	
ATPS print services	Installed, one print queue for LaserWriter (named "Sales NT") on LocalTalk	

See "AppleTalk Configuration in NetWare for Macintosh" on page 31 for information about the configuration data and syntax.

Figure 31 shows the AppleTalk network configuration when the installation is complete. No clients are shown, to enable you to see the actual networks more clearly.

Figure 31 Configuring Both EtherTalk 1.0 and 2.0 on the Same Ethernet Cable



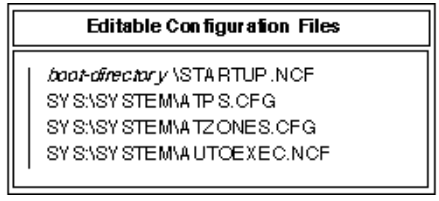
Example 7 Configuration Procedure

To enter a configuration that will be in effect when you bring up the server, follow the steps in this section.

1. Load INSTALL, select Product Options in the main INSTALL menu, and then press <Enter> on the line specifying NW-MAC v3.12.

   If you have just finished installing the NetWare for Macintosh software and are running INSTALL, skip this first step.

   When you press <Enter>, the Editable Configuration Files menu opens.



2 Highlight STARTUP.NCF and press <Enter>.

Add these to the existing commands in STARTUP.NCF:

```
load mac
set minimum packet receive buffers=100
```

See "The Macintosh Name Space" on page 140 and "AppleTalk Stack/ Router Memory Requirements" on page 253 if you would like an explanation of these commands.

Press <Esc> and then <Enter> to save changes to STARTUP.NCF.

3 Use the arrow keys to highlight AUTOEXEC.NCF and then press <Enter>.

Add the NetWare for Macintosh configuration commands to the existing commands in AUTOEXEC.NCF. The commands required for this example configuration appear in bold monospace type in Figure 32.

Figure 32 Example 7 AUTOEXEC.NCF

File SYS:\SYSTEM\AUTOEXEC.NCF

```
file server name MERCURY
ipx internal net C9000555
load ne2000 int=2 port=300 frame=ethernet_802.3 name=ne2-ipx
bind ipx ne2-ipx net=50

load appletlk net=50010 zone={"TechOps"}
load ne2000 int=2 port=300 frame=ethernet_ii name=etalk1
load ne2000 int=2 port=300 frame=ethernet_snap name=etalk2
load dl2000 int=3 port=320 name=ltalk

bind appletlk etalk1 net=100 zone={"TechOps"}
bind appletlk etalk2 net=1000-1002 zone={"TechOps","Marketing"}
bind appletlk ltalk net=500 zone={"Sales"}

load afp
load atps
```

NOTE: Before loading the AFP or ATPS modules, you must load the AppleTalk module and bind AppleTalk to one or more LAN drivers, as shown below.

4 Load the AppleTalk module and configure the internal network:

```
load appletlk net=50010 zone={"TechOps"}
```

You can use any valid AppleTalk network number, as long as it is unique on the internet. For more information, see "Loading the AppleTalk Module" on page 243.

5 Load LAN drivers (and AppleTalk frame types, if applicable):

```
load ne2000 int=2 port=300 frame=ethernet_ii
  name=etalk1
load ne2000 int=2 port=300 frame=ethernet_snap
  name=etalk2
load dl2000 int=3 port=320 name=ltalk
```

The NAME option is a NetWare driver-naming feature that lets you specify a name for a specific configuration. This option is described in the NetWare v3.12 *System Administration* manual. For more information about the FRAME option and AppleTalk frame types, see "Loading LAN Drivers with AppleTalk Frame Types" on page 245.

6 Bind AppleTalk to the LAN drivers and configure AppleTalk networks:

```
bind appletlk etalk1 net=100 zone={"TechOps"}
bind appletlk etalk2 net=1000-1002
  zone={"TechOps","Marketing"}
bind appletlk ltalk net=500 zone={"Sales"}
```

The names **etalk1**, **etalk2**, and **ltalk** refer to the driver configuration names assigned in Step 5.

The NET option configures the AppleTalk networks shown in Table 14. See "Binding AppleTalk to a LAN Driver" on page 247 if you need more information about BIND command lines.

7 Load file and print services:

```
load afp
load atps
```

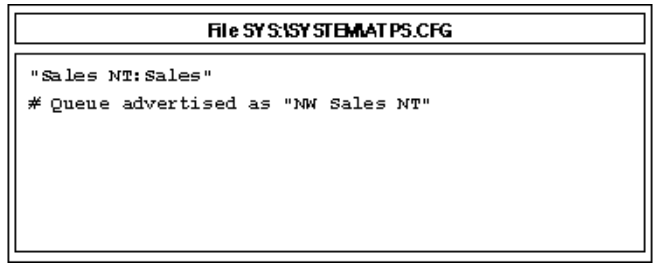
For details on the AFP configuration options you can specify on the LOAD command line, see "Setting Up a Specialized Environment" on page 148.

Press <Esc> and then <Enter> to save your changes and to return to the "Editable Configuration Files" menu.

8 If you are ready to enter a print queue configuration, highlight ATPS.CFG in the menu and then press <Enter>; otherwise, go to Step 9.

Add a queue configuration command line, such as the example queue shown in Figure 33.

Figure 33 Print Queue Using the Default Syntax



This example uses the default "*printer-name:zone-name*" syntax, where *printer-name* is the name of the AppleTalk printer, and *zone-name* is the zone in which the printer resides.

This syntax creates a NetWare print queue and an AppleTalk print spooler that advertises the queue in the Chooser. The AppleTalk spooler will use the name "NW *printer-name*" (for example, "NW Sales NT"). The queue name will be derived from the spooler name; in this case, it will be "NW_SALES_NT."

The AppleTalk spooler will be visible in the zone of the internal network. In this example, it will appear in "TechOps." The printer itself resides in the "Sales" zone.

See "Print Services Configuration" on page 159 for information about your options in configuring and naming queues.

9 Exit INSTALL, saving your changes.

10 Down the file server and bring it back up.

If you don't wish to down the file server at this time, re-enter at the console prompt all configuration commands specified in the STARTUP.NCF and AUTOEXEC.NCF files. This action brings up NetWare for Macintosh for the current server session. The next time you down the server, the specifications in STARTUP.NCF and AUTOEXEC.NCF will apply.

If you *can* down the server at this time, follow your usual procedure, for example:

```
DOWN <Enter>
EXIT <Enter>
SERVER <Enter>
```

A series of messages appears, indicating that the system is loading the modules you specified.

11 Use the MODULES command to verify that the NLMs loaded.

See Step 2 on page 90 if you would like an example.

12 Use ATCON to verify the configuration.

Now that the router is up and running, you should make sure that it is using the correct AppleTalk configuration. At the file server console, type

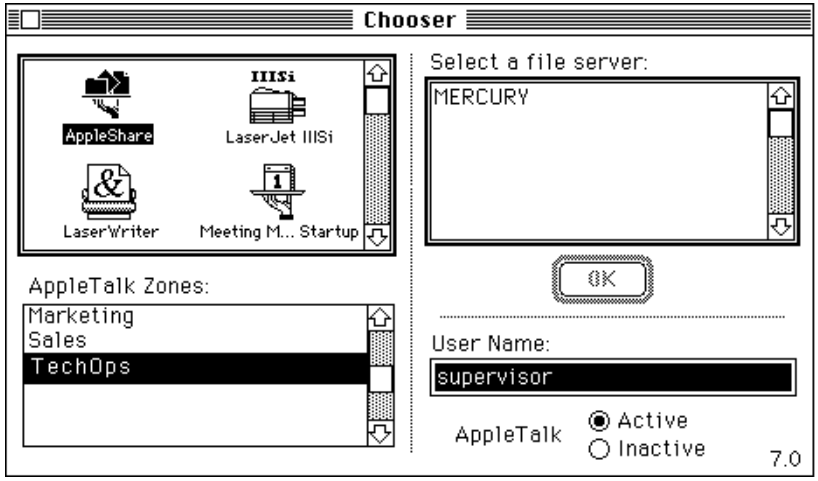
```
LOAD ATCON <Enter>
```

Then, choose View Router Interfaces in the main ATCON menu. A window opens, showing the networks and zones you configured. Please see "Checking the Router's Configuration and Function" on page 288 for more information.

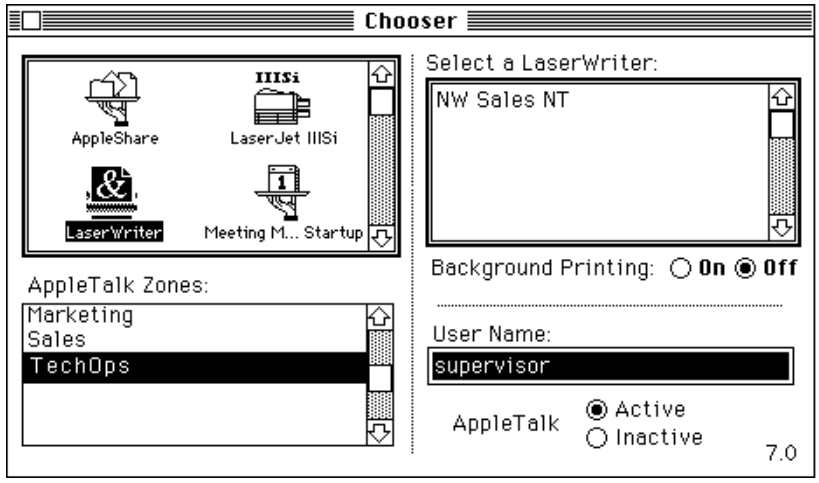
Verifying Services from a Macintosh Client

After you have configured NetWare for Macintosh and have installed the required Macintosh client software, you can follow the instructions in the *Using the NetWare for Macintosh Client* guide to check the configuration from a Macintosh client.

In this example, both the file server and its print queue appear in the TechOps zone (the zone of the internal network).



To see the print queue "NW Sales NT," click the LaserWriter icon and choose the TechOps zone.

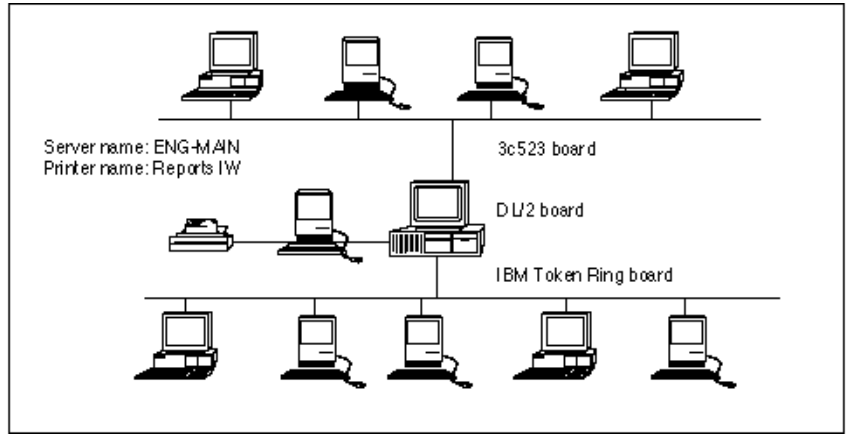


In this example, the AppleTalk print spooler appears in the default zone of the internal network, because only one zone was configured on the internal network. See “Example 4: EtherTalk 2.0 with Other AppleTalk Routers” on page 69 for an example showing how to configure multiple zones on the internal network.

Example 8: TokenTalk, EtherTalk 1.0, and LocalTalk

This example shows how to configure NetWare for Macintosh for TokenTalk, EtherTalk 1.0, and LocalTalk in a file server with Micro-Channel architecture, running NetWare v3.12. The basic network is shown in Figure 34.

Figure 34 AppleTalk Networks Using Micro-Channel Adapters



Using Token Ring with Macintosh Clients

When Macintosh clients are connected to Token Ring, you must load the ATTOKLLC NLM as described in this example configuration. If you have not already manually copied the NLM to the server's SYS:SYSTEM directory, see "If the Server Has Macintosh Clients on Token Ring" on page 40.

Example 8 Configuration Data

In this example, the router uses the information in Table 15.

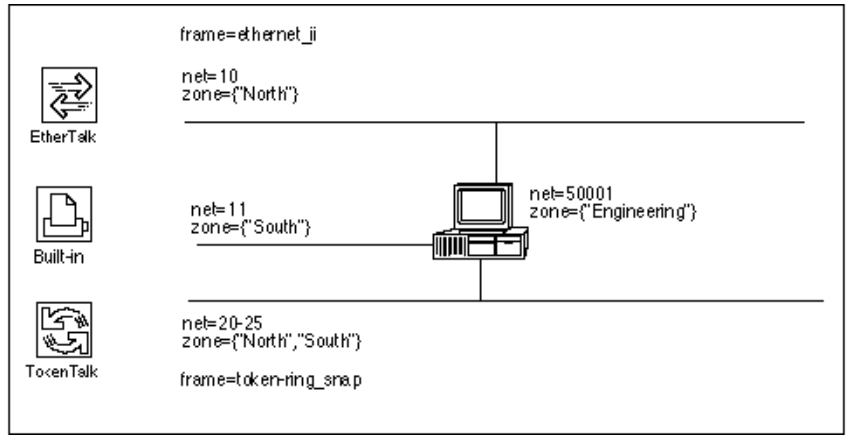
Table 15 Example 8 Configuration

Configurable Component	Example Data	
Internal AppleTalk network	`net=50001 zone={"Engineering"}`	Use a unique network number. Use a valid zone name.
EtherTalk 1.0	`net=10 zone={"North"}`	Use a valid network number. Use a valid zone name.
LocalTalk	`net=11 zone={"South"}`	Use a valid network number. Use a valid zone name.
TokenTalk	`net=20-25 zone={"North","South"}`	Use a valid network range. Use a list of at least one zone name.
3c523 LAN driver	`frame=ETHERNET_II`	
DL/2 LAN driver	No frame required	
Token Ring LAN driver	`frame=TOKEN-RING_SNAP`	
AFP file services	Installed (no options used)	
ATPS print services	Installed, two print queues for ImageWriter (named "Reports IW") on LocalTalk	

See "AppleTalk Configuration in NetWare for Macintosh" on page 31 for information about the configuration data and syntax.

Figure 35 shows the AppleTalk network configuration when the installation is complete. No clients are shown, to enable you to see the actual networks more clearly.

Figure 35 EtherTalk 1.0, LocalTalk, and TokenTalk Configurations



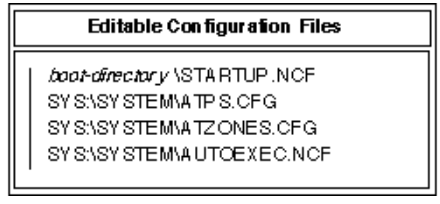
Example 8 Configuration Procedure

To enter a configuration that will be in effect when you bring up the server, follow the steps in this section.

1. Load INSTALL, select Product Options in the main INSTALL menu, and then press <Enter> on the line specifying NW-MAC v3.12.

   If you have just finished installing the NetWare for Macintosh software and are running INSTALL, skip this first step.

   When you press <Enter>, the Editable Configuration Files menu opens.



2 Highlight STARTUP.NCF and press <Enter>.

Add these to the existing commands in STARTUP.NCF:

```
load mac
set minimum packet receive buffers=100
```

See "The Macintosh Name Space" on page 140 and "AppleTalk Stack/ Router Memory Requirements" on page 253 if you would like an explanation of these commands.

Press <Esc> and then <Enter> to save changes to STARTUP.NCF.

3 Use the arrow keys to highlight AUTOEXEC.NCF and then press <Enter>.

Add the NetWare for Macintosh configuration commands to the existing commands in AUTOEXEC.NCF. The commands required for this example configuration appear in bold monospace type in Figure 36.

Figure 36 Example 8 AUTOEXEC.NCF (Micro Channel)

FILE: SYS:SYSTEM\AUTOEXEC.NCF

```
file server name ENG-MAIN
ipx internal net C900083B
load 3c523 slot=6 frame=ETHERNET_802.3 name=enet-ipx
load token int=2 saps=4 ls=32 name=tring-ipx
bind ipx enet-ipx net=2
bind ipx tring-ipx net=3
load appletlk net=50001 zone={"Engineering"}
load 3c523 slot=6 frame=ethernet_ii name=etalk1
load dl2 slot=4 name=ltalk
load token int=2 saps=4 ls=32 frame=token-ring_snap name=ttalk
bind appletlk etalk1 net=10 zone={"North"}
bind appletlk ltalk net=11 zone={"South"}
bind appletlk ttalk net=20-25 zone={"North","South"}
load route board=1
load route board=2
load attok1lc
bind attok1lc to tring-ipx
load afp
load atps
```

NOTE: Before loading the AFP or ATPS modules, you must load the AppleTalk module and bind AppleTalk to one or more LAN drivers, as shown below.

4 Load the AppleTalk module and configure the internal network:

```
load appletlk net=50001 zone={"Engineering"}
```

If you would like more information about this command line, see "Loading the AppleTalk Module" on page 243.

5 Load the LAN drivers and AppleTalk frame types:

```
load 3c523 slot=6 frame=ethernet_ii name=etalk1
load dl2 slot=4 name=ltalk
load token int=2 saps=4 ls=32 frame=token-ring_snap
  name=ttalk
```

The NAME option is a NetWare driver-naming feature that lets you specify a name for a specific configuration. This option is described in the NetWare v3.12 *System Administration* manual. For more information, see "Loading LAN Drivers with AppleTalk Frame Types" on page 245.

6 Bind AppleTalk to the LAN drivers and configure the AppleTalk networks:

```
bind appletlk etalk1 net=10 zone={"North"}
bind appletlk ltalk net=11 zone={"South"}
bind appletlk ttalk net=20-25 zone={"North","South"}
```

The names **etalk1**, **ltalk**, and **ttalk** each refer to the driver names assigned in Step 5.

Please see "Binding AppleTalk to a LAN Driver" on page 247 if you need more information about BIND command lines.

NOTE: Because this example has already configured IPX and APPLETLK on the same Token-Ring LAN driver, you do not need to load the frame type TOKEN-RING for the Token-Ring LAN driver being used for AppleTalk. In this example, the TOKEN-RING frame type is already loaded. It is the default frame used by IPX on Token Ring boards.

7 Load the Token-Ring Source Routing NLM (ROUTE.NLM) for the Token-Ring board with the TOKEN-RING frame type:

```
load route board=1
load route board=2
```

8 Load ATTOKLLC.NLM:

```
load attokllc
```

There are no options for this NLM. (Remember that you manually copy this NLM from the *NW-MAC* diskette to the server's SYS:SYSTEM.)

9 Bind ATTOKLLC to the Token-Ring board handling TOKEN-RING frames:

```
bind attokllc to tring-ipx
```

Note that this is not the same logical board to which APPLETLK is bound.

10 Load the file and print service modules:

```
load afp
load atps
```

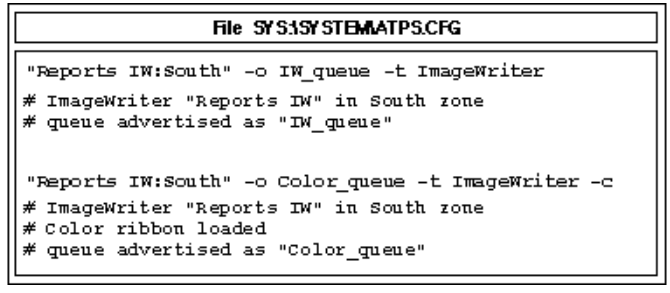
For details on the AFP configuration options you can specify on the LOAD command line, see “Setting Up a Specialized Environment” on page 148.

Press <Esc> and then <Enter> to save your changes and to return to the "Editable Configuration Files" menu.

11 If you are ready to enter a print queue configuration, highlight ATPS.CFG in the menu and then press <Enter>; otherwise, go to Step 9.

Add a queue configuration command line, such as the example queue shown in Figure 37.

Figure 37 ImageWriter and Color ImageWriter Print Queues



The **-o** option is used to create a name for the AppleTalk print spooler that advertises the print queue in the Chooser. In Figure 37, two AppleTalk print spoolers are created; one is named "IW_queue" and the other is named "Color_queue." See “Assigning a Descriptive Name: -o” on page 170 for details.

The **-t** option enables you to specify a printer type. In Figure 37, "IW_queue" will send print jobs to an ImageWriter named "Reports IW." "Color_queue" will send print jobs to the same ImageWriter with a color

ribbon loaded. This allows users with color Macintosh applications to generate the proper codes for an ImageWriter with a color ribbon. See "Specifying a Color ImageWriter: -t and -c" on page 166.

See "Print Services Configuration" on page 159 for a complete discussion of your options in configuring queues.

12 Exit INSTALL, saving your changes.

13 Down the file server and bring it back up.

If you don't wish to down the file server at this time, re-enter at the console prompt all configuration commands specified in the STARTUP.NCF and AUTOEXEC.NCF files. This action brings up NetWare for Macintosh for the current server session. The next time you down the server, the specifications in STARTUP.NCF and AUTOEXEC.NCF will apply.

If you *can* down the server at this time, follow your usual procedure, for example:

```
DOWN <Enter>
EXIT <Enter>
SERVER <Enter>
```

A series of messages appears, indicating that the system is loading the modules you specified.

14 Verify that the modules have loaded.

When you see the console colon (:) prompt, type

```
MODULES <Enter>
```

A list of loaded NLMs appears on the screen.

15 Use ATCON to verify the configuration.

Now that the router is up and running, you should make sure that it is using the correct AppleTalk configuration. At the file server console, type

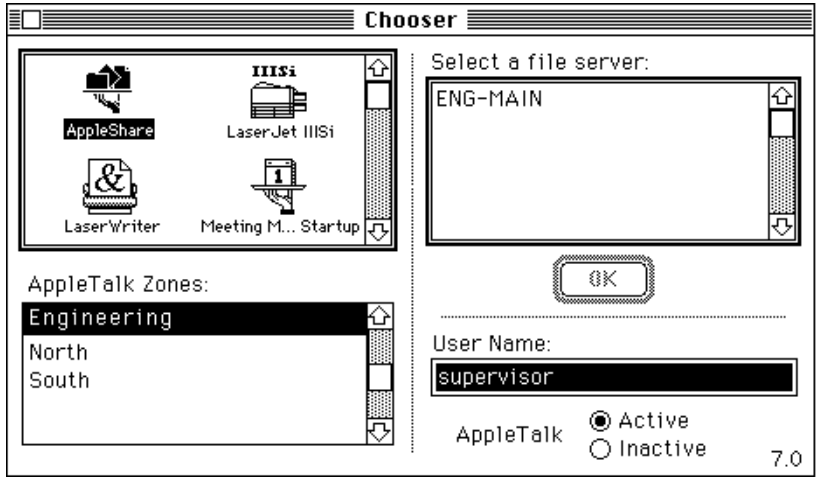
```
LOAD ATCON <Enter>
```

Then, choose View Router Interfaces in the main ATCON menu. A window opens, showing the networks and zones you configured. Please see "Checking the Router's Configuration and Function" on page 288 for more information.

Verifying Services from a Macintosh Client

After you have configured NetWare for Macintosh and have installed the required Macintosh client software, you can follow the instructions in the *Using the NetWare for Macintosh Client* guide to check the configuration from a Macintosh client.

In this example, the file server appears in the Engineering zone, because this is the zone of the internal network.



Example 9: Learning from Routers on an Internet

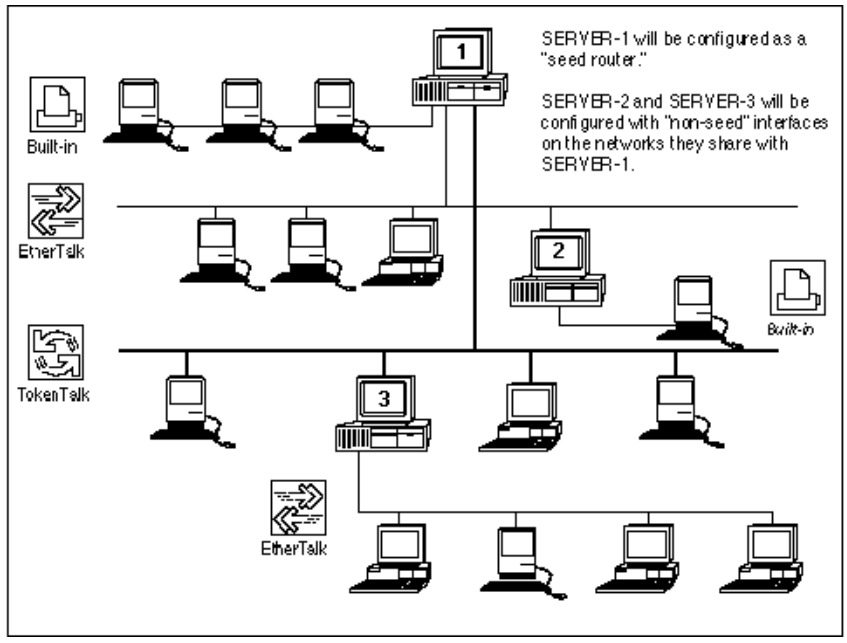
This example configures NetWare for Macintosh on three NetWare v3.12 file servers, shown in Figure 38.

One AppleTalk router will be manually configured on each network, and the other AppleTalk router(s) connected to that network will "learn" the correct network number(s) and zone(s) from the configured router.

A router that is explicitly configured on a network is called a "seed router." The configuration you specify to instruct another router on that network to "learn" from the seed router is called a "non-seed interface."

NOTE: This example focuses on the "seeding" feature of the AppleTalk router in NetWare for Macintosh, and does not include example print queue configurations. Please see "Managing AppleTalk Print Services" on page 155 for details about AppleTalk print services.

Figure 38 AppleTalk Phase 2 Internet Using Non-Seed Interfaces



Of course, the networks that are not shared with SERVER-1 must be explicitly configured in both SERVER-2 and SERVER-3. Table 16 shows the data used in the three servers.

Table 16 Example 9 Configurations

Configurable Component	SERVER-1 Example Data	SERVER-2 Example Data	SERVER-3 Example Data
Internal AppleTalk network	net=50005 zone={"Admin"}	net=50006 zone={"Admin"}	`net=50007` `zone={"Engineering}`

Configurable Component	SERVER-1 Example Data	SERVER-2 Example Data	SERVER-3 Example Data
LocalTalk	`net=100 zone={"Admin"}`	`net=200 zone={"Admin"}`	N/A
EtherTalk 2.0	`net=1-10 zone={"Admin", "Sales"}`	`net=0-0`	N/A
TokenTalk	`net=11-20 zone={"Engineering" , "TechOps"}`	N/A	`net=0-0`
EtherTalk 2.0	N/A	N/A	`net=21-25 zone={"Engineering, "Maintenance"}`
DL2000 LAN Driver	No frame required.	No frame required.	N/A
NE2000 LAN Driver	`frame= ETHERNET_SNAP`	`frame= ETHERNET_SNAP`	N/A
Token Ring LAN Driver	`frame= TOKEN-RING_SNAP`	N/A	`frame= TOKEN-RING_SNAP`

See "AppleTalk Configuration in NetWare for Macintosh" on page 31 for information about the configuration data and syntax.

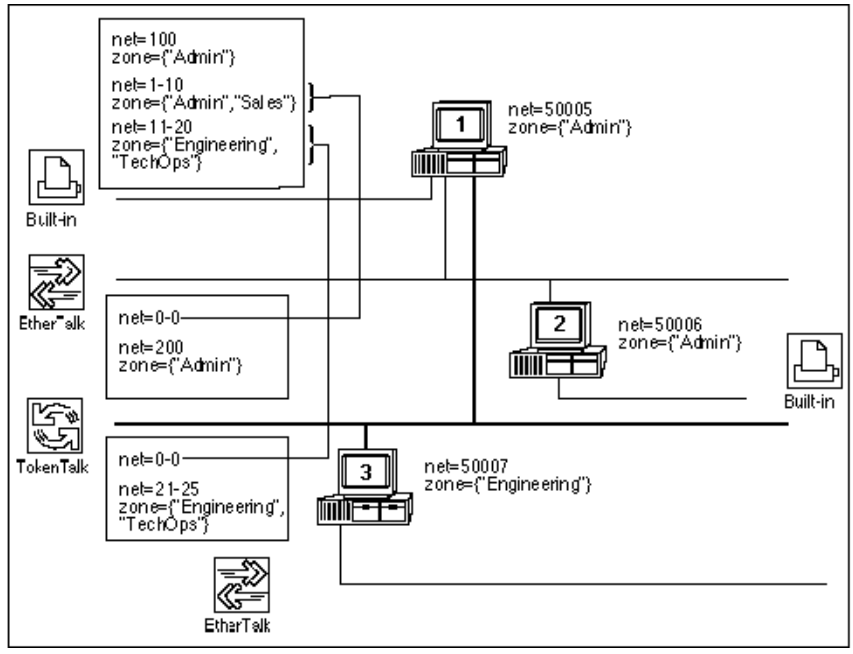
After SERVER-1 has been configured, the following events can occur:

- SERVER-2 can learn its network and zone configuration from SERVER-1 on the EtherTalk network. Because there is no "seed router" on SERVER-2's LocalTalk interface, the network and zone configuration for that interface must be explicitly supplied.
- SERVER-3 can learn its network and zone configuration from SERVER-1 on the TokenTalk network. Because there is no "seed router" on SERVER-3's EtherTalk interface, the network and zone configuration for that interface must be explicitly supplied.

  NOTE: The internal network configuration can never be "learned" from another router. You must always supply an explicit configuration for the internal network in each file server.

Figure 39 shows the AppleTalk internet configuration on all three file servers. No clients are shown, to enable you to see the actual networks more clearly.

Figure 39 EtherTalk 2.0, TokenTalk, and LocalTalk Configurations



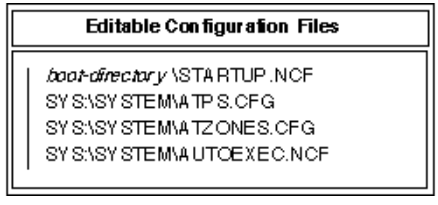
SERVER-1 Configuration Procedure

To enter a configuration that will be in effect when you bring up the server, follow the steps in this section.

1. Load INSTALL, select Product Options in the main INSTALL menu, and then press <Enter> on the line specifying NW-MAC v3.12.

   If you have just finished installing the NetWare for Macintosh software and are running INSTALL, skip this first step.

   When you press <Enter>, the Editable Configuration Files menu opens.



2 Highlight STARTUP.NCF and press <Enter>.

Add these to the existing commands in STARTUP.NCF:

```
load mac
set minimum packet receive buffers=100
```

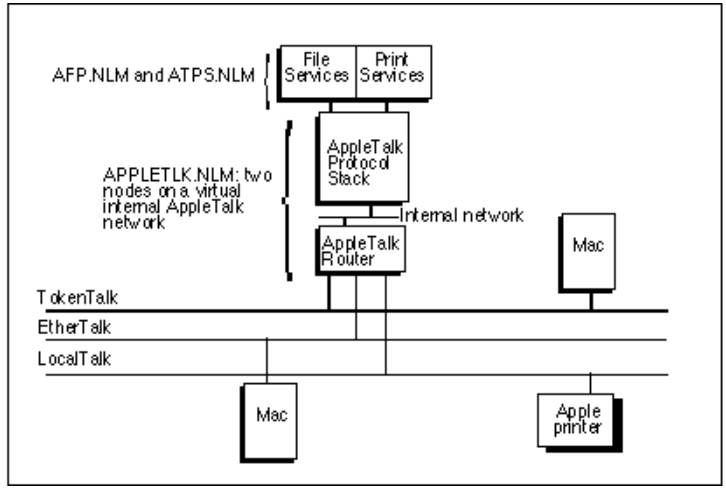
See "The Macintosh Name Space" on page 140 and "AppleTalk Stack/ Router Memory Requirements" on page 253 if you would like an explanation of these commands.

Press <Esc> and then <Enter> to save changes to STARTUP.NCF.

3 Use the arrow keys to highlight AUTOEXEC.NCF and then press <Enter>.

Add the NetWare for Macintosh configuration commands to the existing commands in AUTOEXEC.NCF. The commands required for this example configuration appear in bold monospace type in Figure 40.

Figure 40 "Seed" Configuration for SERVER-1



NOTE: Before loading the AFP or ATPS modules, you must load the AppleTalk module and bind AppleTalk to one or more LAN drivers, as shown below.

4 Load the AppleTalk module and configure the internal network:

```
load appletlk net=50005 zone={"Admin"}
```

For more information about this command line, see "Loading the AppleTalk Module" on page 243.

5 Load LAN drivers (and AppleTalk frame types, if applicable):

```
load dl2000 int=5 port=200 name=ltalk
load ne2000 int=3 port=300 frame=ethernet_snap
  name=etalk2
load token int=2 frame=token-ring_snap name=ttalk
```

The NAME option is a NetWare driver-naming feature that lets you specify a name for a specific configuration. This option is described in the NetWare v3.12 *System Administration* manual. For more information about the FRAME option and AppleTalk frame types, see "Loading LAN Drivers with AppleTalk Frame Types" on page 245.

6 Bind AppleTalk to the LAN drivers and configure AppleTalk networks:

```
bind appletlk ltalk net=100 zone={"Admin"}
bind appletlk etalk2 net=1-10 zone={"Admin","Sales"}
bind appletlk ttalk net=11-20
  zone={"Engineering","TechOps"}
```

The names **ltalk**, **etalk2**, and **ttalk** each refer to the names assigned in Step 5. See "Binding AppleTalk to a LAN Driver" on page 247 if you need more information abut BIND command lines.

NOTE: Because this example has already configured IPX and APPLETLK on the same Token-Ring LAN driver, you do not need to load the frame type TOKEN-RING for the Token-Ring LAN driver being used for AppleTalk.In this example, the TOKEN-RING frame type is already loaded. It is the default frame used by IPX on Token Ring boards.

7 Load the Token-Ring Source Routing NLM (ROUTE.NLM) for the Token-Ring board with the TOKEN-RING frame type:

```
load route board=1
load route board=2
```

8 Load ATTOKLLC.NLM:

```
load attokllc
```

There are no options for this NLM. (Remember that you manually copy this NLM from the *NW-MAC* diskette to the server's SYS:SYSTEM directory.)

9 Bind ATTOKLLC to the Token-Ring board handling TOKEN-RING frames:

```
bind attokllc to token-ipx
```

Note that this is not the same logical board to which APPLETLK is bound.

10 Load file services:

```
load afp
```

For details on the AFP configuration options you can specify on the LOAD command line, see "Setting Up a Specialized Environment" on page 148.

Press <Esc> and then <Enter> to save your changes and to return to the "Editable Configuration Files" menu.

11 Exit INSTALL, saving your changes.

12 Down the file server and bring it back up.

If you don't wish to down the file server at this time, re-enter at the console prompt all configuration commands specified in the STARTUP.NCF and AUTOEXEC.NCF files. This action brings up NetWare for Macintosh for the current server session. The next time you down the server, the specifications in STARTUP.NCF and AUTOEXEC.NCF will apply.

If you *can* down the server at this time, follow your usual procedure, for example:

```
DOWN <Enter>
EXIT <Enter>
SERVER <Enter>
```

A series of messages appears, indicating that the system is loading the modules you specified.

13 Use the MODULES command to verify that the NLMs loaded.

When you see the console colon (:) prompt, type

```
MODULES <Enter>
```

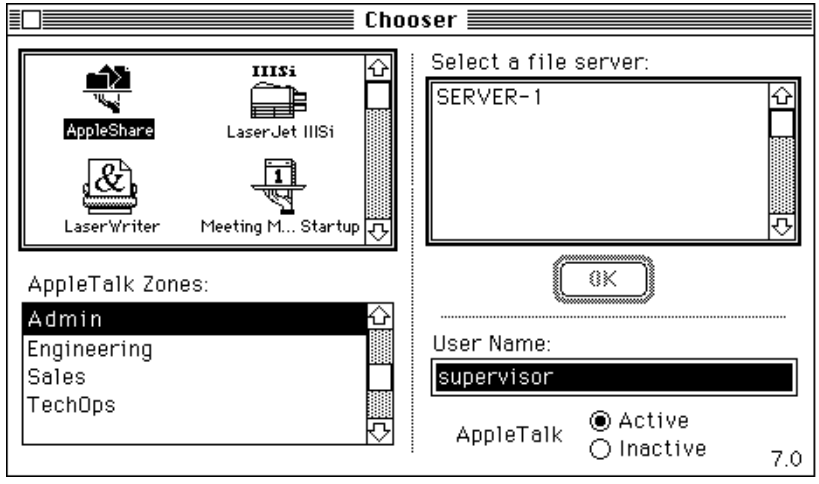
A list of loaded NLMs appears on the screen.

14 Check the router's interfaces in ATCON.

Please see "Checking the Router's Configuration and Function" on page 288 for details.

15 Log in to the server from a Macintosh client.

The *Using the NetWare for Macintosh Client* guide describes how to check the configuration from a Macintosh client. In this example, the server will appear in the "Admin" zone:



SERVER-2 Configuration Procedure

To enter a configuration that will be in effect when you bring up the server, follow the steps in this section.

1. Load INSTALL, select Product Options in the main INSTALL menu, and then press <Enter> on the line specifying NW-MAC v3.12.

   If you have just finished installing the NetWare for Macintosh software and are running INSTALL, skip this first step.

2. Highlight STARTUP.NCF in the "Editable Configuration Files" menu and press <Enter>.

Add these to the existing commands in STARTUP.NCF:

```
load mac
set minimum packet receive buffers=100
```

See "The Macintosh Name Space" on page 140 and "AppleTalk Stack/ Router Memory Requirements" on page 253 if you would like an explanation of these commands.

Press <Esc> and then <Enter> to save changes to STARTUP.NCF.

3 Use the arrow keys to highlight AUTOEXEC.NCF and then press <Enter>.

Add the NetWare for Macintosh configuration commands to the existing commands in AUTOEXEC.NCF. The commands required for this example configuration appear in bold monospace type in Figure 41.

Figure 41 A Non-Seed Configuration on SERVER-2's EtherTalk 2.0 Network

File SYS:SYSTEM\AUTOEXEC.NCF

```
file server name SERVER-2
ipx internal net C90008AB
load ne2000 int=3 port=300 frame=ethernet_802.3 name=enet-ipx
bind ipx enet-ipx net=29

load appletlk net=50006 zone={"Admin"}

load dl2000 int=5 port=200 name=ltalk
load ne2000 int=3 port=300 frame=ethernet_snap name=etalk2

bind appletlk ltalk net=200 zone={"Admin"}
bind appletlk etalk2 net=0-0

load afp
```

NOTE: The internal network is explicitly configured. The internal network configuration can never be "learned" from another router. Before loading the AFP or ATPS module, you must load the AppleTalk module and bind AppleTalk to one or more LAN drivers, as shown below.

4. Load the AppleTalk module and configure the internal network:

```
load appletlk net=50006 zone={"Admin"}
```

See "Loading the AppleTalk Module" on page 243 if you would like more information about this command.

5. Load LAN drivers (and AppleTalk frame types, if applicable):

```
load dl2000 int=5 port=200 name=ltalk
load ne2000 int=3 port=300 frame=ethernet_snap
  name=etalk2
```

The NAME option is a NetWare driver-naming feature that lets you specify a name for a specific configuration. This option is described in theNetWare v3.12 *System Administration* manual. For more information, see "Loading LAN Drivers with AppleTalk Frame Types" on page 245.

6. Bind AppleTalk to the LAN drivers and configure AppleTalk networks:

```
bind appletlk ltalk net=200 zone={"Admin"}
bind appletlk etalk2 net=0-0
```

The names **ltalk** and **etalk2** each refer to the LAN drivers by the names assigned in Step 5. The parameter **net=0-0** creates a non-seed interface. The router will listen for information from other routers on that network for its own configuration data.

7. Load the AFP module:

```
load afp
```

For details on AFP configuration options, see "Setting Up a Specialized Environment" on page 148.

8. Exit INSTALL, saving your changes.

9. Down the file server and bring it back up.

If you don't wish to down the file server at this time, re-enter at the console prompt all configuration commands specified in the STARTUP.NCF and AUTOEXEC.NCF files. This action brings up NetWare for Macintosh for the current server session. The next time you down the server, the specifications in STARTUP.NCF and AUTOEXEC.NCF will apply.

If you *can* down the server at this time, follow your usual procedure, for example:

```
DOWN <Enter>
EXIT <Enter>
SERVER <Enter>
```

A series of messages appears, indicating that the system is loading the modules you specified.

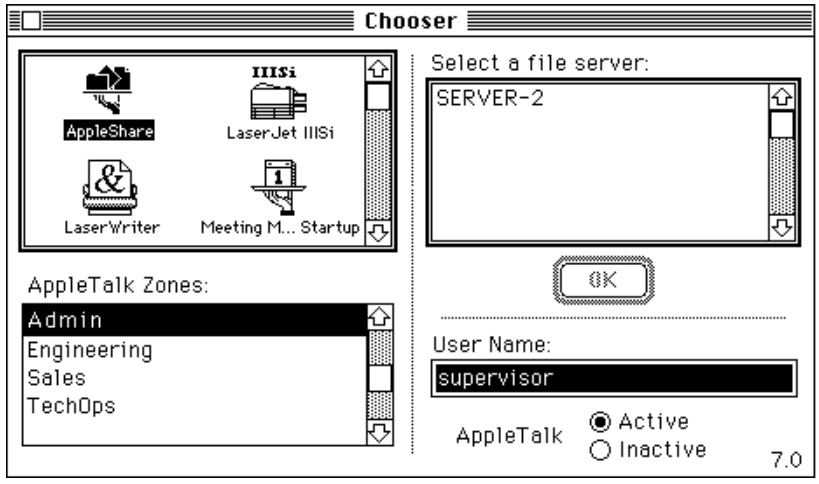
10 Use the MODULES command to verify that the NLMs loaded.

11 Check the router's interfaces in ATCON.

Please see “Checking the Router's Configuration and Function” on page 288 for details.

12 Log in to the server from a Macintosh client.

The *Using the NetWare for Macintosh Client* guide describes how to check the configuration from a Macintosh client. In this example, the server will appear in the "Admin" zone:



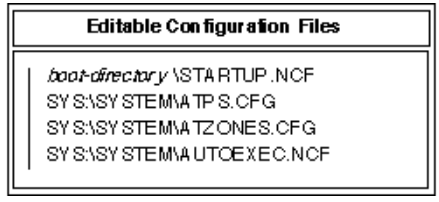
SERVER-3 Configuration Procedure

To enter a configuration that will be in effect when you bring up the server, follow the steps in this section.

1. Load INSTALL, select Product Options in the main INSTALL menu, and then press <Enter> on the line specifying NW-MAC v3.12.

   If you have just finished installing the NetWare for Macintosh software and are running INSTALL, skip this first step.

   When you press <Enter>, the Editable Configuration Files menu opens.



2 Highlight STARTUP.NCF and press <Enter>.

Add these to the existing commands in STARTUP.NCF:

```
load mac
set minimum packet receive buffers=100
```

See "The Macintosh Name Space" on page 140 and "AppleTalk Stack/ Router Memory Requirements" on page 253 if you would like an explanation of these commands.

Press <Esc> and then <Enter> to save changes to STARTUP.NCF.

3 Use the arrow keys to highlight AUTOEXEC.NCF and then press <Enter>.

Add the NetWare for Macintosh configuration commands to the existing commands in AUTOEXEC.NCF. The commands required for this example configuration appear in bold monospace type in Figure 42.

Figure 42 A Non-Seed Configuration on SERVER-3's TokenTalk 2.0 Network

File SYS:\SYSTEM\AUTOEXEC.NCF

```
file server name SERVER-3
ipx internal net C90008AC
load ne2000 int=3 port=300 frame=ethernet_802.3 name=ne2-ipx
bind ipx  ne2-ipx net=31
load token int=2 name=TR-ipx
bind ipx TR-ipx net=30
load appletlk net=50007 zone={"Engineering"}
load ne2000 int=3 port=300 frame=ethernet_snap name=etalk2
load token int=2 frame=token-ring_snap name=ttalk
bind appletlk etalk2 net=21-25 zone={"Engineering","TechOps"}
bind appletlk ttalk net=0-0
load route board=1
load route board=2
load attokllc
bind attokllc to TR-ipx
load afp
```

NOTE: The internal network is explicitly configured. The internal network configuration can never be "learned" from another router. Before loading the AFP or ATPS module, you must load the AppleTalk module and bind AppleTalk to one or more LAN drivers, as shown below.

4 Load the AppleTalk module and configure the internal network:

```
load appletlk net=50007 zone={"Engineering"}
```

For more information about this command line, see "Loading the AppleTalk Module" on page 243.

5 Load LAN drivers and extended frame types:

```
load ne2000 int=3 port=300 frame=ethernet_snap
  name=etalk2
load token int=2 frame=token-ring_snap name=ttalk
```

For more information, see "Loading LAN Drivers with AppleTalk Frame Types" on page 245.

6 Bind AppleTalk to the LAN drivers and configure AppleTalk networks:

```
bind appletlk etalk2 net=21-25
  zone={"Engineering","TechOps"}
bind appletlk ttalk net=0-0
```

The names **etalk2** and **ttalk** each refer to the LAN drivers by the names assigned in Step 5. The parameter **net=0-0** creates a non-seed interface. The router will listen for information from other routers on that network for its own configuration data.

NOTE: Because this example has already configured IPX and APPLETLK on the same Token-Ring LAN driver, you do not need to load the frame type TOKEN-RING for the Token-Ring LAN driver being used for AppleTalk. In this example, the TOKEN-RING frame type is already loaded. It is the default frame used by IPX on Token Ring boards

7 Load the Token-Ring Source Routing NLM (ROUTE.NLM) for the Token-Ring board with the TOKEN-RING frame type:

```
load route board=1
load route board=2
```

8 Load ATTOKLLC.NLM:

```
load attokllc
```

There are no options for this NLM. (Remember that you manually copy this NLM from the *NW-MAC* diskette to the server's SYS:SYSTEM directory.)

9 Bind ATTOKLLC to the Token-Ring board handling TOKEN-RING frames:

```
bind attokllc to TR-ipx
```

Note that this is not the same logical board to which APPLETLK is bound.

10 Load AFP file services:

```
load afp
```

For details on the AFP configuration options, see "Setting Up a Specialized Environment" on page 148.

11 Exit INSTALL, saving your changes.

12 Down the file server and bring it back up.

If you don't wish to down the file server at this time, re-enter at the console prompt all configuration commands specified in the STARTUP.NCF and AUTOEXEC.NCF files. This action brings up NetWare for Macintosh for the current server session. The next time you down the server, the specifications in STARTUP.NCF and AUTOEXEC.NCF will apply.

If you *can* down the server at this time, follow your usual procedure, for example:

```
DOWN <Enter>
EXIT <Enter>
SERVER <Enter>
```

A series of messages appears, indicating that the system is loading the modules you specified.

13 Use the MODULES command to verify that the NLMs loaded.

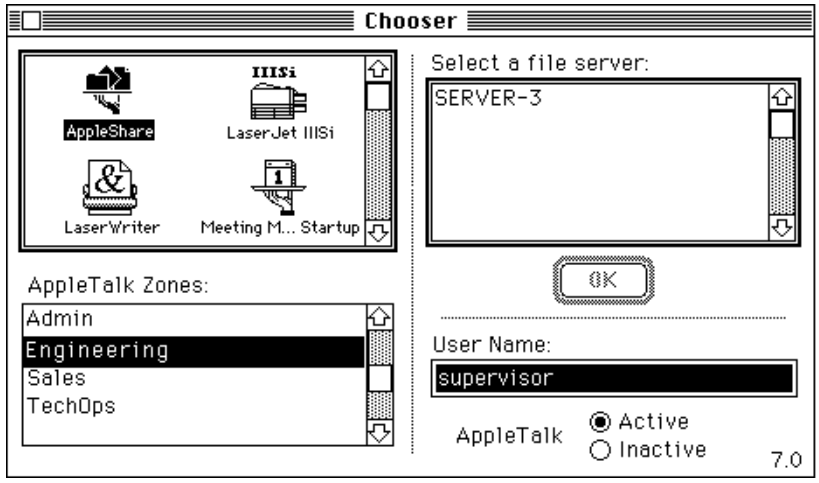
See Step 13 on page 126 if you would like an example.

14 Check the router's interfaces in ATCON.

Please see "Checking the Router's Configuration and Function" on page 288 for details.

15 Log in to the server from a Macintosh client.

The *Using the NetWare for Macintosh Client* guide describes how to check the configuration from a Macintosh client. In this example, the server will appear in the "Engineering" zone:


Chooser
AppleShare
IIISi
LaserJet IIISi
LaserWriter
Meeting M... Startup
AppleTalk Zones:
Admin
Engineering
Sales
TechOps
Select a file server:
SERVER-3
OK
User Name:
supervisor
AppleTalk
Active
Inactive
7.0

5 Changing the Configuration

In NetWare for Macintosh, you must modify configuration files to make "permanent" changes to the network or service configuration. Changes made to configuration files are in effect whenever you bring up the file server and load the NLMs.

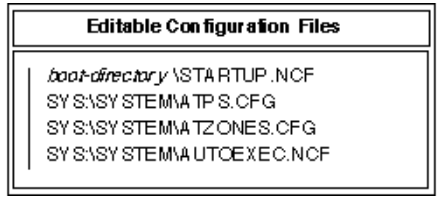
The sections in this chapter describe how to modify the NetWare for Macintosh configuration files and how to make "temporary" changes by entering configuration data at the server console.

Modifying Configuration Files

To modify NetWare for Macintosh configuration files, follow these steps:

1. Load INSTALL, select Product Options in the main INSTALL menu, and then press <Enter> on the line specifying NW-MAC v3.12.

   NetWare asks you to choose between the current STARTUP.NCF file and a previous STARTUP.NCF file, if you have relocated the file since you installed the product. When you select the proper STARTUP.NCF file, the "Editable Configuration Files" menu appears:



2 Use the arrow keys to select the file you wish to modify, and press <Enter>.

You can now follow the same procedure documented in the example configurations in this chapter to change the configuration data.

3 Exit the INSTALL utility, saving your changes.

You might need to down the file server and bring it up again, or unload and load the NLMs, for the changes you made to take effect. These tasks are discussed in the sections that follow.

NOTE: If you wish, you can use the "Edit STARTUP.NCF" or "Edit AUTOEXEC.NCF" functions in the "System Options" menu of INSTALL instead of the "Product Options" function. However, if you open the "System Options" menu to edit these files, be careful not to select "Create STARTUP.NCF" or "Create AUTOEXEC.NCF." Choosing either of the "Create" functions could cause you to inadvertently overwrite your NetWare for Macintosh v3.12 configuration.

Changing the Packet-Receive Buffer Allocation

See "AppleTalk Stack/Router Memory Requirements" on page 253 for a discussion of the memory issues that would warrant changing the minimum (or maximum) number of packet-receive buffers in STARTUP.NCF.

To change the number of packet-receive buffers in STARTUP.NCF, follow these steps:

1 Use the INSTALL utility to edit STARTUP.NCF to include the modified command.

For example, you might change this command line:

```
set minimum packet receive buffers=100
```

to

```
set minimum packet receive buffers=300
```

NOTE: Unless you have removed the Macintosh name space from a server's volumes by using VREPAIR, you should never remove the LOAD MAC command from STARTUP.NCF. Otherwise, you cannot mount the volumes supporting the Macintosh name space.

2. Down the file server and bring it back up.

   Follow the procedure you usually follow for booting the file server, such as this one:

   ```
   DOWN <Enter>
   EXIT <Enter>
   SERVER <Enter>
   ```

   When you bring up the server, the system allocates the specified number of packet-receive buffers.

Changing the AFP Configuration

You can unload and load the AFP module at the console prompt, specifying different LOAD options as desired. See "Maintenance Issues: Clearing and Rebuilding the Desktop" on page 146 and "Setting Up a Specialized Environment" on page 148 for information about the options you can specify on the LOAD command line.

NOTE: Changes specified at the console prompt are temporary, and are in effect only until the next time you down the file server.

To make a temporary change to the AFP environment, follow these steps:

1. Make sure all Macintosh clients are logged out, or warn them that you are about to interrupt file service.
2. Unload AFP at the server console and reload it with a LOAD option.

   For example, you might type these commands at the console (:) prompt:

   ```
   UNLOAD AFP <Enter>
   LOAD AFP DELAY30 <Enter>
   ```

   File service will be restored almost immediately.

To make a permanent change that will be in effect each time you bring up the file server, follow these steps:

1. Make sure all Macintosh clients are logged out, or warn them that you are about to interrupt file service.

2 Unless you plan to down the file server immediately, enter the modified command at the console prompt.

   For example, type

   ```
   UNLOAD AFP <Enter>
   LOAD AFP DELAY30 <Enter>
   ```

3 Use the INSTALL utility to edit AUTOEXEC.NCF to include the modified command.

   Because you already entered the command at the console prompt, you do not need to down the file server. The next time you down the file server and bring it up again, the permanent change made in AUTOEXEC.NCF takes effect.

Changing the AppleTalk Print Services Configuration

See "Print Services Configuration" on page 159 and "Loading the ATPS Module" on page 158 for more details on configuring AppleTalk print services.

The ATPS module recognizes changes to the ATPS.CFG file only when the module is loading, so changes to the configuration file require that you unload ATPS and reload it.

To change print queue information, follow these steps:

1 Use the INSTALL utility to edit ATPS.CFG to include the new queue configuration command line.

2 Load and unload the ATPS module at the console prompt:

   ```
   UNLOAD ATPS <Enter>
   LOAD ATPS <Enter>
   ```

Changing the AppleTalk Network Number or Range

If you have more than one AppleTalk router connected to a network that you must reconfigure, remember that all AppleTalk routers connected to a network must have a consistent network and zone configuration for that cable.

When a Seed Router is in Use

If you configured one seed router and used non-seed interfaces in the other AppleTalk routers connected to the cable, the reconfiguration process is as follows:

1. Down all AppleTalk routers directly connected to the network.

   To down an AppleTalk router, unload the AppleTalk module by typing this command at the console prompt:

   ```
   UNLOAD APPLETLK <Enter>
   ```

   AppleTalk is automatically unbound from all interfaces.

2. On the seed router, use INSTALL to edit AUTOEXEC.NCF.

   In AUTOEXEC.NCF, modify the BIND command line on which the network number or range is defined. Make sure that the new network number or range is not already in use on another cable.

   NOTE: If you used the ATZONES.CFG file for a BIND command line exceeding 82 characters, remember to edit ATZONES.CFG to modify the network/zone specification.

3. Bring up the seed router with the new configuration.

   If you cannot down the file server at this time, re-enter the LOAD APPLETLK and BIND APPLETLK command lines at the console prompt, exactly as they appear in AUTOEXEC.NCF.

4. Bring up the AppleTalk routers with non-seed interfaces on the network.

When Each Router is Configured Manually

If you configured each router manually (rather than using the seeding feature of AppleTalk routers), you need to manually change the configuration in each router connected to the network:

1. Down all AppleTalk routers directly connected to the network.

   To down an AppleTalk router, unload the AppleTalk module by typing this command at the console prompt:

   ```
   UNLOAD APPLETLK <Enter>
   ```

   AppleTalk is automatically unbound from all interfaces.

2. On each router connected to the network, use INSTALL to edit AUTOEXEC.NCF.

In AUTOEXEC.NCF, modify the BIND command line on which the network number or range is defined. Make sure that the new network number or range is not already in use on another cable.

NOTE: If you used the ATZONES.CFG file for a BIND command line exceeding 82 characters, remember to edit ATZONES.CFG to modify the network/zone specification.

3. When you have manually edited AUTOEXEC.NCF on each router, bring up the routers again, one by one.

   If you cannot down the file server at this time, re-enter the LOAD APPLETLK and BIND APPLETLK command lines at the console prompt, exactly as they appear in AUTOEXEC.NCF.

Changing the AppleTalk Zone Name or Zones List

If you must change the name of one or more zones, first read "How Zone Information Is Maintained on an Internet" on page 260 to understand how routers keep track of zone names and why you might see unexpected results if you do not allow enough time to elapse before bringing routers back up.

When a Seed Router is in Use

If you configured one seed router and used non-seed interfaces in the other AppleTalk routers connected to the cable, the zone reconfiguration process is as follows:

1. Down all AppleTalk routers directly connected to the network.

   To down an AppleTalk router, unload the AppleTalk module by typing this command at the console prompt:

   ```
   UNLOAD APPLETLK <Enter>
   ```

   AppleTalk is automatically unbound from all interfaces.

2. On the seed router, use INSTALL to edit AUTOEXEC.NCF.

   In AUTOEXEC.NCF, modify the BIND command line on which the zone or zones list is defined.

   NOTE: If you used the ATZONES.CFG file for a BIND command line exceeding 82 characters, remember to edit ATZONES.CFG to modify the network/zone specification.

3 Wait ten to twenty minutes (or more, if the AppleTalk internet is large).

Waiting ten or twenty minutes allows other AppleTalk routers on the internet to recognize that the "old" zones are no longer there. If you are not sure that you have allowed enough time, check the RTMP table in one or more routers by using the ATCON utility, as described in "Viewing the RTMP Routing Table" on page 289.

If you don't wish to wait ten or twenty minutes, and the AppleTalk internet is small, you can create the new zones list, and then down *all AppleTalk routers on the internet*. When you bring the routers back up, each router will create a new zones list that contains only the current zone names.

4 Bring up the seed router with the new configuration.

If you cannot down the file server at this time, re-enter the LOAD APPLETLK and BIND APPLETLK command lines at the console prompt, exactly as they appear in AUTOEXEC.NCF.

5 Bring up the AppleTalk routers with non-seed interfaces on the network.

When Each Router is Configured Manually

If you configured each router manually (rather than using the seeding feature of AppleTalk routers), you need to manually change the configuration in each router connected to the network:

1 Down all AppleTalk routers directly connected to the network.

To down an AppleTalk router, unload the AppleTalk module by typing this command at the console prompt:

```
UNLOAD APPLETLK <Enter>
```

AppleTalk is automatically unbound from all interfaces.

2 On each router connected to the network, use INSTALL to edit AUTOEXEC.NCF.

In AUTOEXEC.NCF, modify the BIND command line on which the zone or zones list is defined.

NOTE: If you used the ATZONES.CFG file for a BIND command line exceeding 82 characters, remember to edit ATZONES.CFG to modify the network/zone specification.

3 Make sure that ten to twenty minutes have elapsed (or more, if the AppleTalk internet is large) since you downed the routers.

Waiting ten or twenty minutes allows other AppleTalk routers on the internet to recognize that the "old" zones are no longer there. If you are not sure that you have allowed enough time, check the RTMP table in one or more routers by using the ATCON utility, as described in "Viewing the RTMP Routing Table" on page 289.

If you don't wish to wait ten or twenty minutes, and the AppleTalk internet is small, you can create the new zones list, and then down *all AppleTalk routers on the internet*. When you bring the routers back up, each router will create a new zones list that contains only the current zone names.

4. When you have manually edited AUTOEXEC.NCF on each router, bring up the routers again, one by one.

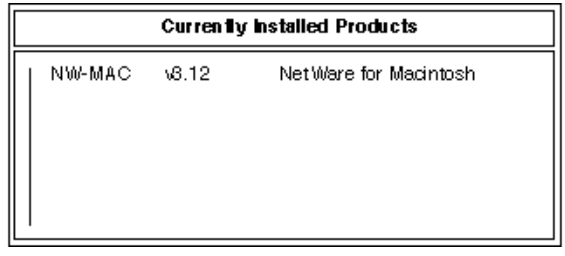
   If you cannot down the file server at this time, re-enter the LOAD APPLETLK and BIND APPLETLK command lines at the console prompt, exactly as they appear in AUTOEXEC.NCF.

Removing NetWare for Macintosh

To remove NetWare for Macintosh, you must delete the NLMs from SYS:SYSTEM and clear the NetWare for Macintosh data from SYS:SYSTEM\PRODUCTS.DAT (the products database maintained by the INSTALL module). PRODUCTS.DAT is cleared automatically when you follow the steps below. In addition, you must manually remove or comment out commands relevant to NetWare for Macintosh, as described below.

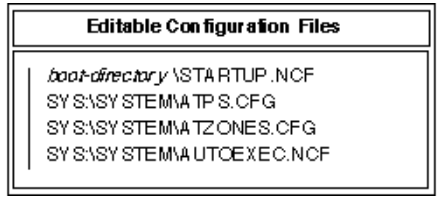
1. Load INSTALL, select Product Options in the main INSTALL menu, and then press <Del> on the line specifying NW-MAC v3.12.

   If you have installed multiple products, use the arrow keys to select NW-MAC before pressing <Del>.



NetWare asks you to confirm that you wish to remove the product. The system also asks you to choose between the current and previous STARTUP.NCF file, if you have relocated the file since you installed the product.

When you select the STARTUP.NCF file you wish to use, the "Editable Configuration Files" menu appears:



2. Use the arrow keys to select AUTOEXEC.NCF, and press <Enter>.

   SYS:SYSTEM\AUTOEXEC.NCF is the only file that *requires* changes. You must remove or comment out the command lines that load the AppleTalk module, specify AppleTalk frame types for a LAN driver, bind AppleTalk to a LAN driver, and load the AFP and ATPS modules. (To comment out a command line, insert the pound-sign character (#) as the first character in that command line.)

   When you have removed or commented out command lines in AUTOEXEC.NCF, press <Esc> and then <Enter> to save your changes and to return to the "Editable Configuration Files" menu.

3. Down the file server and bring it back up.

   Follow the procedure you usually use for booting the file server, such as this one:

   ```
   DOWN <Enter>
   EXIT <Enter>
   SERVER <Enter>
   ```

   NetWare for Macintosh is no longer available on the file server.

If you want to be complete, you can use the VREPAIR utility to remove the Macintosh name space from the server's volumes, and then remove or comment out the LOAD MAC command and the SET MINIMUM PACKET RECEIVE BUFFERS command from the STARTUP.NCF file. You can also delete the files in DESKTOP.AFP and remove the directory.

Finally, you can use a DOS client to delete the ATPS.CFG and ATZONES.CFG files from SYS:SYSTEM. However, note that these files contain valuable configuration information for restoring NetWare for Macintosh in the future. You might want to print their contents or save them to other files for future reference.

6 Managing AppleTalk File Services

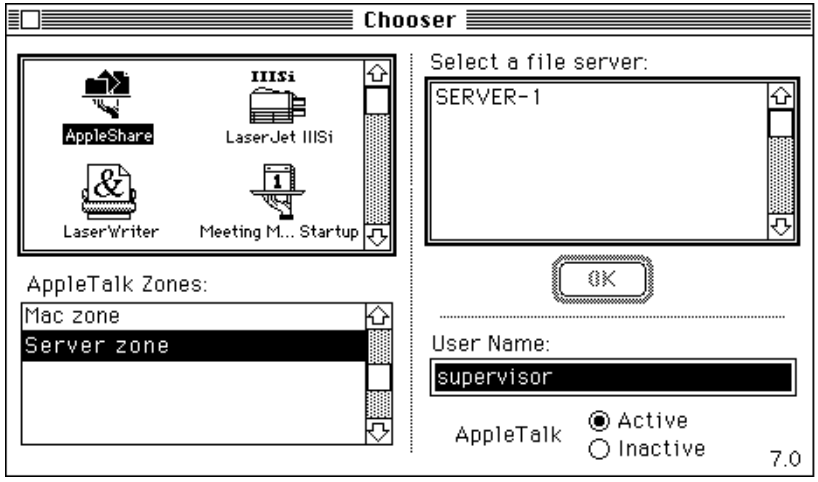
This chapter explains how the AFP module establishes the NetWare for Macintosh file service and how to customize the environment for your site. It also covers file service security issues, performance and memory trade-offs, and maintenance issues.

The AFP File Service Environment

The AppleTalk Filing Protocol (AFP) file service environment is established when you load the AFP module. Typically, the AFP module is loaded from the file server's AUTOEXEC.NCF file, as shown in the sample configurations in this guide (see Figure 3-4 on page 35 for an example).

Macintosh requests are sent to the NetWare file server via AppleTalk, as shown in Figure 43. The file server receives these requests and uses the AppleTalk Filing Protocol (AFP) to allow the Macintosh user to log in and access data on the server.

Figure 43 Macintosh Initiating a Login Session with a NetWare Server



Once a Macintosh user logs in to the NetWare file server, the Macintosh interface and applications appear very much as if the user were accessing a local Macintosh disk. Two basic NetWare for Macintosh features make this possible:

- Macintosh name space
- Desktop database

The Macintosh Name Space

The NetWare operating system (Version 3.0 or later) uses "name spaces" to extend the directory structure to accommodate different file naming conventions used by client operating systems. A name space maintains and checks the validity of filenames based on a specific set of rules, such as the Macintosh rules that a filename can be up to 31 characters, can include spaces, and cannot include the colon character (:). Name spaces allow a user who logs

in to a NetWare file server from a different client platform to see folders and files as he or she would expect to see them.

Loading the Name Space Support Module

The Macintosh name space depends on a support module, which must be loaded before adding the name space to a volume. Once the name space has been added to a volume, the support module must be loaded before that volume is mounted; *otherwise, the volume fails to mount*.

To load the support module before adding the Macintosh name space, type this command at the server console prompt:

```
LOAD MAC <Enter>
```

You can then add the name space, as described in "Adding the Macintosh Name Space to Volumes" on page 141.

To make sure the support module is loaded before the server attempts to mount its volumes, you should add the LOAD MAC command to the STARTUP.NCF file, as shown in the configuration examples in this guide.

Adding the Macintosh Name Space to Volumes

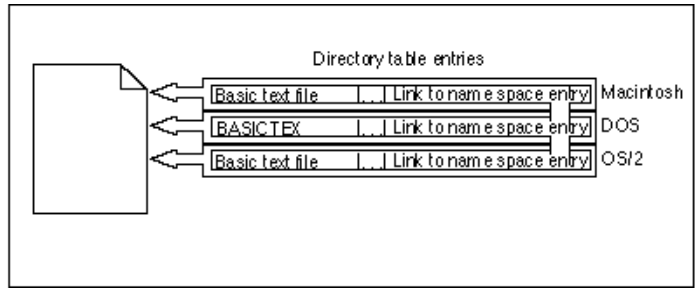
The DOS name space is part of the NetWare operating system. However, you must explicitly add the Macintosh name space to each volume that supports Macintosh clients. Use this command:

```
ADD NAME SPACE MACINTOSH TO VOLUME name <Enter>
```

name is the name of the volume. When you add the Macintosh name space to a volume, NetWare version 3.0 or later creates a separate name space for Macintosh folder and filenames and links those name space entries to directory table entries. Macintosh users and processes can then create folders and files on the volume.

For example, Figure 44 shows directory table entries for a Macintosh file on a volume that has both the Macintosh and OS/2 name space:

Figure 44 Directory Table Entries Linked to Three Name Spaces



When a Macintosh user creates "Basic text file," NetWare calls the Macintosh name space and the filename is checked for validity according to Macintosh file-naming rules. When the Macintosh name space has validated the filename, NetWare calls the DOS name space. The DOS name space finds the name invalid according to DOS file naming rules, so it creates a valid DOS filename by truncating the name to eight characters and dropping the spaces, resulting in the name "BASICTEX" for that file. In the OS/2 name space, the same procedure is repeated.

The Desktop Database

AFP requires that file servers maintain a desktop database that contains information associating documents and applications with icons, and providing bitmap representations of the icons. The Macintosh Finder uses this database to build the familiar Macintosh graphical user interface on the server's volumes, just as it uses the Macintosh desktop file on the local Macintosh disk(s).

In NetWare for Macintosh, the DESKTOP.AFP folder contains three files that implement the AFP desktop database. The AFP module creates DESKTOP.AFP and creates and initializes its files at the root of each volume that supports the Macintosh name space.

The Macintosh Finder initializes updates of these three files:

Filename	Contents
ICONINDX.AFP	Information linking documents and applications with their icons
ICONDATA.AFP	Bitmap representations of the icons
APPLDATA.AFP	Information about the location of an application so that it can be found quickly when a user double-clicks a document

How the Desktop Is Updated

The Macintosh Finder updates the desktop. Typically, when the Finder on a client Macintosh copies an application to the file server or moves an application to a new folder, the Finder adds the icon and application data to the desktop.

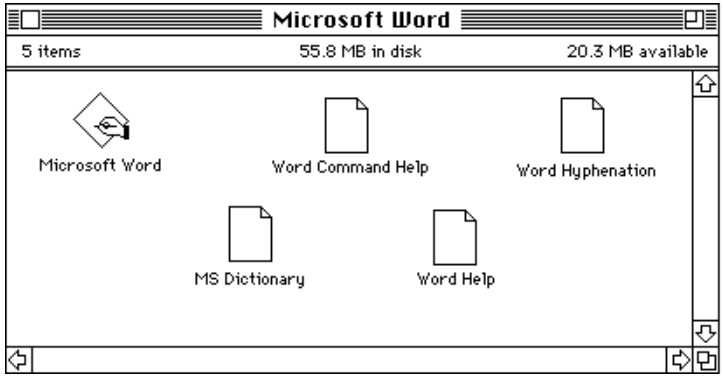
You can force a complete update by rebuilding the desktop from a Macintosh client. (See "Rebuilding the Desktop" on page 145.) Doing so causes the Macintosh Finder to traverse the file systems on the rebuilt volume in order to update all Macintosh icon and application data.

Special Considerations with Target Volumes from NetWare Versions 2.15 and 2.2

If you support NetWare for Macintosh on a volume that was previously configured as a target volume for the Macintosh VAPs, the newly initialized DESKTOP.AFP folder (created by the AFP module) will not contain any icons or application information related to the Macintosh applications that have already been installed on the file server.

Macintosh users logging in via the AFP NLM will see the existing files and applications, but the icons will be "generic," and double-clicking the icons will not open the appropriate application. Generic icons for Microsoft Word® are shown in Figure 45.

Figure 45 Generic Icons Indicating That the Desktop Should Be Rebuilt



The Macintosh VAPs created a hidden folder named DESKTOP. While this folder follows the same principles as the desktop database created by the AFP NLM, it uses a different format and will maintain information only as it is updated by clients logging in to a NetWare v3.12 file server *through the Macintosh VAPs*. Clients logging in to the file server via the AFP NLM will be able to access only the information contained in DESKTOP.AFP. If you wish to maintain this type of configuration, you should occasionally rebuild the desktop from each type of Macintosh client.

If you are installing NetWare for Macintosh on a file server that was previously a NetWare version 3.0 or later target for the NetWare for Macintosh VAPs *and you intend to use the file server both in native-mode (using the NLMs) and as a target to the Macintosh VAPs*, you should be aware that the two desktop folders, DESKTOP.AFP for the NLMs and DESKTOP for the VAPs, will become inconsistent over time. For this reason, using a file server both in native-mode and as a target to the Macintosh VAPs is not recommended.

Rebuilding the Desktop

To force an update of the application and icon data in the DESKTOP.AFP folder, follow these steps:

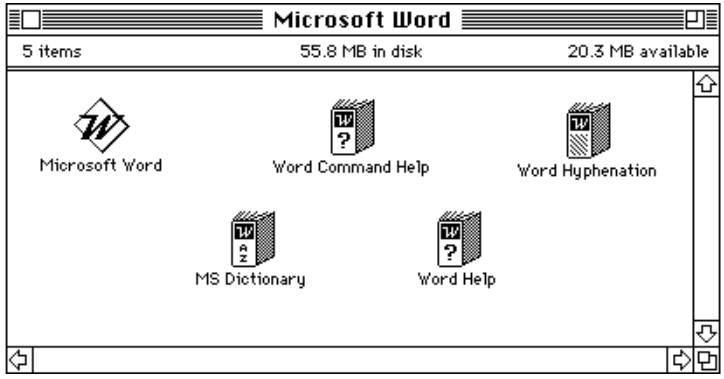
1. Restart the Macintosh using the Finder (not MultiFinder, if the Macintosh is running System 6.x).
2. Log in as a supervisor from a Macintosh client.

   Make sure you are logging in from a client using the AFP NLM, not across the IPX internet using the Macintosh VAPs.
3. When you mount the server's volume(s), hold down the Command-Option keys on the Macintosh keyboard.

   This action causes the Finder to traverse the file system on the file server's volumes and update the contents of each DESKTOP.AFP folder with the current location and document icon for each Macintosh application. You will be prompted to confirm that you wish to rebuild the desktop on the server's volume(s).

After the Finder rebuilds the desktop, Macintosh users see the appropriate icons for Macintosh applications and, in most cases, can open an application by double-clicking it. Macintosh icons are shown in Figure 46.

Figure 46 Macintosh Icons after Rebuilding the Desktop



If you have removed an application from the server's volume and the application does not exist on any mounted volumes or on the Macintosh local hard disk, the icons for documents created in that application still appear

generic after you rebuild the desktop. You can remedy this situation by copying the application to the server and rebuilding the desktop again.

NBACKUP does not back up the desktop files. If you are restoring data and applications by using NBACKUP, you should rebuild the desktop following the restoration.

Maintenance Issues: Clearing and Rebuilding the Desktop

The information maintained in the DESKTOP.AFP is never automatically cleared. If the environment allows Macintosh clients to add and move applications, the desktop folder can eventually contain enough obsolete information that Macintosh users begin to notice slowed performance in launching applications. In addition, the DESKTOP.AFP folder can become corrupted if the Finder modifies it during an error condition, or if you maintain it incorrectly (for example, if you inadvertently restore it from an old backup tape). If the desktop has become corrupted, icons can sometimes display incorrectly.

NetWare for Macintosh provides an option for clearing the information in DESKTOP.AFP; you must then rebuild the desktop from a Macintosh client. While the AFP module is loaded on the file server, the files contained in DESKTOP.AFP are in use and cannot be deleted, so you must unload AFP first. To clear the DESKTOP.AFP folder on all volumes that support Macintosh clients and are currently mounted, first make sure that all Macintosh clients are logged out. Then, at the file server console, type

```
UNLOAD AFP <Enter>
LOAD AFP CDT <Enter>
```

You should then rebuild the desktop. See “Rebuilding the Desktop” on page 145.

Advertising a Volume under a Different Name

When Macintosh users mount volumes other than the SYS volume on the Macintosh desktop, only the volume name (not the server name) displays under the icon. If you have not assigned descriptive names to server volumes, Macintosh users can be confused about which volumes belong to which servers when they have mounted multiple volumes on their desktop.

If you wish, you can assign "alias" volume names that will be advertised on the AppleTalk network. The alias you assign will be advertised only on the

AppleTalk network. It does not affect users who are logging in via other protocols, such as NCP.

The AFP module creates a hidden ASCII file named VOLNAMES.AFP in SYS:\SYSTEM. The AFP module initializes this file with the following name mapping for the SYS volume:

SYS=*server-name*.SYS

server-name is the NetWare server name. You can assign an alias name to the SYS volume, using this format:

SYS=*alias*

You can assign an alias name to any other volume that supports Macintosh clients by adding a command line to the file, using this format:

Volume-name=alias

alias can be up to 27 characters, and cannot include the colon (:) character. (You should also avoid the underscore (_) and slash (/) characters in order to prevent confusion with pathname conventions in Macintosh software that emulates other platforms.) Control characters (such as Å) and any character whose ASCII code is less than a blank, are treated as carriage returns.

For example, if two NetWare servers support a volume named PROJ, you can assign an AppleTalk alias to the PROJ volume on SERVER-1 as follows:

1. Open VOLNAMES.AFP in a text editor.

   You can use any ASCII text editor from a client or at the server console. For example, at the server console type

   LOAD EDIT SYS:\SYSTEM\VOLNAMES.AFP <Enter>

   This command line loads the EDIT NLM and opens a window for the file. In this example, assume two volumes supporting the Macintosh name space: SYS and PROJ. The file initially contains only one line, mapping the SYS volume name:

   SYS=SERVER-1.SYS

2. Add a command line for the PROJ volume and its alias.

   After you establish the alias for the PROJ volume, the file looks like this:

   SYS=SERVER-1.SYSPROJ=SERVER-1.PROJ

3. Press <Esc> to save your changes and exit the editor.

4 Unload the AFP module and load it again.

The new name will not be advertised on the AppleTalk network until you unload the AFP module and load it again. Type these commands at the console prompt:

```
UNLOAD AFP <Enter>
LOAD AFP <Enter>
```

Setting Up a Specialized Environment

This section describes your configuration options when loading the AFP module. You can specify most of these options on the standard LOAD AFP command line in AUTOEXEC.NCF. The LOAD command-line syntax for specifying these options is

LOAD AFP *options*

options can be any combination of the arguments described in Table 17.

Table 17 AFP LOAD Command Line Options

AFP Option	Effect on NetWare File Services Environment
ENCRYPT	See “Changing the Macintosh User Authentication Method” on page 149
DELAY*nnn*	See “Performance Issues: Delaying Macintosh Finder Updates” on page 150
IF	See “Performance Issues: Changing Cache-Buffer Writes” on page 151
LS*nnn*	See “Memory Issues: Limiting the Number of AFP Login Sessions” on page 152
NCPW	See “Protecting the NetWare Name Services Environment” on page 152
CDT	This argument is a maintenance option rather than a configuration option, and is intended for use at the console command line rather than in AUTOEXEC.NCF. See “Maintenance Issues: Clearing and Rebuilding the Desktop” on page 146

Changing the Macintosh User Authentication Method

You can enforce NetWare password encryption on Macintosh clients by loading the AFP module with the **ENCRYPT** option:

```
LOAD AFP ENCRYPT
```

When you set the **ENCRYPT** option and the NetWare UAM software has not been installed on a Macintosh client, the user will be unable to log in to the server.

The **ENCRYPT** option causes the AFP module to accept only passwords encrypted by the NetWare User Authentication Method (UAM) software on the Macintosh client. NetWare password encryption represents a significant security enhancement. If your installation is security-conscious, you should use it.

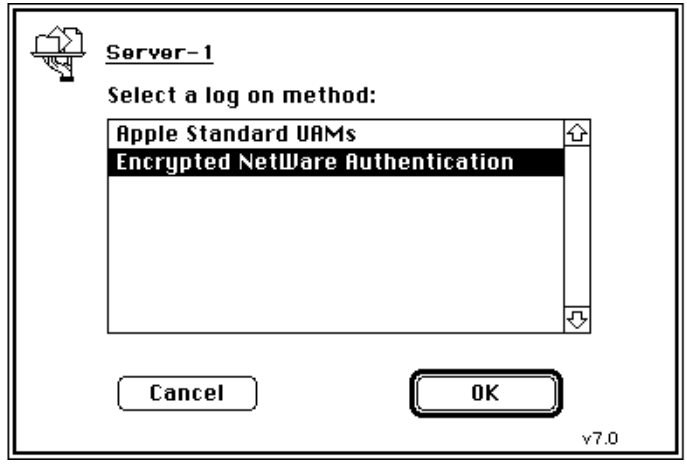
NOTE: Note that you must install the NetWare UAM software on each Macintosh client to enforce password encryption. Please see the *Using the NetWare for Macintosh Client* guide for instructions.

When you use the **ENCRYPT** option, all passwords on Macintosh clients must be encrypted by the NetWare UAM software before being transmitted to the file server. This action prevents a user with packet-analyzer software from detecting a "clear text" AppleShare-style password while it is in transit to the file server on the network cable. (Although AppleShare supports its own "Scrambled" encryption method, the server does not recognize AppleShare's encryption method, so the password defaults to clear text.)

Once you install the NetWare UAM on the Macintosh client, the Macintosh user's login procedure changes in these ways:

1. Macintosh users must explicitly select NetWare authentication *at each login*. The AppleShare Workstation software presents users with a dialog box before accepting their passwords, shown in Figure 47.

Figure 47 UAM Dialog Box During Login



The *Using the NetWare for Macintosh Client* manual presumes this login procedure.

2. The AppleShare software does not allow start-up mounting of a file server's volumes when a user logs in using NetWare password encryption.
3. The Macintosh Chooser does not allow users to change their passwords when they log in using NetWare password encryption. Macintosh users must ask the administrator to change their passwords, or use the NetWare Tools software. The Using the NetWare for Macintosh Client manual recommends that users contact their administrator to change a password.

Performance Issues: Delaying Macintosh Finder Updates

You can use the **DELAY** option to specify the number of seconds for the AFP module to delay before informing the Macintosh Finder that a folder's contents have been changed. This option reduces background traffic caused by the default Finder behavior when many Macintosh clients are accessing a common folder hierarchy.

By default, the Finder behaves like this when accessing a file server volume:

- When a Macintosh user changes a folder's contents (for example, by creating or deleting a file), the Finder on that user's Macintosh immediately updates the folder contents to reflect the change.
- The Finder on other Macintosh clients who are working in the same folder delays up to 10 seconds and then updates the folder contents on the other users' screens to reflect the change.

To specify a longer delay for the Finder on other Macintosh clients accessing the same folder, use the command:

LOAD AFP DELAY*nnn*

nnn is the number of seconds delay (greater than 10). For example, the command line might look like this:

LOAD AFP DELAY30

This command line causes the AFP module to wait thirty seconds before informing the Finder that folder contents have changed. In this case, the other users sharing the same folder do not see an update until (1) they close and reopen the folder window (causing the Finder on their Macintosh to automatically update folder contents), or (2) thirty seconds has elapsed, whichever comes first.

The trade-offs in using the DELAY option are these:

1. If many Macintosh clients access a common folder hierarchy, the DELAY option reduces the amount of background traffic on the network.
2. Macintosh users can be inconvenienced if they are not shown folder changes in a short period of time. For example, users may try to access files that have been deleted but still appear in their version of the folder.

Performance Issues: Changing Cache-Buffer Writes

The NetWare cache-buffer flush mechanism is highly reliable, but it returns disk-write confirmation before it finishes writing the cache-buffer contents to disk. You can force the AFP module to wait for the entire contents to be written to disk by using the **IF** ("Immediate Flush") option on the **LOAD AFP** command line. The main benefit of this flag option is increased assurance that users will not lose data in the event of a system crash.

To modify the cache-buffer flush mechanism for AFP logins, use this command:

```
LOAD AFP IF
```

When you use this command line, cache buffers will continue to write their data to disk every three seconds (the standard NetWare mechanism), but the AFP module will wait for full disk write confirmation before proceeding.

NOTE: The use of this option causes a significant performance penalty.

Memory Issues: Limiting the Number of AFP Login Sessions

You can limit the number of login sessions the AFP module allows by using the **LS** option on the **LOAD AFP** command line. To limit the number of AFP login sessions, use the command:

```
LOAD AFP LSnnn
```

nnn is the number of sessions. For example, if you are running the 100-user version of NetWare for Macintosh, you might enter

```
LOAD AFP LS50
```

This command line limits the number of sessions to 50. If 50 login sessions are in use and another user attempts to log in, a message appears indicating that the server is not responding or is busy.

You might want to use this option if you have a very large print requirement and expect Macintosh users to require more concurrent print jobs than are currently provided for, or if you are running NetWare applications or NLMs that use AppleTalk connections, but not AFP login sessions.

Protecting the NetWare Name Services Environment

If you are running in a NetWare Name Services (NNS) environment, you can protect the consistency of user passwords in Name Services domains by using the **NCPW** option on the **LOAD AFP** command line. This option causes the AFP module to prevent Macintosh users from changing their passwords on the file server. To accomplish this task, use this command:

```
LOAD AFP NCPW
```

NOTE: The Macintosh Chooser does not allow a user to change his or her password when the NetWare UAM is installed. However, only the **NCPW** option will cause the AFP module to actively prevent passwords from being changed by anyapplication based on AFP.

Network Administration from a Macintosh Workstation

Once you have configured AFP at the NetWare v3.12 file server, you can administer it from a Macintosh workstation connected to the server. NetWare Tools software for the Macintosh, included with NetWare v3.12, enable you to perform a full set of administrative tasks from a Macintosh workstation, such as creating users and groups, or setting user privileges and file system security.

For information about the NetWare Tools software, including installation at the Macintosh workstation, refer to the *Using the NetWare for Macintosh Client* manual, included with NetWare v3.12 and NetWare for Macintosh.

7 Managing AppleTalk Print Services

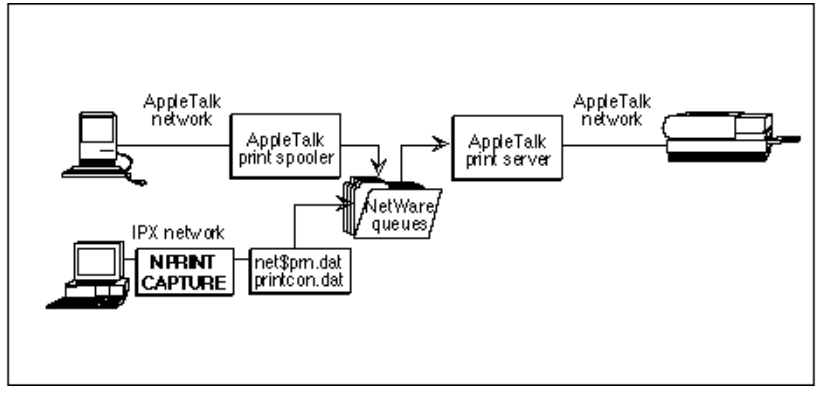
This chapter explains how AppleTalk print services work and how to configure NetWare print queues that will be visible to Macintosh clients, or that will be serviced by an AppleTalk printer, or both.

This chapter also provides information about general print queue maintenance (including Macintosh-specific issues such as Laser Prep files and PostScript font lists) and about using NetWare print utilities with queues that are spooled to or serviced by the ATPS module.

How AppleTalk Print Services Work

The ATPS module provides two main functions: AppleTalk print spooling and AppleTalk print serving. Both of these functions are built into the ATPS NLM.

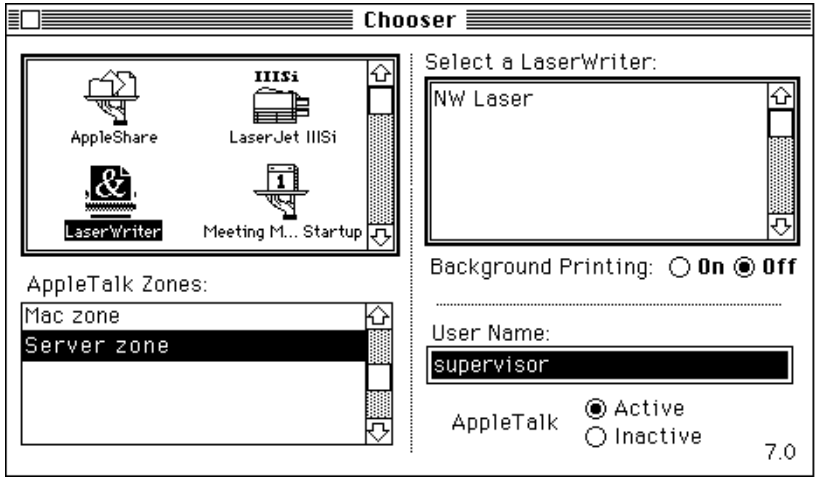
Figure 48 AppleTalk Print Spooler and Print Server



The AppleTalk Print Spooler

The *AppleTalk print spooler* "advertises" a NetWare print queue on AppleTalk networks and accepts print jobs submitted by Macintosh clients. The print spooler makes a queue visible to Macintosh clients by responding to requests for LaserWriter or ImageWriter devices.

Figure 49 AppleTalk Print Spooler Advertises the Queue



There are several configuration options that affect how Macintosh users see AppleTalk print services in the Chooser. For example,

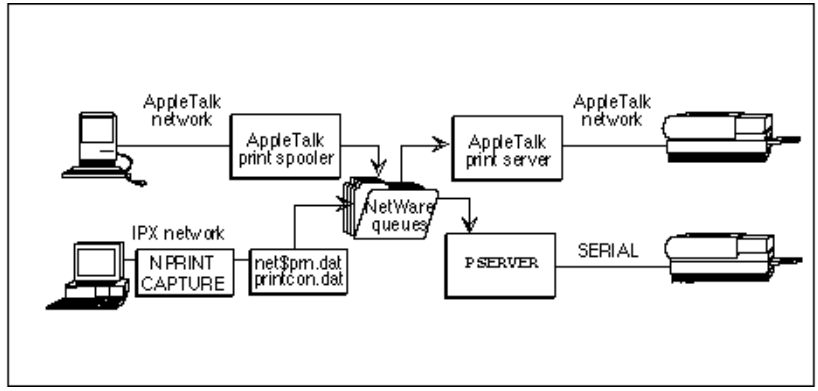
- You can assign a descriptive AppleTalk print spooler name that helps Macintosh users to choose the right queue. The name of the queue itself is derived from the spooler name you assign. (Macintosh users see the spooler name only, but DOS or other clients can see the queue in PCONSOLE or other NetWare utilities.)
- You can hide the AppleTalk printer itself, so that only the spooler appears in the Chooser.
- If you are operating in a Phase 2 environment and have configured multiple zones on the internal network, you can advertise the queue in any one of those zones.

See “Print Services Configuration” on page 159 for a complete discussion of queue configuration options.

The AppleTalk Print Server

The *AppleTalk print server* takes print jobs out of a NetWare print queue and sends them to a printer on the AppleTalk network. For each NetWare queue it services, the AppleTalk print server manages the communication between the queue and the AppleTalk printer. For AppleTalk PostScript printers, the AppleTalk print server also manages the Laser Prep issues.

Figure 50 PSERVER Also Services Macintosh Print Jobs



There are several configuration options that affect how print jobs are handled once they are placed in the queue. For example,

- You can turn off the AppleTalk print server altogether, and configure PSERVER to poll the queue and ship print jobs to a serial, parallel, or Novell Remote printer. See “Print Server Configuration Options” on page 179 for a full description of alternative print server configurations.
- You can assign multiple AppleTalk printers to service a single queue. See “Multiple AppleTalk Printers Servicing a Print Queue: -wf” on page 177 for details.

See “Print Services Configuration” on page 159 for a complete discussion of queue configuration options.

Loading the ATPS Module

NOTE: Before loading the ATPS module, you must load the AppleTalk module and bind AppleTalk to one or more LAN drivers, as described in Chapters 3 and 4.

When the ATPS module is loaded on the server, it opens and reads SYS:SYSTEM\ATPS.CFG for its list of queues. If the ATPS.CFG file does not exist or contains errors, the ATPS module does not load.

The ATPS module supports two options on the LOAD command line, using the following syntax:

LOAD ATPS [-D *pathname*][-V]

(Square brackets indicate that a parameter is optional, and are not part of the syntax.) These options are described in Table 18.

Table 18 LOAD ATPS Options

Parameter	Action
-D *pathname*	Create the specified directory (pathname) to contain all queues spooled to or serviced by the ATPS module, as well as files used internally by ATPS. See "Specifying an Alternative Location for Queue Directories" on page 197.
-V	"Verbose option." Create an ATPS console window and display informational, as well as standard, error messages. See "Verbose Mode: Viewing Troubleshooting Messages" on page 198.

Unloading the ATPS Module

When you type **UNLOAD ATPS** at the console while ATPS is receiving jobs from AppleTalk clients or printing jobs on AppleTalk printers, a prompt appears at the console asking if you really wish to unload.

Answering "Yes" to the confirmation prompt unloads the ATPS module but may interrupt printing. Print jobs that are currently being received from a Macintosh workstation are lost. Jobs that are currently being printed are interrupted but remain in the queue until ATPS is loaded again and the jobs are printed or otherwise removed from the queue.

NOTE: ATPS automatically attempts to restore hidden printers upon unloading. However, hidden printers remain hidden if the server is downed or turned off without first unloading ATPS. You can make a printer visible again by turning it off

and on. In addition, hidden printers may slow the process of unloading ATPS, particularly if the hidden printers are processing jobs or off-line at the time of unloading. Allow up to 90 seconds per hidden printer when unloading ATPS. If the printer is still busy or unreachable after this time, the printer will not be restored. Power-cycle the printer to restore it. For more information, see “ATPS Console Commands” on page 198.

Print Services Configuration

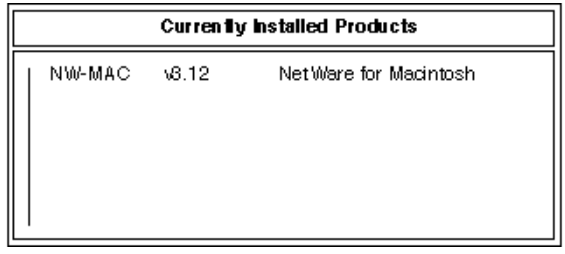
This section shows the basic procedure for creating or modifying AppleTalk print spoolers and print servers with the ATPS module, and describes all of the available print services configuration options.

How to Configure AppleTalk Print Services in ATPS.CFG

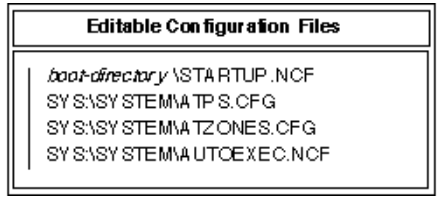
To enter a configuration that will be in effect when you load the ATPS module, follow these steps at the file server console:

1. Load the INSTALL utility and select Product Options in the main INSTALL menu.
2. Press <Enter> on the line specifying NW-MAC v3.12.

   If you have installed multiple products, use the arrow keys to select NW-MAC v3.12 before pressing <Enter>.



When you press <Enter>, the Editable Configuration Files menu opens:



3 Use the arrow keys to select ATPS.CFG in the menu and then press <Enter>.

An ATPS.CFG window opens in which you can enter the server's print queue configuration. For example, to create a queue using the default syntax, enter the command line:

```
"my printer:printer zone"
```

NOTE: This example uses the "*printer-name*:*zone-name*" default queue configuration syntax. See "Using the Default Configuration Syntax" on page 163 for details.

See "AppleTalk Print Services Configuration Options" on page 160 for a list of all of the available queue configuration options. When you have configured the printer in ATPS.CFG,

4 Exit the INSTALL utility, saving your changes.

5 Unload and load ATPS.

If ATPS is already running on this server, unload it by typing

```
UNLOAD ATPS <Enter>
```

(Otherwise, skip this step.)

Load ATPS by typing

```
LOAD ATPS <Enter>
```

NOTE: This example assumes that you have already fully configured NetWare for Macintosh. Please see Chapter 3, "Simple Network Configurations," on page 43 and Chapter 4, "More Complex Network Configurations," on page 81 if you have not already configured and loaded the AppleTalk NLM.

AppleTalk Print Services Configuration Options

Table 19 describes the options you can use on ATPS.CFG configuration command lines.

NOTE: If a parameter to one of these options includes a space character, you must enclose the parameter in double-quotes.

Table 19 Print Services Configuration Options and Parameters

Parameter	Explanation
-p *printer-name*	*printer-name* is the name assigned to an AppleTalk printer by using Macintosh software. The name can be up to 31 characters in length and cannot include a colon character (:) or an at-sign (@). If you do not specify a spooler name, ATPS creates a default spooler name by prefixing "NW" to printer-name. See "Using the Default Configuration Syntax" on page 163 for information about a shorthand syntax for specifying the printer name without the **-p** option and "Specifying an AppleTalk Printer Explicitly: -p" on page 164 for examples using **-p**.
-z *zone-name*	*zone-name*is the name of the AppleTalk zone in which an AppleTalk printer resides. If you do not specify zone-name, ATPS assumes the default zone of the internal network. See "Using the Default Configuration Syntax" on page 163 for information about a shorthand syntax for specifying the zone name without the **-z** option and "Specifying an AppleTalk Printer's Zone Explicitly: -z" on page 164 for examples using **-z**.
-a	(Print spooler option.) Allows Macintosh users to spool print jobs to the queue only if they are logged in to the server via AFP and are designated as Queue Users. See "Enabling Print Queue Security: -a" on page 165 for and example using **-a**.
-b	(Print spooler option.) Causes Macintosh print jobs submitted via the spooler to be marked for printing with a banner page. See "Printing Banner Pages: -b" on page 166 for an example using **-b**.
-c	(Print spooler option.) Causes the AppleTalk print spooler of type "ImageWriter" or "ImageWriter LQ" to return status as an ImageWriter with the color ribbon loaded. This enables Macintosh applications to generate the appropriate color codes. See "Specifying a Color ImageWriter: -t and -c" on page 166 for an example configuration line specifying a LaserWriter with a color ribbon.
-e	(Print server option.) Turns off error banner pages that are otherwise generated for PostScript errors. See "Turning Off Error Banner Pages: -e" on page 167 for an example using **-e**.
-f*filename*	(Print spooler option.) *filename* is a PostScript font list file located in NW-MAC\FONTS. See "Specifying a PostScript Font List: -f" on page 167 for an example configuration line using **-f**. "PostScript Font Lists: *.FNT Files" on page 191 discusses the issues related to PostScript fonts.

Parameter	Explanation
`-h`	(Print server option: "disable bypass printing.") Hides the AppleTalk printer by changing its NBP type. This option is used to prevent users from submitting print jobs directly to the printer. See "Enabling Printer Security: -h" on page 168 for an example configuration using `-h`.
`-l`	(Print spooler option.) Includes the necessary Macintosh Laser Prep file in each job placed in the queue. See "Including Laser Prep Files in All Macintosh Print Jobs: -l" on page 168 for an example using `-l`. "Laser Prep Files: *.PRS" on page 194 discusses the issues related to Laser Prep files.
`-n`*N*	(Print spooler option.) *N* is the number of concurrent print jobs allowed to print to an AppleTalk print spooler, which must be between 1 and 50. If you do not specify this option, the default is 10. If you increase or decrease *N*, more or less server memory and processor time are accessible to print jobs. See "Changing the Number of Concurrent Print Jobs Allowed: -n" on page 169 for an example configuration using `-n`.
`-o` *spooler-name*	*spooler-name*is the "object name" of the AppleTalk print spooler, that is, the name that appears in the Chooser. *spooler-name* can be any valid Chooser name (up to 31 characters), but should not include these characters: : @. The print queue name itself (visible to DOS users inPCONSOLE) is derived from *spooler-name*; if necessary, underscores are substituted for spaces and the characters / \ ; , * ? % and + in *spooler-name* to create a valid queue name. If the print spooler is turned off, this option can be used to provide a descriptive name for the queue itself. See "Assigning a Descriptive Name: -o" on page 170 for an example using `-o`.
`-o` *spooler-name* [`:`*izone-name*] (Shown on two lines above for printing purposes only.)	When the spooler name is followed by a colon (`:`) and a zone name, the spooler will be visible in the specified zone of the internal network. See "Advertising a Queue in a Specified Zone: -o" on page 170 for an example configuration specifying an internal zone. See "Internal Network and Zone Configuration" on page 33 for information about configuring the internal network with multiple zones.
`-t`*printer-type*	*printer-type*is the NBP type of the printer that accepts print jobs from the print server. Unless you specify the `-t` option, the default printer type is "LaserWriter." See "Specifying a Printer Type: -t" on page 171 for an example using `-t` to specify an ImageWriter printer, and "Options for Non-Apple Printers: -t, -s, -f, and -l" on page 172 for information on specifying a non-Apple printer type.
`-s`	If you are using a PostScript printer that is not the default LaserWriter type (if you have specified a different printer type by using the `-t` option), use the `-s` option to specify that the printer is a PostScript printer. See "Options for Non-Apple Printers: -t, -s, -f, and -l" on page 172 for more information.

Parameter	Explanation
-wb	("Without back end.") This option specifies that the AppleTalk print server will *not* be in use. Presumably, PSERVER or some other print server will service the queue. See "Turning Off the AppleTalk Print Server: -wb" on page 174 for an example configuration using **-wb** and "Print Server Configuration Options" on page 179 for details on configuring a queue to be serviced by PSERVER.
-wf	("Without front end.") This option specifies that the AppleTalk print spooler will *not* be in use. The queue will be usable by PC users but not Macintosh clients. You can also use this option to allow multiple printers to service a queue that is advertised via a single AppleTalk print spooler. See "Turning Off the AppleTalk Print Spooler: -wf" on page 176 and "Multiple AppleTalk Printers Servicing a Print Queue: -wf" on page 177 for examples.

Using the Default Configuration Syntax

The following default configuration syntax specifies a queue that will be serviced by the specified LaserWriter printer and will be advertised on AppleTalk—in other words, the specified queue has both an AppleTalk print spooler and an AppleTalk print server:

***printer-name*[:*zone-name*]**

(The brackets shown above indicate that the zone name is optional. They are not part of the default syntax.)

NOTE: When you specify the printer name and zone name without explicitly specifying the **-p** and **-z** options, they must appear first on the configuration line. If a space character appears anywhere in the **"***printer-name*:*zone-name***"** string, you must enclose the entire string in double-quotes.

When you use the default syntax, the AppleTalk print spooler name is derived by preceding the printer name with "NW," and a valid queue name is derived as usual from the AppleTalk print spooler name. ATPS will create the queue if it does not already exist.

printer-name is the name assigned to the LaserWriter by using Macintosh software. If you are not sure about the name of the printer or the name of the zone in which it is located, you can check them in the Macintosh Chooser or by using the Lookup service in the ATCON utility. See "Looking Up an AppleTalk Service" on page 278 for details.

zone-name is the name of the AppleTalk zone in which the printer resides. If you do not specify *zone-name*, ATPS assumes the default zone of the internal network. This means that you can omit the *zone-name* parameter only if the

printer resides in the same AppleTalk zone as the default zone of the internal network. The name is case-insensitive but must include any leading or trailing white-space characters.

You can add configuration options to the default syntax, provided that the printer name appears first on the configuration line (optionally followed by a colon character (**:**) and a zone name). For example, the following configuration line creates a queue that will send print jobs to the specified ImageWriter printer, and that has both an AppleTalk print spooler and an AppleTalk print server:

***printer-name*[:*zone-name*] -t ImageWriter**

Specifying an AppleTalk Printer Explicitly: -p

The following configuration line specifies a queue that will send jobs to a LaserWriter named "LaserWriter IINT" in the "Admin" zone:

-o "Admin Q" -p "LaserWriter IINT" -z Admin

The AppleTalk spooler will be visible in the Chooser as "Admin Q," and the queue will be named "ADMIN_Q."

Note that the "Admin" zone is the zone in which the printer resides, and not the zone in which the AppleTalk print spooler will be visible. See "Advertising a Queue in a Specified Zone: -o" on page 170 for details.

When you use the **-p** option to specify an AppleTalk printer's name instead of using the default syntax, the printer name can appear anywhere on the configuration line. If you are not sure about the name of the printer or name of the zone in which it is located, you can check them in the Macintosh Chooser or by using the Lookup service in the ATCON utility. See "Looking Up an AppleTalk Service" on page 278 for details.

Specifying an AppleTalk Printer's Zone Explicitly: -z

The following configuration line specifies a queue that will send jobs to a LaserWriter named "Tech Pubs" in the "Publications" zone:

-z Publications -p "Tech Pubs"

The AppleTalk spooler will be visible in the Chooser as "NW Tech Pubs" (the default name derived from the printer name) and the queue will be named "NW_TECH_PUBS."

Note that the "Publications" zone is the zone in which the printer resides, and not the zone in which the AppleTalk print spooler will be visible. See “Advertising a Queue in a Specified Zone: -o” on page 170 for details. If you do not specify a zone name, ATPS uses the default zone of the internal network. This means that you can omit the name of the zone in which a printer resides only if the same zone is specified as the default zone of the internal network.

When you use the **-z** option to specify an AppleTalk printer's zone name instead of using the default syntax, the zone name can appear anywhere on the configuration line.

Enabling Print Queue Security: -a

To prevent Macintosh users from submitting print jobs when they have not logged in to the NetWare v3.12 server via AFP, use the **-a** option on the configuration line in ATPS.CFG. When the **-a** option is in use, the AppleTalk print spooler will be visible in the Chooser, but if a user has not logged in to the NetWare server or is not a designated Queue User, that user's connection is dropped and an error message appears on the Macintosh screen indicating that the print job has failed.

The following configuration line specifies a queue located in the server's default zone that will send jobs to a LaserWriter on the AppleTalk network named "LaserWriter1."

```
LaserWriter1 -o "Tim's Queue" -h -a
```

The AppleTalk print spooler will be visible in the Chooser as "Tim's Queue," and the queue will be named "TIM_S_QUEUE." Because a zone name is not specified, the printer must reside in the same zone configured as the default zone of the internal network.

The **-h** option hides the LaserWriter named "LaserWriter1" to prevent users from printing directly to the printer, and the **-a** option prevents Macintosh users from printing to the queue unless they have logged in to the server.

NOTE: If you configure a print queue with the **-a** option in ATPS.CFG, you must designate Macintosh users who are to use that queue as Queue Users in PCONSOLE. By default, the group EVERYONE is designated as a Queue User, so all members of that group can print to a queue.

Printing Banner Pages: -b

By default, Macintosh print jobs submitted to a queue are not marked for printing with a banner page. However, you can use the **-b** option to have all Macintosh jobs submitted to the queue so marked. The print server will then generate banner pages that specify the user's name for appropriately marked jobs. DOS users can mark their jobs by using PRINTCON.

NOTE: If you are using PSERVER to service a queue advertised by ATPS, do not use the **-b** (banner) option with LaserWriters and other PostScript printers. The banner page created by PSERVER is not in PostScript format, and it causes the PostScript job to fail. For the same reason, when printing to PSERVER-connected PostScript printers from DOS, specify NO to "Print banner" and YES to "Suppress form feed" in PRINTCON.

The following configuration line specifies a queue that will send jobs to a LaserWriter named "Printer-1" in the "Engineering" zone, and each Macintosh print job submitted to the queue will be marked for printing with a banner page that specifies the user's name:

```
Printer-1:Engineering -b
```

In this example configuration line, the AppleTalk print spooler will be named "NW Printer-1" (the default spooler name derived from the printer name), and the queue will be named "NW_PRINTER_1."

NOTE: For an ImageWriter queue, the Macintosh user's name will appear in the banner only if the user is logged in to the file server via AFP.

Specifying a Color ImageWriter: -t and -c

Either of these lines specifies a queue that will send jobs to a color ImageWriter named "Dot matrix" in the "Admin" zone:

```
-p "Dot matrix" -z Admin -t ImageWriter -c
"Dot matrix:Admin" -t ImageWriter -c
```

The AppleTalk print spooler will be named "NW Dot matrix" (the default name derived from the printer name), and the queue will be named "NW_DOT_MATRIX."

The spooler will be visible as an ImageWriter in the Chooser. Provided that Macintosh users have the right printer driver software, the Macintosh applications can generate the codes necessary to print in color on an ImageWriter.

Turning Off Error Banner Pages: -e

By default, PostScript errors returned by a printer to the AppleTalk print server are printed on a special banner page. For printers that use high-resolution film, this situation can cause unacceptable waste. To turn off error banner pages, use the **-e** option on the configuration line in ATPS.CFG.

The following configuration line specifies a queue that will send jobs to a LaserWriter named "Tech Support" in the "TechOps" zone, and PostScript errors will not generate a special banner page.

```
"Tech Support:TechOps" -o "QUEUE 1" -e
```

The spooler will be named "QUEUE 1" and the queue itself will be named "QUEUE_1."

Specifying a PostScript Font List: -f

Please refer to "PostScript Font Lists: *.FNT Files" on page 191 for a discussion of PostScript font files and how they are used by the ATPS module, and for information on creating a customized font file.

If you are specifying a queue for a LaserWriter on AppleTalk, you can specify a font list for that printer to allow the AppleTalk print spooler to advertise its queue even if the printer is not available on the network when ATPS is loaded. To do so, use the **-f** option on the configuration line. For example, the following line specifies a queue using the default font list for a Apple LaserWriter NT:

```
printer-name:zone-name -f applwnt
```

NOTE: Font list files must be stored in the SYS:SYSTEM\NW-MAC\FONTS directory and must use the ".FNT" filename extension. Please see Table 22 on page 191 for the standard font list files.

If you are specifying a queue for a PostScript printer on a serial or parallel (or remote) connection, you must specify a font list file for the queue.

The following configuration line specifies a queue named "MAIN_Q" and a print spooler named "Main Q." The AppleTalk print server has been disabled by specifying the **-wb** option, so the **-f** option is used to provide the print spooler with the proper list of fonts, in this case, the default font list supported by the Apple LaserWriter IINT:

```
-o "Main Q" -wb -f applwnt
```

This configuration line instructs ATPS to obtain the font list from SYS:SYSTEM\NW-MAC\FONTS\APPLWNT.FNT. For each AppleTalk

spooler, a font list must be obtained either from the specified AppleTalk printer or from a font list file.

See "Turning Off the AppleTalk Print Server: -wb" on page 174 for more information about the **-wb** option.

Enabling Printer Security: -h

The **-h** option prevents Macintosh users from bypassing the queue and submitting print jobs directly to the printer (sometimes called "bypass printing").

The following configuration line specifies a queue that will send jobs to a LaserWriter named "LaserWriter1" in the "Engineering" zone.

```
LaserWriter1:Engineering -o "Tim's Queue" -h
```

The AppleTalk print spooler will be named "Tim's Queue" and the NetWare queue will be named "TIM_S_QUEUE."

The **-h** option causes the AppleTalk print server to instruct the printer to use a different NBP type, for example, "LaserShared" instead of "LaserWriter." This prevents the Chooser from listing the printer as a device of type "LaserWriter." If you have multiple print queues configured for one printer, a single instance of **-h** hides the printer on the AppleTalk internet.

The printer becomes visible again if ATPS is unloaded, or if you choose to make it visible again by using the ATPSSHOW command.

NOTE: "ATPS Console Commands" on page 198 describes console commands for hiding AppleTalk printers or making "hidden" printers visible.

Including Laser Prep Files in All Macintosh Print Jobs: -l

Please refer to "Laser Prep Files: *.PRS" on page 194 for a discussion of Laser Prep files and how they are used by printers.

If you are configuring a queue for a LaserWriter or compatible printer on a serial or parallel (or remote) connection, you use **-l** (lowercase L) to include the correct Macintosh Laser Prep file in each Macintosh print job as it is placed in the queue.

For example, the following configuration line specifies the default font list for the Apple LaserWriter NT, and specifies that the required Laser Prep file will be included in each Macintosh print job:

```
-o "Main Q" -wb -f applwnt -l
```

This example configuration line creates a queue named "MAIN_Q" and a print spooler named "Main Q." It also turns off the AppleTalk print server, to allow PSERVER to send print jobs to a serial, parallel, or remote printer. See “Turning Off the AppleTalk Print Server: -wb” on page 174 for information about the **-wb** option.

NOTE: “Recommended Way to Handle Laser Prep Files” on page 195 describes an alternative way to manage these files, which avoids the print performance penalty caused by using the -loption.

Changing the Number of Concurrent Print Jobs Allowed: -n

By default, NetWare for Macintosh v3.12 allows ten Macintosh print jobs (ten Printer Access Protocol connections) to write to a single AppleTalk print spooler at any given moment. If more than ten print jobs attempt to write to a print spooler concurrently, ATPS returns a message to the Macintosh indicating that the printer is busy. This message will disappear and the spooler will accept the print job as soon as one of the print jobs has been written to the queue.

If you wish to allow more or less than ten print jobs to write to a queue concurrently, use the **-n** option when configuring ATPS. For example, the following line creates a spooler named "NW LaserWriter2" and a queue named "NW_LASERWRITER2," and allows 5 Macintosh print jobs to be submitted concurrently:

```
"LaserWriter2:Engineering" -n5
```

Because the print spooler accepts jobs very quickly, a setting of less than ten should suffice for most sites. You can reduce the maximum amount of memory that could be used by the print queue and control the number of AppleTalk connections it can consume by limiting the number of print jobs it will accept at the same time.

The number of concurrent print jobs must be 50 or less. The amount of memory on the file server, available disk space, available AppleTalk stack connections, and processor time are factors to consider when increasing or decreasing the number of concurrent print jobs.

Assigning a Descriptive Name: -o

When you specify a configuration line in ATPS.CFG, you can allow ATPS to create a default print spooler name of "**NW** *printer-name*," or you can use the **-o** option to specify a spooler name explicitly. In either case, the queue name is derived from the spooler name.

The following configuration line specifies a queue for a LaserWriter named "Robin" in the "Publications" zone:

```
Robin:Publications -o "Doc Queue"
```

The AppleTalk print spooler will be named "Doc Queue" and the NetWare print queue used will be named "DOC_QUEUE."

AppleTalk print spooler names follow the rules for all Macintosh Chooser names: they can include up to 31 characters but cannot include the **:** or **@** characters. NetWare print queue names can include up to 47 characters, and cannot include (in addition to **:** or **@**) spaces or the **/ \ ; , * ? %** or **+** characters.

The name of a queue used by ATPS is derived from the spooler name by converting special characters and spaces in the spooler name to underscore characters, and converting uppercase and lowercase characters to all uppercase. The queue is created by ATPS if it does not already exist.

NOTE: You must use the **-o** option to name queues for serial, parallel, or remote printers. Because these printers are not on the AppleTalk network, ATPS cannot use the AppleTalk printer name in the default configuration syntax.

See "Turning Off the AppleTalk Print Server: -wb" on page 174 for information about naming queues for serial, parallel, or remote printers.

Advertising a Queue in a Specified Zone: -o

In NetWare for Macintosh, the internal AppleTalk network is an extended Phase 2 network, which can support multiple zones. A reason for configuring multiple zones on an internal network is to advertise AppleTalk print spoolers in a zone other than the default internal zone. See "Internal Network and Zone Configuration" on page 33 for more information about the internal network.

NOTE: Configuring an AppleTalk print spooler to appear in one of the multiple zones on the internal network is not recommended on AppleTalk internets that support Phase 1 routers. The spooler will not appear reliably to all Macintosh users.

To specify the zone in which the AppleTalk print spooler will appear in the Macintosh Chooser, use the **-o** option with this syntax:

-o *spooler-name*[:*izone-name*]

NOTE: When you specify a zone name following the spooler name, it must be preceded by a colon character (**:**). The zone name you specify must be one of the zones of the server's internal AppleTalk network. If a space character appears anywhere in the **"***spooler-name*:*izone-name***"** string, you must enclose the entire string in double-quotes.

spooler-name is the name of the AppleTalk print spooler, and *izone-name* is the name of the internal zone in which the print spooler will be visible. If you don't specify the *izone-name* parameter, the spooler will always appear in the default zone of the server's internal network (the first zone in the zones list specified for the internal network).

For example, assuming that the internal network has been configured with two zones, "Sales" and "Marketing," the following configuration line creates a spooler named "LW_queue," which will appear in the "Marketing" zone:

"my-printer:my zone" -o LW_queue:Marketing

If you wish to use the default spooler name ("NW *printer-name*") but you wish to advertise in a zone other than the default zone of the internal network, you can simply specify the *izone-name* parameter as follows:

printer-name*:*zone-name* -o :*izone-name

For example, the following configuration line creates a spooler named "NW my-printer" which will appear in the "Marketing" zone of the internal network:

"my-printer:my zone" -o :Marketing

The queue name will be visible to users of DOS users of the Print Queue module as "NW_MY_PRINTER."

Specifying a Printer Type: -t

To create a spooler or specify a printer other than the default LaserWriter type, you must specify the printer type on the configuration line by using the **-t** option. The **-t** option requires that you specify a valid NBP type. The default printer types are "LaserWriter" (the default), "ImageWriter," or "LQ."

The following configuration line sends print jobs to an ImageWriter LQ named "Reports IW" in the "Marketing" zone.

```
"Reports IW:Marketing" -t LQ
```

The AppleTalk print spooler will named "NW Reports IW," and the NetWare queue will be named "NW_REPORTS_IW."

If you wish to specify a printer type other than the default printer types, see "AppleTalk Printers That Use a Different NBP Type" on page 172.

Options for Non-Apple Printers: -t, -s, -f, and -l

There are two types of non-Apple printers for which you might want to create a queue in ATPS.CFG: (1) printers that are fully compatible with Apple printers, and (2) AppleTalk printers that use a different NBP type. Please turn to "AppleTalk Basics" on page 255 if you would like background information about NBP.

Fully Compatible Non-Apple Printers

For printers that are truly compatible with the Apple LaserWriter, ImageWriter, or ImageWriter LQ, you can use the same configuration lines as those shown for the respective Apple printers in this chapter.

If the printer is a LaserWriter-compatible PostScript printer, there can be PostScript and TrueType font issues that might cause problems between the Macintosh LaserWriter driver and the printer itself. If you run into problems with PostScript extensions or TrueType fonts, contact the printer manufacturer.

AppleTalk Printers That Use a Different NBP Type

For third-party printers that use their own Macintosh print software rather than the Apple LaserWriter or ImageWriter drivers, you need to use the Lookup service function in the ATCON utility to determine the printer's NBP type. To do so, follow these steps:

1. Load ATCON at the file server console and choose Lookup and Echo Services in the ATCON menu.
2. Highlight Edit Lookup Parameters and then press <Enter>.

   When you press <Enter>, a dialog opens.

If you know the printer's name, enter the printer's name in the Name field. If you do not know the printer's name, leave the default equals sign (=) in both the Name and Type fields.

3. Highlight the Zone field and press <Enter> to choose the printer's zone.
4. Press <Esc> and answer Yes to use these settings.
5. Use the arrow keys to select Execute Lookup Test in the Available Actions menu, and then press <Enter>.

   After a few seconds, you should see the results of the Lookup service, where the printer's type (or the types of all printers in that zone) will be displayed. If the Lookup fails, the name of the service won't appear. If no services are available, a message is displayed.

If you are creating a queue for a non-Apple printer that is not completely compatible, keep these suggestions in mind:

- Specify the printer's NBP type by using the **`-t`** option on the ATPS configuration line. ATPS uses the NBP printer type you specify both when a user selects an icon in the Chooser (client-to-server lookup), and when the print server ships a print job to the printer (server-to-printer lookup).
- If the printer is a PostScript printer, use the **`-s`** option on the ATPS configuration line. The **`-s`** option informs ATPS that the printer behaves like a LaserWriter, even though its NBP type is different, and that the spooler should behave like a LaserWriter.
- If the printer is a PostScript printer not on the AppleTalk network, use the **`-f`** option to specify a font list for the AppleTalk print spooler, as described in "Specifying a PostScript Font List: -f" on page 167 and "PostScript Font Lists: *.FNT Files" on page 191 for a discussion of font lists.
- If the printer is a PostScript printer not on AppleTalk, use the **`-l`** option to include the Laser Prep file in Macintosh print jobs, as described in "Including Laser Prep Files in All Macintosh Print Jobs: -l" on page 168. For a discussion of Laser Prep files, see "Laser Prep Files: *.PRS" on page 194.

For example, to create a print queue for a non-Apple PostScript printer that behaves like a LaserWriter, use this configuration line:

```
printer-name -t printer-type -s
```

NOTE: The Macintosh must be running printer software for the third-party printer, as would be true if Macintosh users were printing directly to the printer over AppleTalk.

Potential Problems with Using PSERVER with Serial Printers

Connecting a printer serially via PSERVER instead of over AppleTalk via ATPS can have many disadvantages. Performance will most likely be slower, potentially by a factor of 10, and the communications channel itself is less reliable (data is more likely to contain errors). Additionally, with PostScript printers connected serially via PSERVER, you lose the following capabilities:

- The ability to send binary PostScript data (see "Technical Note about Printer Communication Channels" on page 179)
- The ability to print banners before jobs
- The reporting of PostScript errors

Turning Off the AppleTalk Print Server: -wb

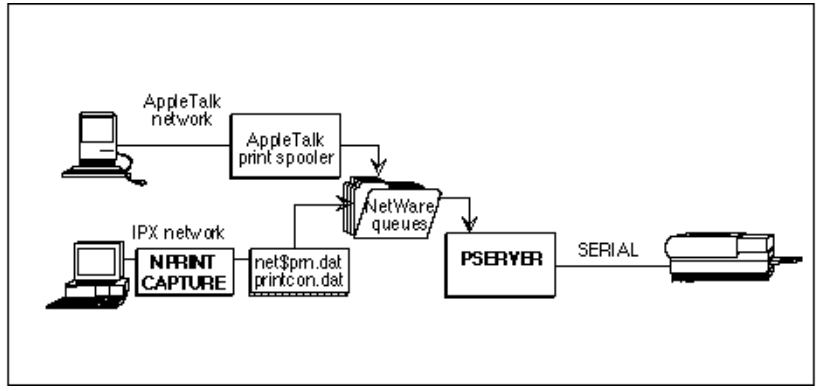
In NetWare for Macintosh, print queues can be advertised on AppleTalk and serviced by PSERVER to a serial, parallel, or Novell Remote printer. The print queues can also be serviced by third-party print server products.

When using ATPS to advertise a queue that is not to be serviced by an AppleTalk printer, you need to "turn off" the AppleTalk print server and configure PSERVER instead. This section describes how to "turn off" the AppleTalk print server.

NOTE: See "Print Server Configuration Options" on page 179 for information on configuring PSERVER.

Figure 51 shows how a queue operates when the AppleTalk print server has been disabled:

Figure 51 NetWare Queue with AppleTalk Print Spooler but No AppleTalk Print Server



To specify a queue such as the one shown in Figure 51, use the **-wb** option. For example, the following configuration line specifies a spooler for a queue named QUEUE1:

```
-o QUEUE1 -wb -l -f applwnt
```

When PostScript printers are not on AppleTalk, ATPS cannot query the printer for its font list or Laser Prep version.

- For PostScript printers, use the **-f** option to specify a font list for the printer, as described in "Specifying a PostScript Font List: -f" on page 167.
- For PostScript printers, use the **-l** option to include the correct Laser Prep file in Macintosh print jobs, as described in "Including Laser Prep Files in All Macintosh Print Jobs: -l" on page 168.

ImageWriter and ImageWriter LQ queues can also be serviced by PSERVER if you specify a configuration line like this:

```
-o IW_QUEUE -wb -t ImageWriter
```

or

```
-o LQ_QUEUE -wb -t LQ
```

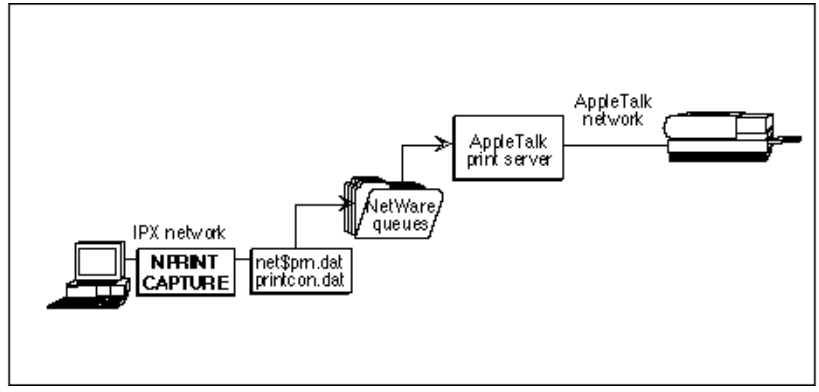
Note that ImageWriter queues do not use the **-l** option or the **-f** option, because Laser Prep files and PostScript fonts do not apply. The **-c** option applies for color ImageWriters and ImageWriter LQs.

Turning Off the AppleTalk Print Spooler: -wf

In NetWare for Macintosh, you can configure a queue that sends print jobs to a printer on AppleTalk, but does not accept print jobs from the AppleTalk network (Macintosh clients). This enables you to create a queue for an AppleTalk printer that accepts jobs from DOS, Windows, and OS/2 users, as well as other print packages such as NFS PRINT.

To specify a queue to be serviced by an AppleTalk printer but not advertised to Macintosh users, you need to "turn off" the AppleTalk print spooler. "NetWare Queue with AppleTalk Print Server but without the Print Spooler" on page 176 shows how a queue operates when the AppleTalk print spooler has been disabled:

Figure 52 NetWare Queue with AppleTalk Print Server but without the Print Spooler



To specify a queue such as the one shown in Figure 52, use the **-wf** option. For example, the following configuration line creates a queue named QUEUE1 for an AppleTalk printer named "LaserWriter1":

```
LaserWriter1 -o QUEUE1 -wf
```

The **-wf** option instructs ATPS *not* to advertise the queue on AppleTalk, but to send its print jobs to the specified printer on the AppleTalk network.

Please refer to "Multiple AppleTalk Printers Servicing a Print Queue: -wf" on page 177 for additional uses for the **-wf** option.

Multiple AppleTalk Printers Servicing a Print Queue: -wf

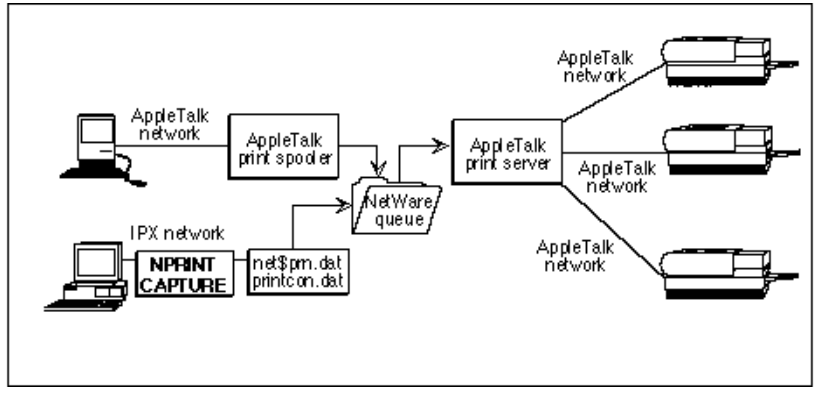
In NetWare for Macintosh, a print queue can be serviced by more than one printer.

NOTE: When multiple printers are servicing a print queue, a print job is sent to the first available printer servicing that queue.

All of the printers servicing one queue should be of the same printer type; for example, multiple LaserWriters and compatibles, multiple ImageWriters, or multiple ImageWriter LQs. There is no maximum number of AppleTalk printers that can service a single print queue.

Figure 53 shows a single print queue being serviced by three LaserWriter NT printers on the AppleTalk network:

Figure 53 One Print Spooler with Multiple AppleTalk Printers



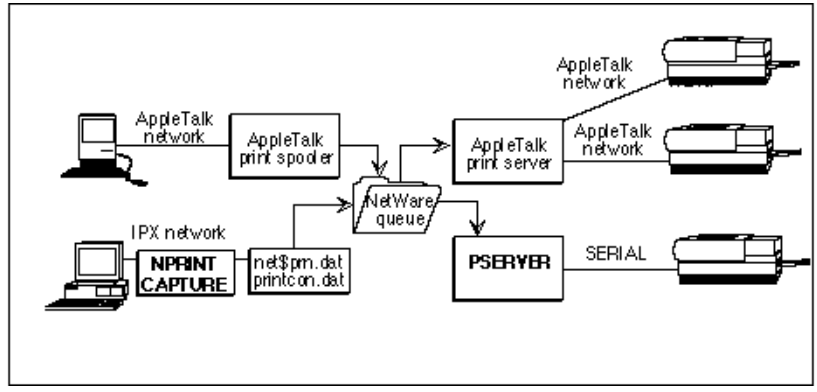
To configure a queue such as the one shown in Figure 53, create three configuration lines in ATPS.CFG, all using the same queue name. Only one of the configurations will create an AppleTalk print spooler; the other two configuration lines "turn off" the print spooler by using the **-wf** option. This insures that only one spooler is created for the queue. For example, the following configuration lines create a queue and spooler named QUEUE1, which will be serviced by three AppleTalk printers, named "LaserWriter1," "LaserWriter2,"and "LaserWriter3":

```
LaserWriter1:zone1 -o QUEUE1 -f applwnt
LaserWriter2:zone2 -o QUEUE1 -wf
LaserWriter3:zone3 -o QUEUE1 -wf
```

The **-f** option is recommended when you configure multiple printers to service a single queue. If the printers do not all support the identical set of fonts, you can create a "global" font list, which includes each font that is supported on *each and every* printer servicing the queue, to ensure that print jobs print correctly on any of the associated printers. (Otherwise, the font list for the queue is obtained by querying the printer configured without **-wf** for the queue.) See "Creating Specialized Font Files" on page 193 for information about creating a "global" font list.

Figure 54 shows a single print queue being serviced by three LaserWriter NT printers, two on the AppleTalk network and one on a direct or remote serial port:

Figure 54 Another Example with Multiple Printers



To create a queue such as the one shown in Figure 54, create two configuration lines in ATPS.CFG, both of which use the same queue name. Only one of the configuration lines specifies an AppleTalk print spooler, and the other one "turns off" the print spooler by using the **-wf** option. The following configuration lines create a spooler and a queue named QUEUE1, which will be serviced by two AppleTalk printers named "LaserWriter1" and "LaserWriter2":

```
LaserWriter1:zone1 -o QUEUE1 -f applwnt -
LaserWriter2:zone2 -o QUEUE1 -wf
```

The serial printer that will service this queue must obtain its Laser Prep file along with Macintosh print jobs, so the ATPS.CFG configuration must include the **-l** option. See "Laser Prep Files: *.PRS" on page 194 for more information.

NOTE: After creating the configuration lines in ATPS.CFG, you must use PCONSOLE to configure PSERVER for the serial printer. Make sure to select the correct queue (named "QUEUE1" in this example) in PCONSOLE. Please see "Creating a Queue for an Apple Printer on a Direct Serial Connection" on page 181 for detailed instructions.

Print Server Configuration Options

This section describes how to use PCONSOLE to configure PSERVER for the following printers:

- An Apple printer connected to a serial port on the server.
- An Apple printer connected to a DOS workstation.

Please refer to "Options for Non-Apple Printers: -t, -s, -f, and -l" on page 172 for suggestions if you are using LaserWriter-compatible PostScript printers.

Technical Note about Printer Communication Channels

This section discusses the differences between AppleTalk connections and serial, parallel, or Novell Remote Printer connections. These types of communications channels are shown in Table 20.

Table 20 Printer Communication Channels

Type of Connection	Description of Communications Channel
AppleTalk	AppleTalk's Printer Access Protocol (PAP) is a "binary capable" communications channel, which means that it has ways of handling flow control, requesting status, and signaling the end of a job which do not depend on a print job's data stream. A binary capable channel allows all 8-bit characters to be received by the printer.
Serial	Serial (RS-232) communication channels may depend on certain control codes such as X-On/X-Off being sent as part of the data stream. A PostScript job on an RS-232 channel includes additional control characters to request printer status (0x14), interrupt the PostScript interpreter (0x3) or signal the end of a job (0x4). When a serial printer receives a data stream including control codes, the printer's communications interface detects the control codes and removes them from the data stream so that they can be acted upon. This means that the serial channel is not "binary- capable," that is, some data values cannot be received by the printer's PostScript interpreter because the communications interface will always intercept them. A serial channel may be configured to use less than 8 bits of data per character.

Type of Connection	Description of Communications Channel
Parallel or Novell Remote Printer	Centronix Parallel and Novell Remote Printer communications channels use 0x4 (Control-D) to signal the end of a job to the PostScript interpreter, primarily because of the precedent set by the serial channel. This means that parallel and Remote Printer connections are also not binary capable.

Macintosh PostScript Applications

Most Macintosh applications and drivers generate "Clean8Bit" PostScript data. ("Clean8bit" is a PostScript classification specified by Adobe Systems, Inc. in which the PostScript data does not rely on the binary-capable nature of AppleTalk.)

NOTE: When you use NPRINT to download the SERIAL.PS program to a LaserWriter on a serial channel, the program changes the LaserWriter's interface to accept 8-bit rather than 7-bit data. For all Macintosh applications that produce Clean8Bit data, this program solves problems with character translation or loss of characters that might otherwise be seen on a serial interface.

Some Macintosh applications rely on the binary-capable nature of AppleTalk to send bitmap information or other binary data. Although Adobe Systems has developed a standard for safely encoding binary information for transmission across non-binary channels, few printers currently support it.

If applications at your site produce binary PostScript data, you should connect the printer via AppleTalk rather than by using a serial or other non-binary connection.

DOS PostScript Applications

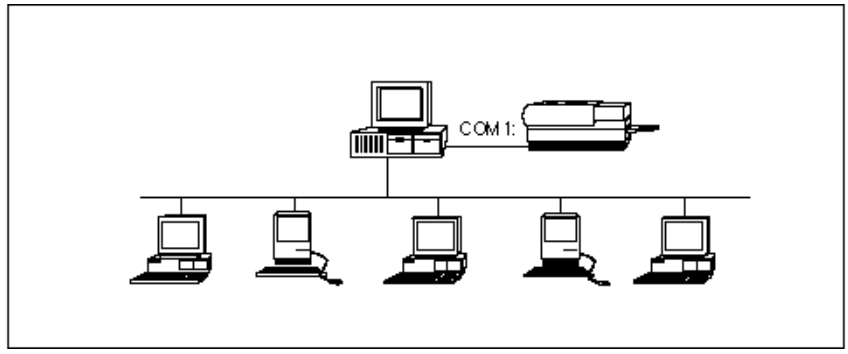
Many DOS and Windows applications generate PostScript to be sent to a printer across a serial or parallel interface. These applications include the Control-D (0x4) character to signal the end of the job. If this data is sent to a queue serviced by an AppleTalk printer, the Control-D character will be passed to the printer's PostScript interpreter instead of being intercepted by the printer's serial or parallel interface. This can cause PostScript errors or job failures from these applications. ATPS solves this problem by filtering jobs for Control-D characters and replacing them with Printer Access Protocol (PAP) EOFs.

NOTE: Other DOS and Windows applications may generate binary PostScript data, which could use Control-D as data rather than to signal the end of a job. For these applications, you should create a print job configuration using the "PostScript (Binary Graphics)" mode in PRINTCON. See “PostScript Binary Graphics Mode” on page 208 for details.

Creating a Queue for an Apple Printer on a Direct Serial Connection

This example shows how to create a print queue that will be advertised on the AppleTalk network for a LaserWriter NT connected to a serial port on the NetWare v3.12 file server. The example printer setup is shown in “Apple Printer on a Direct Serial Connection” on page 181.

Figure 55 Apple Printer on a Direct Serial Connection



To enter a configuration that will be in effect when you load the ATPS module, follow these steps:

1. Load INSTALL and select Product Options in the main INSTALL menu.
2. Press <Enter> on the line specifying NW-MAC v3.12.

   When you press <Enter>, the Editable Configuration Files menu opens.
3. Use the arrow keys to select ATPS.CFG in the menu and then press <Enter>.

   Pressing <Enter> opens a text editor window in which you can enter the server's print queue configuration. In the ATPS.CFG text window, enter the following configuration line:

   ```
   -o serial_Q -l -f applwnt -wb
   ```

   NOTE: If you are creating an AppleTalk print spooler for an existing NetWare print queue, you enter a configuration line such as the one shown above, specifying the existing queue name. In that case, the name of the existing queue must be 31 characters or less.

   When you have entered the configuration line in ATPS.CFG,
4. Exit the INSTALL program, saving your changes.

5. Go to a DOS workstation, and log in to the server as supervisor or equivalent.

6. Open PCONSOLE, highlight Print Queue Information in the Available Options menu, and then press <Enter>.

   To open PCONSOLE, type **PCONSOLE** at the prompt.

7. Press <Ins> to create a new queue and enter the name for the queue you just created in ATPS.CFG.

   For this example, type **SERIAL_Q**.

   In PCONSOLE, the name of a queue is always upper-case, no matter how you type it, so it is not important that you match upper- and lowercase characters when you type the queue name.

8. Press <Esc>, highlight Print Server Information, and press <Enter>.

9. Press <Ins> to create a new print server and enter a name for the print server you are creating.

   For this example, type **SERIAL_PSRVR** (you can specify any valid PCONSOLE name) and then press <Enter>.

10. Press <Enter> again to get to the Print Server Information window for the server you just created.

11. Highlight Print Server Configuration and press <Enter>.

12. Highlight Printer Configuration and press <Enter>.

    Now you have a list of printers that say "Not Installed."

13. Press <Enter> to define a printer.

14. Enter a name for the printer connected to the server's serial port.

    Enter a name or leave PRINTER_0 (you can enter any valid PCONSOLE name).

15. Highlight the Type field and press <Enter>.

    There are four serial choices, one for each possible port on the server. Select the correct choice for the port you used to connect the printer, e.g., COM1.

    NOTE: Make sure that you choose Serial rather than Remote Serial.

16 Use the arrow keys to move to the Use Interrupt field.

If you know the correct interrupt for the serial port you have chosen, leave "Use Interrupts" as "Yes," and enter the IRQ in the proper field below. Otherwise, choose "No."

17 Unless you have server-specific information that should be added in the next three fields, leave them with the default values.

18 Use the arrow keys to move to the "Baud Rate" field.

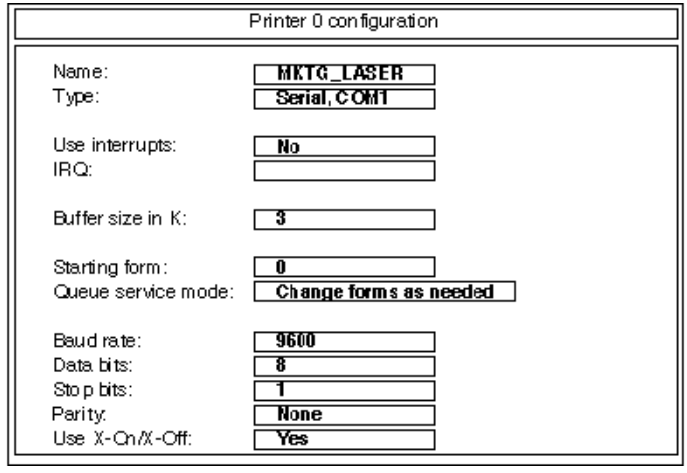
This and the remaining fields are for information specific to the configuration of your printer's serial interface. For most LaserWriters, the default information will be correct, except for X-ON/X-OFF, which should be turned on. To turn it on,

19 Choose "Yes" in the "Use X-ON/X-OFF" field.

If your LaserWriter's serial interface is configured differently, make sure that you change these fields appropriately.

See Figure 56 for an example PCONSOLE window.

Figure 56 Example PCONSOLE Window Showing Direct Serial Connection



20 Press <Esc> and say "Yes" to save your changes.

21 Press <Esc> again to leave the configured printer's menu.

22 In the Print Server Configuration menu, highlight "Queues Serviced by Printer" and press <Enter>.

The printer you just defined should be listed here.

23 Choose that printer's name and press <Enter>.

24 Press <Ins> to see all queues on the server.

25 Choose SERIAL_Q and press <Enter>.

26 Press <Enter> again in the "Priority" window.

27 Press <Esc> twice and highlight "Notify List for Printer" in the Print Server Configuration menu. Then press <Enter>.

You will see a list of defined printers.

28 Select your printer and press <Enter>.

29 Press <Ins> to bring up a list of Notify candidates.

30 Press <Enter> on "Job Owner."

Choosing "Job Owner" as a Notify candidate means that the print server will notify the owner of a print job when a printer runs out of paper or goes off-line when processing his or her job.

When you press <Enter>, a "Notify Intervals" window opens. Press <Esc> and say "Yes" to save all the changes you have made. If you wish to configure more Notify candidates, press <Ins> and repeat the process. When you have configured the Notify List,

31 Press <Esc> as necessary to exit PCONSOLE.

32 Return to the file server on which the queue was created.

At the file server console, type

```
LOAD PSERVER SERIAL_PSRVR <Enter>
```

If ATPS is already running on this server, unload it by typing

```
UNLOAD ATPS <Enter>
```

(Otherwise, skip this step.)

Load ATPS by typing

```
LOAD ATPS <Enter>
```

33 Return to the DOS workstation again.

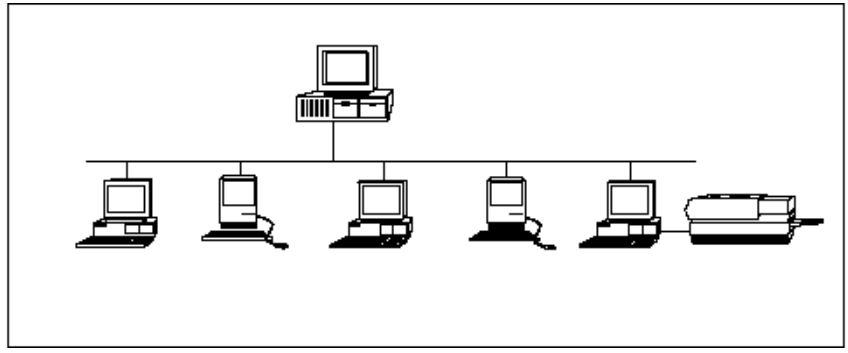
34 Change directories to SYS:PUBLIC and use NPRINT to send the program "SERIAL.PS" to the queue.

The SERIAL.PS program changes the Apple LaserWriter's serial interface to use 8 bits of data rather than 7 bits. This is recommended for Macintosh print jobs. See "Technical Note about Printer Communication Channels" on page 179 for details.

Creating a Queue for an Apple Printer on a Remote DOS Workstation

This example shows how to create a print queue for a LaserWriter connected to a serial port on a remote DOS workstation. The example printer setup is shown in "Apple Printer on a Remote DOS Workstation" on page 185:

Figure 57 Apple Printer on a Remote DOS Workstation



To enter a configuration that will be in effect when you load the ATPS module, follow these steps:

1 Load INSTALL and select Product Options in the main INSTALL menu.

2 Press <Enter> on the line specifying NW-MAC v3.12.

When you press <Enter>, the Editable Configuration Files menu opens.

3 Use the arrow keys to select ATPS.CFG in the menu and then press <Enter>.

Pressing <Enter> opens a text editor window in which you can enter the server's print queue configuration. In the ATPS.CFG text window, enter the following configuration line:

```
-o remote_Q -l -f applwnt -wb
```

4. Exit the INSTALL program, saving your changes.
5. Go to a DOS workstation, and log in to the server as supervisor or equivalent.
6. Open PCONSOLE, highlight Print Queue Information in the Available Options menu, and then press <Enter>.

   To open PCONSOLE, type **PCONSOLE** at the prompt.
7. Press <Ins> to create a new queue and enter the name for the queue you just created in ATPS.CFG.

   For this example, type **REMOTE_Q**.

   In PCONSOLE, the name of a queue is always upper-case, no matter how you type it, so it is not important that you match upper- and lowercase characters when you type the queue name.
8. Press <Esc>, highlight Print Server Information, and press <Enter>.
9. Press <Ins> to create a new print server and enter a name for the print server you are creating.

   For this example, type any valid PCONSOLE name, such as **REMOTE_PSRVR**, and then press <Enter>.
10. Press <Enter> again to get to the Print Server Information window for the server you just created.
11. Highlight Print Server Configuration and press <Enter>.
12. Highlight Printer Configuration and press <Enter>.

    Now you have a list of printers that say "Not Installed."
13. Press <Enter> to define a printer.
14. Enter a name for the printer connected to the remote DOS workstation's serial port.

    Enter a name or leave PRINTER_0 (you can enter any valid PCONSOLE name).
15. Highlight the Type field and press <Enter>.

    There are four serial choices, one for each possible port on the server. Select the correct choice for the port you used to connect the printer, e.g., REMOTE COM1.

    NOTE: Make sure that you choose Remote Serial rather than Serial.

16 Use the arrow keys to move to the Use Interrupt field.

If you know the correct interrupt for the serial port you have chosen, leave "Use Interrupts" as "Yes," and enter the IRQ in the proper field below. Otherwise, choose "No."

17 Unless you have server-specific information that should be added in the next three fields, leave them with the default values.

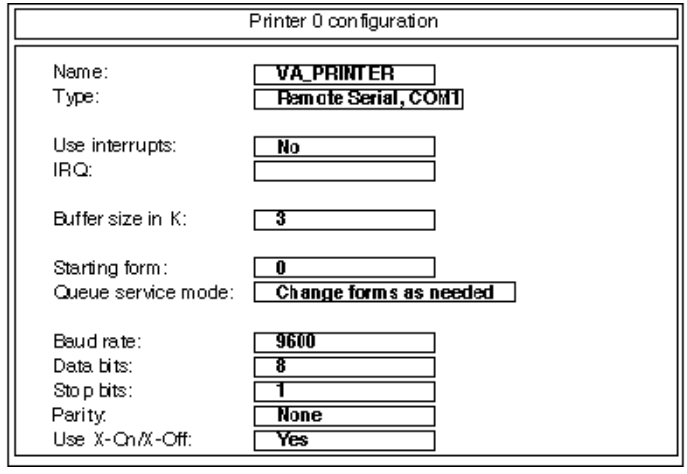
18 Use the arrow keys to move to the "Baud Rate" field.

This and the remaining fields are for information specific to the configuration of your printer's serial interface. For most LaserWriters, the default information will be correct, except for X-ON/X-OFF, which should be turned on. To turn it on,

19 Choose "Yes" in the "Use X-ON/X-OFF" field.

If your LaserWriter's serial interface is configured differently, make sure that you change these fields appropriately.

Figure 58 Example PCONSOLE Window Showing Remote Serial Connection



20 Press <Esc> and say "Yes" to save your changes.

21 Press <Esc> again to leave the configured printer's menu.

22 In the Print Server Configuration menu, highlight "Queues Serviced by Printer" and press <Enter>.

The printer you just defined should be listed here.

23 Choose that printer's name and press <Enter>.

24 Press <Ins> to see all queues on the server.

25 Choose REMOTE_Q and press <Enter>.

26 Press <Enter> again in the "Priority" window.

27 Press <Esc> twice and highlight "Notify List for Printer" in the Print Server Configuration menu. Then press <Enter>.

You will see a list of defined printers.

28 Select your printer and press <Enter>.

29 Press <Ins> to bring up a list of Notify candidates.

30 Press <Enter> on "Job Owner."

Choosing "Job Owner" as a Notify candidate means that the print server will notify the owner of a print job when a printer runs out of paper or goes off-line when processing his or her job.

When you press <Enter>, a "Notify Intervals" window opens. Press <Esc> and say "Yes" to save all the changes you have made. If you wish to configure more Notify candidates, press <Ins> and repeat the process. When you have configured the Notify List,

31 Press <Esc> as necessary to exit PCONSOLE.

32 Return to the file server on which the queue was created.

At the file server console, type

```
LOAD PSERVER REMOTE_PSRVR <Enter>
```

33 Return to the remote DOS workstation to which the printer is connected.

34 Modify SHELL.CFG to contain the line

```
SPX=50
```

35 Reload the NetWare shell to make this change active.

36 Log in as GUEST to the server on which the queue was created.

37 Type RPRINTER at the command line.

In the main RPRINTER menu,

38 Select the print server you configured earlier and press <Enter> to open a list of remote printers defined for this print server.

39 Choose the name of the remote printer you defined for this print server and press <Enter>.

40 Exit to DOS.

You will see a message indicating that the remote printer has been installed.

41 Return to the file server on which the queue was created.

If ATPS is already running on this server, unload it by typing

```
UNLOAD ATPS <Enter>
```

(Otherwise, skip this step.)

Load ATPS by typing

```
LOAD ATPS <Enter>
```

42 Return to a DOS workstation again.

43 Change directories to SYS:PUBLIC and use NPRINT to send the program "SERIAL.PS" to the queue.

The SERIAL.PS program changes the Apple LaserWriter's serial interface to use 8 bits of data rather than 7 bits. This is recommended for Macintosh print jobs. See “Technical Note about Printer Communication Channels” on page 179for details.

Managing Print Queues, Font Lists, and Laser Prep Files

This section describes how to manage print queues. It describes the issues related to PostScript fonts, Laser Prep files, and queue directories in detail. It also lists the ATPS console commands and describes how to view "verbose" messages when troubleshooting a queue. PCONSOLE management tasks are described, including step-by-step instructions for deleting a queue.

Files and Directories Used by ATPS

The files and directories shown in Table 21 are related to AppleTalk print services.

Table 21 ATPS-Related Files

File or Directory	Explanation
NW-MAC\FONTS	This directory is created within the server's SYS:SYSTEM directory when is installed. It contains *.FNT files for the default font lists (the fonts that are always resident) for Apple LaserWriters.
ATPS	By default, this directory is created within the server's SYS:SYSTEM directory when the ATPS NLM is loaded. It will contain directories for all NetWare print queues that will be advertised or serviced by the ATPS NLM, as well as the ATPS.CFG file, described below. If you wish, you can specify a different name and location for the ATPS directory by using the `-D` option when loading the ATPS module.
ATPS.CFG	This file resides in the NetWare server's SYS:SYSTEM directory. If you specify NetWare print queues that will be advertised or serviced by the ATPS NLM, ATPS.CFG contains an entry for each of these queues. This file can be created or edited by using the INSTALL utility.
*.QDR	A *.QDR directory is created in the ATPS directory for each queue created in the ATPS.CFG file. These directories are used to temporarily store print jobs when they are submitted to the queue. There must be enough available disk space to accommodate incoming print jobs on the volume containing the *.QDR directories.
ATPS*.FNT	One *.FNT file is created in the ATPS directory for each AppleTalk PostScript printer serviced by a queue created in the ATPS.CFG file. These files can be created by specifying a font list when creating the queue, or they can be created automatically when ATPS queries an AppleTalk printer.
*.QRY	When a Macintosh client sends a print job, it sends a ProcSet query to the spooler to find out whether the printer is initialized with the same version of the Laser Prep file that is present on the Macintosh. This query is stored in a *.QRY file in the ATPS directory and used by the ATPS module whenever it is necessary to query the printer for its Laser Prep version.
*.PRS	When ATPS receives a ProcSet query from a Macintosh client, it checks to be sure that the current version of the Laser Prep file is stored in the ATPS directory. All versions of the Laser Prep files are stored in *.PRS files. When a Macintosh uses a Laser Prep version that ATPS does not have, a new *.PRS file is created.

PostScript Font Lists: *.FNT Files

The ATPS module must be able to ascertain which fonts are supported on a PostScript printer that services the queue. If the ATPS module cannot determine a font list for a queue, that queue will not be advertised on AppleTalk.

When you install NetWare for Macintosh, the following font list files are copied to SYS:SYSTEM\NW-MAC\FONTS:

Table 22 Default Font Files

Filename	Font List
APPLW.FNT	Default fonts for the Apple LaserWriter
APPLWPLS.FNT	Default fonts for the Apple LaserWriter Plus
APPLWNT.FNT	Default fonts for the Apple LaserWriter II NT
APPLWNTX.FNT	Default fonts for the Apple LaserWriter II NTX
HPLASER.FNT	Default fonts for the HP Laser Jet family with installed PostScript option

NOTE: Except for APPLW.FNT, all of the font list files listed in Table 22 have the same list of fonts and can be used interchangeably.

ATPS can obtain a font list for a queue in one of the following ways:

- ATPS can query an AppleTalk printer servicing the queue. It then creates a *.FNT file in the ATPS directory containing that printer's current font list. You can use the ATPSQUERY command to update the font list at any time. Please refer to "Updating AppleTalk Print Spoolers' Font Lists" on page 200 for information about this command.
- ATPS can use the font list specified on the configuration line (via the `-f` option). You can specify one of the default font files provided with NetWare for Macintosh, or create a specialized font list. (See "Creating Specialized Font Files" on page 193.)
- ATPS can query the AppleTalk printer specified on the configuration line and use that printer's font list, even if the queue is serviced by another printer.

Issues Related to PostScript Fonts

Each type of Apple LaserWriter has a set of resident fonts available in ROM when you turn on the printer. A printer can also support additional fonts that have been downloaded by using a Macintosh Font Downloader application, which will be stored in the printer's RAM until the printer is turned off and on again. If the printer supports an external hard disk, downloaded fonts can be stored on the external disk, in which case they are still available after you turn the printer off and on again.

Macintosh applications query a printer for its font list and automatically download fonts that are required for the print job but are not currently on the printer. If the required font is not available, a bitmap of the font is sent instead. The printer uses the downloaded fonts only for the current print job.

NOTE: If the spooler does not advertise a font that the printer does have, the spooler will request that the Macintosh application download the font. This will cause unnecessary delays in printing or substitution of a bitmap font when a required font is unavailable on the Macintosh. If the spooler advertises a font that the printer does not support, the printer will substitute a default font, usually the monospace Courier font.

In NetWare for Macintosh, the "conversation" between the Macintosh application and the printer is handled instead by the ATPS module, which answers the query from the Macintosh application based on its understanding of the printer's font list. The ATPS module must have a font list for each PostScript-capable spooler when the ATPS module is loaded; if it cannot set the spooler's font list, ATPS does not advertise the queues.

Recommended Way to Handle PostScript Fonts

If an AppleTalk printer is turned off and on again or reset after ATPS has been loaded, or if a Macintosh application downloads a font to the printer's RAM, the queue's font list can become inconsistent with the list of fonts actually supported in the printer.

For AppleTalk printers that will support only the default set of resident fonts, you can either allow the ATPS module to query the printer each time it is loaded, or you can specify one of the default *.FNT files on the configuration line in ATPS.CFG. Either way, you do not need to worry about font lists becoming inconsistent over time.

For AppleTalk printers that will support fonts other than the default resident fonts, the best way to ensure that a queue's font list is consistent with the printer's font list is to supervise the font download process (using a Macintosh Font Downloader), and then manually update the queue's font list by using the

ATPSQUERY *printer-name* command. See “Updating AppleTalk Print Spoolers' Font Lists” on page 200 for information about ATPSQUERY.

NOTE: Fonts should be downloaded directly to the printer, not via a queue.

Creating Specialized Font Files

If a standard font file is not applicable for the model of PostScript printer you are using, or your printer has more fonts (for example, due to expansion boards or attached hard disks), you can create your own font file.

NOTE: This is not necessary for printers on AppleTalk, because ATPS retrieves a font list directly from the printer.

To create a font list for a PostScript printer connected to the file server's serial or parallel port, follow these steps:

1. Change directories to SYS:PUBLIC.
2. Use NPRINT to send the file named FONTLIST.PS to the queue.

   FONTLIST.PS is a PostScript file that instructs the printer to print out its list of fonts in the correct format.
3. Use a text editor such as EDIT.NLM to create a font file.

   Create a new file and type in the list of the printer's fonts as they appear on the printed output.

   - The name of the file must use the ".FNT" extension.
   - The file must be located in SYS:SYSTEM\NW-MAC\FONTS.
   - The last item in the list of fonts must be a single asterisk (*).
   - Lines beginning with a pound-sign character (#) are treated as comments and ignored.
   - Every line must end with a linefeed character (0xA). The EDIT NLM and most DOS text editors use the linefeed character for end-of-line.

     NOTE: Standard Macintosh text editors such as TeachText do not use linefeed characters. Font files created with these editors will not be read correctly by ATPS.

Laser Prep Files: *.PRS

Laser Prep files contain a dictionary of PostScript "shorthand" commands required by the LaserWriter or LaserWriter-compatible printer. These files are used by the LaserWriter driver on the Macintosh when formatting PostScript print jobs, and are used to initialize the printer with the required commands.

The AppleTalk print server must be able to ascertain which version of the Laser Prep file is currently supported on the AppleTalk PostScript printer that services a queue, so it can download a new version if a Macintosh print job requires it. It can do so in one of the following ways:

- When a Macintosh application sends a ProcSet query to determine which version of the Laser Prep file—as reported by ATPS—initialized the printer, ATPS stores the query in files named *.QRY in the ATPS directory. If the printer's Laser Prep file differs from the Laser Prep on the Macintosh, the Macintosh downloads its Laser Prep file, and ATPS stores the Laser Prep file in files named *.PRS in the ATPS directory. ATPS only reports that the Laser Prep file is different if the file is not already stored in the ATPS directory. ATPS can then repeat the process of querying the printer and downloading Laser Prep files for other Macintosh print jobs.
- ATPS can include the correct version of the Macintosh Laser Prep file with each Macintosh print job, as it is placed on the queue. This is recommended for print queues that are serviced by a print server other than the AppleTalk print server.
- Aldus Prep files used by Aldus PageMaker are also supported and downloaded as required.

Issues Related to Laser Prep Files

For compatibility with the LaserWriter 7.0 driver, ATPS resets AppleTalk printers if they are initialized with a version of Laser Prep other than the one required by the current job. This process takes roughly 30 seconds and it causes the printer to generate its initialization page.

NOTE: Print performance is significantly better if all Macintosh clients accessing a queue use the same version of the Laser Prep file.

You can prevent the printer from printing its initialization page when it is reset by following these steps:

1. Change directories to SYS:PUBLIC.
2. Use NPRINT to send the file named NOSTRTPG.PS to the queue.

   NOSTRTPG.PS is a PostScript file that instructs the printer never to print its initialization page, even if the printer is power-cycled.

If you wish to re-enable the initialization page, use these steps:

1. Change directories to SYS:PUBLIC.
2. Use NPRINT to send the file named STRTPGON.PS to the queue.

   STRTPGON.PS is a PostScript file that instructs the printer to resume printing its initialization page when it is power-cycled or reset.

Alternatively, you can send PostScript files to an AppleTalk printer by using a PostScript downloader from a Macintosh workstation.

Recommended Way to Handle Laser Prep Files

The best way to handle Laser Prep files is to ensure that all Macintosh clients are running the same version of the LaserWriter software. If one Macintosh on your network uses System 7.0 or later, we recommend that you install the System 7.0 LaserWriter driver(s) on all Macintosh workstations. Please see the *Using the NetWare for Macintosh Client* guide for details.

If you cannot upgrade all Macintosh clients to use the same version of the Laser Prep file, you can allow the ATPS module to handle Laser Prep versions for AppleTalk printers. When a Macintosh application requires a different Laser Prep version than the one that initialized the printer, ATPS automatically downloads the correct version to the printer. While this causes a print performance penalty, the delay is experienced by the AppleTalk print server rather than the print spooler, so users are not seriously affected.

For serial, parallel, or remote printers, the recommended way to handle Laser Prep files is to instruct the print spooler to include the correct Laser Prep file in each Macintosh print job as it is placed on the queue. You can do this by using the `-l` option on the configuration line in ATPS.CFG. The `-l` option causes ATPS to download the correct Macintosh Laser Prep file with each job it places in the queue.

Serial, parallel, or remote printers use the -l option.

NOTE: For queues serviced by PSERVER, ATPS cannot guarantee the success of print jobs sent from Macintosh workstations running different versions of the LaserWriter driver software.

You can avoid the performance penalty caused by the `-l` option by following these steps:

1. Verify that all Macintosh users who can access the queue are using the same version of the Laser Prep file.
2. Specify the `-l` option on the configuration line in ATPS.CFG, and then unload and load ATPS.
3. Send a print job to the queue from a Macintosh workstation.

   This step creates a Laser Prep file on the server. The Laser Prep file uses the ".PRS" filename extension and is located in the ATPS directory (SYS:SYSTEM\ATPS by default).
4. Remove the `-l` option from the configuration line in the ATPS.CFG file, and then unload and load ATPS.
5. Load ATPS again.

   The preceding five steps avoid downloading the Laser Prep file with each Macintosh print job, but they handle the Laser Prep file management only until the printer is turned off. If you decide to use this method, you can repeat the above steps each time the printer is power-cycled.

If you prefer fewer steps, you can use the following method instead:

1. Use NPRINT to send the Laser Prep file to the queue.

   After the printer has been turned off and on again, you can use the NPRINT program from a DOS workstation to download the Laser Prep file SYS:SYSTEM\ATPS*.PRS to the printer.

Queue Directories: *.QDR

The first time you load the ATPS module, it reads ATPS.CFG and may create print queue directories named *.QDR in the ATPS directory. The queue directory name is the queue's unique bindery object ID (which you can view in PCONSOLE as the print queue ID) followed by the .QDR filename extension.

Each queue directory will contain the print jobs spooled to that queue. Each print job resides in the queue as an ordinary file. DOS users can place print jobs in ATPS queues even when the ATPS module is not loaded. (Of course, the print jobs are not sent to an Apple printer until you load the ATPS module again.)

Purging Old Print Jobs from a Queue Directory

When the AppleTalk print server sends a print job from a queue to a printer, it deletes the file from the queue directory. Because NetWare keeps deleted files on the disk until they are old enough to be "purged," it is possible for print queue directories to use up all available disk space very rapidly. To prevent this condition, you should instruct NetWare to immediately purge deleted files by using the FLAGDIR command:

```
FLAGDIR SYS:SYSTEM\ATPS\*.QDR P <Enter>
```

where "SYS:SYSTEM\ATPS" is the directory containing the queue directories. (If you use the **-D** option to place the queue directories in another location, substitute that pathname.)

The FLAGDIR command marks all queue directories for immediate purging when their files are deleted. (Of course, files that have been printed from the queue are not recoverable after you use this command.)

Specifying an Alternative Location for Queue Directories

If you wish to designate a different volume and/or directory in which to store ATPS queues and other files, you can use the **-D** option on the LOAD command line. For example, you might enter this command line:

```
LOAD ATPS -D PROJ:NW\PRINT
```

This command line creates a directory named PRINT below an existing directory named NW on the PROJ volume. The PRINT subdirectory need not exist. However, no harm is done if it does exist; it will simply contain ATPS queues. The NW directory must already exist.

Once you have specified a location by using the **-D** option, ATPS uses that directory until you change the directory with the **-D** option again.

NOTE: If you use the **-D** option to specify a new location after you have specified queues in SYS:SYSTEM\ATPS or another directory, you must delete the existing queues in PCONSOLE; otherwise, ATPS cannot create new queues in the specified location. See "Deleting Print Queues" on page 201.

Queues that are created using PCONSOLE are accessible to and usable by ATPS, but they are always located in SYS:SYSTEM.

Verbose Mode: Viewing Troubleshooting Messages

ATPS prints error messages to the console and to the system log file. See "Viewing Systemand Volume Messages in the Log Files" on page 286 for information about viewing these messages by using the ATCON utility.

If you wish to see informational messages generated by ATPS, you should turn on "Verbose Mode." In Verbose Mode, the ATPS module creates its own window, which can be viewed by pressing <Alt>+<Esc> at the console, and displays informational as well as standard error messages. ATPS also prints the messages to the system log file, so you can view them again at a later time.

You might want to turn on Verbose Mode if, for example, if you are creating a print queue for a non-Apple printer and need more explicit information about what is occurring between the queue and the printer. You can turn on Verbose Mode by unloading the ATPS module and loading it again with the **-V** option:

```
LOAD ATPS -V <Enter>
```

If you prefer, you can use the "ATPSV ON" and "ATPSV OFF" console commands to turn Verbose Mode on and off. See "ATPS Console Commands" on page 198 for more information.

NOTE: Verbose mode consumes disk space by writing many more messages to SYS$LOG.ERR. We recommend that you use Verbose Mode to troubleshoot problems and verify correct operation when loading, but turn it off for normal operations.

ATPS Console Commands

ATPS supports several new console commands for managing printers and queues.

Turning AppleTalk Print Spoolers Off and On

The following commands turn off the specified AppleTalk print spooler (or all AppleTalk print spoolers), causing the print spooler to disappear from the Chooser:

```
ATPSREM spooler-name
ATPSREM ALL
```

The ATPSREM command is useful for halting printing before unloading ATPS or downing the server, or temporarily making a queue invisible to Macintosh clients. Printing in progress continues uninterrupted, but no new print jobs are accepted.

The following commands re-enable the specified AppleTalk print spooler (or all AppleTalk print spoolers), causing it to reappear in the Chooser:

```
ATPSRES spooler-name
ATPSRES ALL
```

Hiding Printers and Making Them Visible Again

The following commands hide the specified AppleTalk printer (LaserWriter, LaserWriter-compatible, ImageWriter, or ImageWriter LQ printer on the network) by changing the device's NBP type:

```
ATPSHIDE printer-name
ATPSHIDE ALL
```

The following commands reverse the effect of "hiding" printers and make the specified printer (or all AppleTalk printers) visible again on the network:

```
ATPSSHOW printer-name
ATPSSHOW ALL
```

NOTE: ATPS automatically attempts to restore hidden printers upon unloading. However, hidden printers remain hidden if the server is downed or turned off without first unloading ATPS. You can make a printer visible again by turning it off and on. In addition, hidden printers may slow the process of unloading ATPS, particularly if the hidden printers are processing jobs or off-line at the time of unloading. Allow up to 90 seconds per hidden printer when unloading ATPS. If the printer is still busy or unreachable after this time, the printer will not be restored. Power-cycle the printer to restore it.

Turning On Verbose Mode

The following commands turn Verbose Mode on or off:

```
ATPSV ON
ATPSV OFF
```

Verbose mode consumes disk space by writing messages to SYS$LOG.ERR, so it is recommended only for troubleshooting or verifying operations. See “Verbose Mode: Viewing Troubleshooting Messages” on page 198 for more information and an alternative way to use Verbose Mode.

Updating AppleTalk Print Spoolers' Font Lists

The following commands cause ATPS to update the font list used by the AppleTalk print spooler.

```
ATPSQUERY printer-name
ATPSQUERY spooler-name
ATPSQUERY ALL
```

The ATPSQUERY *printer-name* command queries the printer for its current font list and informs the relevant spooler of that list.

The ATPSQUERY *spooler-name* command has the same effect, but it will query the printer associated with the specified AppleTalk print spooler.

If you wish to force an update of all font lists for all AppleTalk spooolers, type ATPSQUERY ALL.

Managing Queues in PCONSOLE

In addition to the steps shown in the preceding sections for installing printers, configuring queues, and configuring print servers, you will also use PCONSOLE for general administration tasks and for the configuration options described in the following sections. Any user can invoke PCONSOLE, but much of its functionality is accessible only to the supervisor or to a user designated as a Queue Operator.

NOTE: When you are using PCONSOLE, make sure that you do not delete the ATPS_PSRVR or ATPS_QUSER object from queues that have an entry in ATPS.CFG while ATPS is running. If you remove the ATPS_PSRVR object, AppleTalk printers cannot service the queue. If you remove the ATPS_QUSER object, Macintosh users continue to see the queue advertised in the Chooser, but cannot place print jobs in the queue. Likewise, do not delete queues spooled to or serviced by ATPS while ATPS is running.

Please see NetWare v3.12 *Installation* for details on using PCONSOLE for the tasks described below.

Adding Queue Users

In NetWare print services, DOS users must log in to a file server and be designated as a Queue User (individually or by their group) to access its queues. You can associate any number of Queue Users with a queue, and can delete a Queue User to prevent that particular user from accessing a queue.

Typically, Macintosh users can access a queue by selecting its spooler in the Chooser, and they do not need to log in to the file server. Because placing a job in the queue involves writing to the file system, ATPS creates a single bindery object named ATPS_QUSER with rights to add jobs to the queue.

NOTE: If you configure a print queue with the `-a` option in ATPS.CFG, Macintosh users must be designated as Queue Users in PCONSOLE. By default, the group EVERYONE is designated as a Queue User, so members of that group can print to a queue.

Viewing a Print Queue's Object ID

You can use the queue's object ID to determine which queue directory implements the queue. Please see "Queue Directories: *.QDR" on page 196 for background information.

Adding Queue Operators

Designating DOS users, Macintosh users, or both as Queue Operators enables them to modify the queue, including deleting, postponing, and changing the order of all queue jobs visible in the NetWare DA. Please see NetWare v3.12 *Installation* for details on using PCONSOLE to designate Queue Operators.

Deleting Print Queues

ATPS creates print queues, but does not delete them. To remove all traces of a print queue specified in ATPS.CFG, you must remove the configuration line from ATPS.CFG and delete the print queue in PCONSOLE. Please see NetWare v3.12 *Installation* for details on using PCONSOLE to delete print queues.

DOS Printing to Apple Printers

This section describes the DOS print utilities used to send print jobs to a queue, and the NetWare v3.12 utilities used to create the required forms, printer definitions, and print job configurations for DOS users. These NetWare v3.12 utilities are described in Table 23.

Table 23 Utilities

Utility Name	Functionality
PRINTDEF	PRINTDEF imports printer definitions (.PDF files) and forms to the network printer database (NET$PRN.DAT).
PRINTCON	PRINTCON creates print job configurations and adds them to a user's individual print job database (PRINTCON.DAT).

CAPTURE and NPRINT: DOS Printing

DOS users print to NetWare print queues by using the CAPTURE or NPRINT commands. These commands use print information stored in two databases on the server. When the user sends a print job to a NetWare queue, these commands access the print information dynamically and provide it as a header to the print job. The two databases are described in Table 24.

Table 24 DOS Print Services Databases

Database Name	Database Description
NET$PRN.DAT	This database, located below SYS:SYSTEM, contains printer definitions (.PDF files) and at least one "print form." See “PRINTDEF: Printer Definitions and Print Forms” on page 203
PRINTCON.DAT	This database, located in each DOS user's MAIL directory, contains print job configurations for that user. “PRINTCON: Creating Print Job Configurationsfor Apple Printers” on page 204

In addition to using these databases, the DOS client must allocate memory for the CAPTURE command to store the header information obtained from these databases. To assign the required memory, add this line to the client's SHELL.CFG file:

```
PRINT HEADER = 255
```

When a DOS client loads the NetWare shell, it reads the SHELL.CFG file, which must be located in the same directory that contains the network software NETx.COM. If the client does not have a SHELL.CFG file, you must create one in the directory that is invoked from NET*x*.COM. Please refer to the NetWare v3.12 *Installation* manual for DOS client issues.

PRINTDEF: Printer Definitions and Print Forms

To enable users to print to both types of Apple printer (LaserWriters and ImageWriters), you need to import Apple printer definitions to the NET$PRN.DAT database. These printer definitions are ".PDF" files, which should be located in the SYS:\PUBLIC directory on each NetWare v3.11 file server.

NOTE: If you have already created a form called Normal, you do not need to create special forms for the Apple printers. The only requirement is that at least one print form exist.

To import the required printer definitions and (if necessary) create a print form, log in to the particular server as a supervisor at a DOS workstation and follow these steps:

1. Run PRINTDEF, choose Print Devices in the main menu, and then press <Enter>.

   To open PRINTDEF, type **PRINTDEF** at the DOS prompt.

   When PRINTDEF prompts you for the source directory containing the printer definition,

2. Type SYS:PUBLIC at the prompt and press <Enter>.

   If you have printer definition updates from Novell, or printer definition files for non-Apple printers you wish to use with the ATPS module, type the location of those files and press <Enter>.

3. Choose Import Print Definitions in the next menu.

   A list of .PDF files opens.

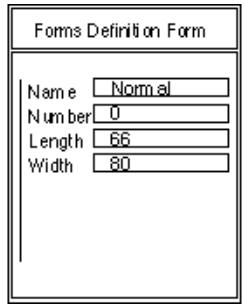
4. Import the Apple printer definitions by selecting APPIMAGE.PDF, APPLASER.PDF, and PSTSCRPT.PDF, and pressing <Enter>.

5. Press <Esc> as necessary to back out to the initial PRINTDEF menu.

   If you need to create the Normal print form, complete the rest of these steps; otherwise, press <Esc> again to exit PRINTDEF.

6. Choose Forms in the main menu, and then press <Enter>.

7 Press <Insert> to open the Forms Definition Form:



8 Enter the values shown in Table 25 to create the Normal print form.

Table 25 Normal Print Form Values

Value	Application
Normal	The Normal form is associated with all Macintosh print jobs.
0	If no other forms exist on this server, the default number is 0. Leave this number as is, or type another number less than or equal to 255.
66	This number specifies the number of lines on a standard page.
80	This number specifies the maximum number of characters on a line of a standard page.

9 Press <Esc> to exit the Forms Definition Form, and answer "Yes" when PRINTDEF prompts you to save your changes.

PRINTCON: Creating Print Job Configurationsfor Apple Printers

Each DOS user has access to one or more print job configurations, which are stored in the PRINTCON.DAT database located in each user's MAIL directory. The queue specification in the print job configuration determines to which queue the user's print job(s) are sent. DOS users can invoke PRINTCON to modify the job configuration you install for them; for example, they can modify the job configuration to print to a different print queue.

For an Apple ImageWriter, the print job configuration must specify "characters-per-inch" (CPI). See “Apple ImageWriter” on page 210.

For an Apple LaserWriter, the print job configuration can specify PostScript, PostScript Binary Graphics (for applications that generate binary PostScript), Diablo 630 (for applications that don't support PostScript), or PostText (for printing ASCII text on a PostScript printer).

To create a print job configuration, log in as a supervisor from a DOS client and follow these steps:

1. Open PRINTCON, choose Edit Print Job Configurations in the main menu, and then press <Enter>.

   To open PRINTCON, type **PRINTCON** at the DOS prompt.

   When you press <Enter>, a list of available configurations opens. If you have not defined any print job configurations, the window will be empty.

2. To create a new print job configuration, press <Ins>.

   A dialog box displays, enabling you to enter a name for the new configuration. You should always name the job configuration so that it is easily identifiable.

   After you name a new print job configuration, the main dialog box appears, where you can enter the values pertinent to the print job you are creating. The fields in the main PRINTCON dialog box are explained in Table 26.

Table 26 Fields in the PRINTCON Dialog

Field Title	Explanation
Number of copies	The value in this field defaults to 1. You can type a higher number here for DOS print jobs that require multiple copies. (Note that when a Macintosh user chooses to send multiple copies of a print job, the system considers it a single print job, so this number is always 1 for Macintosh print jobs.)
File contents	If set to "text," the AppleTalk print server will search out and expand tabs. PostScript jobs should use "byte stream."
Tab size	This field sets the number of spaces to use to expand tab characters if the file contents are set to "text."
Suppress form feed	ATPS ignores this field. Set this field to "Yes" for PostScript printers connected through PSERVER.
Notify when done	The value in this field defaults to No. You can type "Y" here if you wish DOS users to be notified when their print job has printed, when the printer is out of paper, or when the printer encounters errors in the print job.

Field Title	Explanation
Local printer	The value in this field defaults to 1, for LPT1. You can use this value with the DOS CAPTURE command to reroute command-line print directions, such as "`dir > lpt1`," to the ATPS queue.
Auto endcap	The value in this field defaults to No. You can type "Y" here if you wish the DOS CAPTURE command to automatically quit after sending a print job.
File server	The value in this field defaults to the server you are currently logged in to. The field must be set to the name of a file server that loads the ATPS module and supports a print queue serviced by the ATPS print server. If necessary, you can press <Enter> to select another file server.
Print queue	The value in this field must show the name of the print queue to which this job is being sent. Press <Enter> to display a list of queues on the current file server. Of course, you must configure the queue you select for the right type of printer (LaserWriter or ImageWriter) and choose the proper printer definition in the "Device" field described below.
Print server	The value in this field defaults to (Any). This field can be used to choose between the AppleTalk print server and other print servers.
Device	Press <Enter> to open the list of available printer types, and choose Apple LaserWriter, Apple ImageWriter, or PostScript printer.
Mode	Press <Enter> to open the Modes menu, and choose the appropriate mode for this print job configuration. For an Apple LaserWriter, the mode will always be PostScript, PostScript (Binary Graphics), Diablo 630, or PostText with a "CPI" (characters per inch) or Diablo 630 specification. For an Apple ImageWriter, the mode is a CPI specification.
Form name	ATPS ignores this field.
Print banner	The value in this field defaults to No. You can type "Y" here if you wish to print banner pages for DOS print jobs on AppleTalk printers. when printing to PSERVER-connected PostScript printers from DOS, leave the default "No."
Name	The value in this field defaults to the DOS user's login name. It is the name that appears in PCONSOLE, the NetWare DA, and on the banner page.
Banner file	If you enter a name here, the print server includes the name as a "tag" on each banner page to identify the job. By default, the "tag" name is the name of the file being printed.
Timeout	The value in this field defaults to No. If you type "Y" in this field, NetWare assumes a DOS CAPTURE print job is finished if it hasn't received any input for the specified number of seconds.

Field Title	Explanation
Timeout count	The value in this field specifies the number of seconds DOS CAPTURE waits if timeout is enabled.

Once you create a print job configuration, you can use PRINTCON to copy it to other DOS users (provided that you are logged in as supervisor or equivalent) by following these steps:

1. Press <Esc> to return to the initial PRINTCON menu.
2. Choose Copy Print Job Configurations, and press <Enter>.

   This action brings up a dialog box labeled "Source User."
3. Type the name of the user whose print job configuration file you want to copy—for example, SUPERVISOR— and press <Enter>.

   This action brings up a dialog box labeled "Target User."
4. Type the name of the user for whom you are copying the print job configuration file and press <Enter>.

Repeat these steps for each user who needs a copy of the configuration file, and then exit PRINTCON by pressing <Esc>.

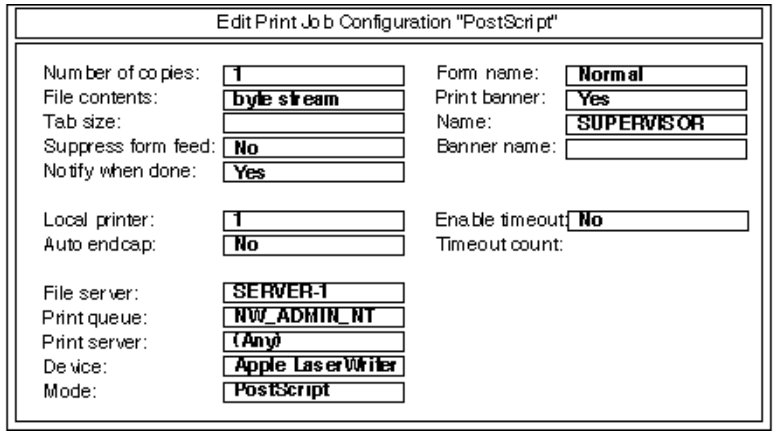
If you need to modify fields for an individual user, you must log in as that user and invoke PRINTCON. Alternatively, individual DOS users can create or modify their own print job configurations.

Please refer to NetWare v3.12 *System Administration* for more details about PRINTCON.

Apple LaserWriter in PostScript Mode

Figure 59 shows a sample print job configuration for an Apple LaserWriter in PostScript mode. DOS or Windows applications must support PostScript and a LaserWriter driver.

Figure 59 Example PRINTCON Window Showing LaserWriter Postscript Configuration



These are the required values for a queue whose print jobs are sent to a LaserWriter II NT:

Print server	(Any)
Device	Apple LaserWriter
Mode	PostScript

PostScript Binary Graphics Mode

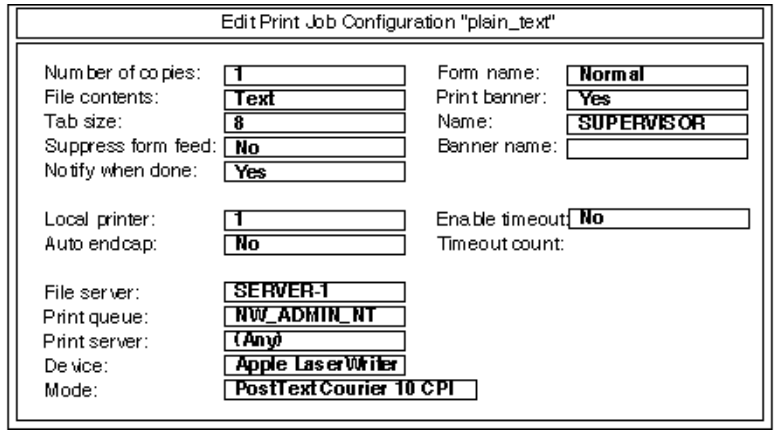
"PostScript Binary Graphics" mode instructs the AppleTalk print server *not* to replace Control-D characters in the print job with Printer Access Protocol (PAP) EOFs. Use this mode for DOS or Windows applications that produce binary PostScript data. Please see "DOS PostScript Applications" on page 180 for background information.

See "Symptom: Printer Sends Multiple Error Messages" on page 238 for a description of what can happen if you select the wrong print mode for binary files.

Apple LaserWriter in PostText Mode

Figure 60 shows a sample print job configuration for an Apple LaserWriter in PostText mode. PostText mode allows applications to send ASCII text to a PostScript printer.

Figure 60 Example PRINTCON Window Showing LaserWriter PostText Configuration



The "Mode" field contains the only required value that must be different from the PostScript configuration shown in Figure 59. For the PostText configuration, the required values are these:

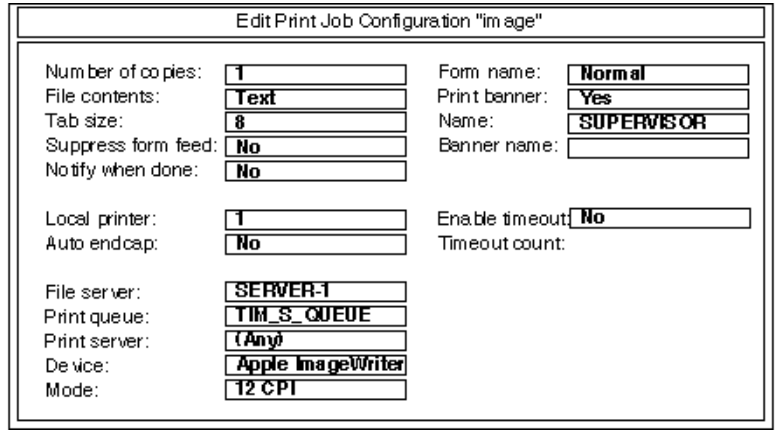
Print server	(Any)
Device	Apple LaserWriter
Mode	PostText Courier 10 CPI

Of course, you can choose a different "characters per inch" (CPI) specification from the Mode menu. CPI simply specifies the relative size of the characters: the higher the number of CPI, the smaller the character size.

Apple ImageWriter

An Apple ImageWriter (including the ImageWriter LQ) uses plain text mode to print jobs submitted from DOS. The jobs use the ImageWriter resident font, which produces output something like a line printer. Figure 61 shows a sample configuration for an Apple ImageWriter:

Figure 61 Example PRINTCON Window Showing ImageWriter Configuration



For the ImageWriter configuration, the required values are these:

Print server	(Any)
Device	Apple ImageWriter
Mode	12 CPI

Of course, you can choose a different "characters per inch" (CPI) specification from the Mode menu. CPI simply specifies the relative size of the characters: the higher the number of CPI, the smaller the character size.

8 SNMP Support in NetWare for Macintosh

NetWare for Macintosh offers limited SNMP (Simple Network Management Protocol) support. SNMP provides network management and monitoring capabilities so that you can use either Novell's AppleTalk console utility (ATCON) or a third-party network management console application. You can find instructions for using ATCON in Appendix C.

Typical kinds of information that you can gather with SNMP include zones lists, routing tables, and lookups of network nodes. The full extent of SNMP support is described in "SNMP Operations on the AppleTalk Network" on page 212.

SNMP.NLM

An SNMP agent is software that acts as a "middleman" to receive SNMP requests and distribute them to the protocol stack. The SNMP agent also relays replies from the protocol stack to a console utility. Novell's SNMP agent, SNMP.NLM, provides information about the AppleTalk network by communicating with the AppleTalk stack and router, contained in APPLETLK.NLM.

SNMP.NLM uses either the Datagram Delivery Protocol (DDP) or TCP/IP as a transport protocol. DDP is native to AppleTalk and is supported by the APPLETLK.NLM. TCP/IP support is provided with the TCPIP.NLM included with NetWare 3.12.

You need an SNMP management console application in order to retrieve AppleTalk data. Most third-party applications use the TCP/IP protocol. However, the APPLETLK.NLM allows an SNMP console to communicate with the SNMP.NLM using DDP as the basic transport. NetWare for

Macintosh can also support SNMP over IP, but this scenario requires that TCPIP.NLM also be loaded on the NetWare server.

Enabling SNMP Support in the AppleTalk Network

When you install the NetWare operating system, SNMP.NLM is copied to SYS:SYSTEM. At load time, SNMP.NLM automatically loads with APPLETLK.NLM.

If you want to use IP as the transport for obtaining information through SNMP, you must load TCPIP.NLM in addition to APPLETLK.NLM, and bind IP to a card appropriately.

It is important to note that versions of TCPIP.NLM previous to NetWare 3.12 are not compatible with SNMP.NLM.

SNMP Operations on the AppleTalk Network

SNMP support in NetWare for Macintosh is compliant with the AppleTalk MIB I specification (described in the Internet document RFC 1243). A MIB (Management Information Base) is a collection of "objects" an application can access through SNMP. The AppleTalk MIB I specification describes the following groups of objects:

- LocalTalk Link Access Protocol (LLAP): This group provides information about all LocalTalk interfaces on the server. Only the objects llapInPkts and llapOutPkts are supported.
- AppleTalk Address Resolution Protocol (AARP): This group is used to map AppleTalk node addresses and the addresses of the underlying data link layer for data links other than LocalTalk. This group provides a view of the AARP Address Mapping table.
- AppleTalk Port (ATPort): An AppleTalk port is a logical connection to a network over which AppleTalk packets can be transmitted. This group of objects provides information about the configuration of each AppleTalk port.
- Datagram Delivery Protocol (DDP): This group provides statistical counters on the operation of DDP.
- Routing Table Maintenance Protocol (RTMP): This group shows the table that the AppleTalk router uses to forward datagrams on the AppleTalk internet.

- Kinetics Internet Protocol (KIP): This group provides status and routing information in an Internet Protocol (IP) tunneling environment; because this version of APPLETLK.NLM does not provide tunneling of AppleTalk encapsulated in IP packets, this group is not supported.
- Zone Information Protocol (ZIP): This group shows the mapping of networks and zone names of which the AppleTalk router is aware.
- Name Binding Protocol (NBP): This group provides information on the NBP table containing services registered with NBP and statistics on NBP operation in the server.
- AppleTalk Echo Protocol (AEP): AEP is a transport level protocol that can verify the status of nodes on the internet. This group provides statistics on the operation of AEP.

APPLETLK.NLM supports the Get and GetNext SNMP operations. It does not support the Set SNMP operation, or SNMP Traps.

For more information about SNMP support in AppleTalk and NetWare, please consult these references:

- "AppleTalk Management Information Base," Steven Waldbusser, editor (document RFC-1243). This document describes the AppleTalk MIB I.
- *The Simple Book: An Introduction to Management of TCP/IP Based Internets*, Marshall T. Rose (Prentice-Hall, 1991).

RFC documents can be purchased through:

SRI International Network Information Systems Center 333 Ravenswood Ave., Room EJ291 Menlo Park, CA 94025 Phone: 1-415-859-3695 Fax: 1-415-859-6028

9 Troubleshooting

This chapter describes symptoms of error conditions and presents basic guidelines for diagnosing problems with the AppleTalk network, with AppleTalk file services, and with AppleTalk print services.

Calling for Help

If your attempt to resolve a problem fails and you purchased NetWare for Macintosh from an authorized dealer, please call your dealer for assistance.

You should be prepared to give a complete description of the problem, including what happens, when it happens, and what you've done to diagnose the problem. You should also have detailed information about your network configuration on hand.

Diagnosing Network Problems

When you become aware of a network problem, the first step is always to define the specific symptoms of the problem. This section describes some problems, presents strategies for obtaining more specific information, and offers solutions for the possible causes.

First Use the ATCON Utility

NetWare for Macintosh provides the ATCON server utility for diagnosing conditions on the AppleTalk network. *If you have a problem with general network operation, it is a good idea to start diagnosing the problem by using ATCON.*

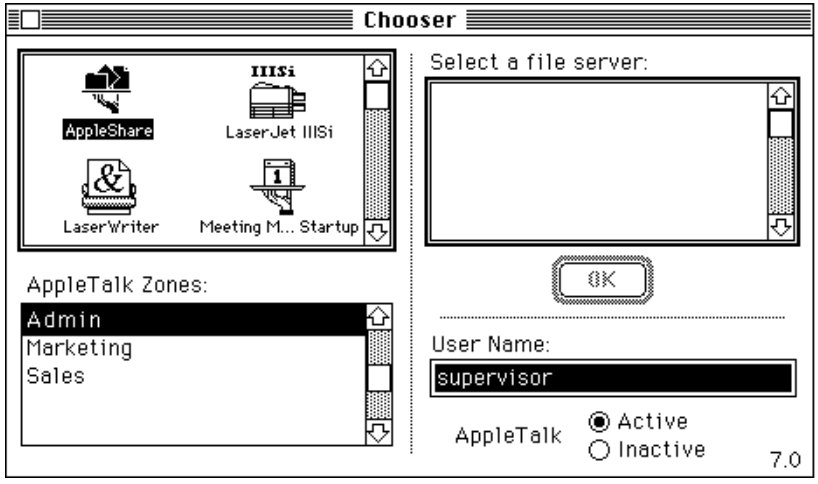
Please see “Using ATCON to Diagnose the AppleTalk Network” on page 277 for an introduction.

Symptom: Macintosh Client Can't See Server in the Chooser

To diagnose the cause of this problem, you need to narrow the problem down and try to localize it to one of the components: the Macintosh client itself, the AppleTalk configuration in the NetWare server, the network hardware connecting them, or the configuration of another router on the network.

Figure 62 depicts a typical error condition where zone names appear in the Chooser, but the server name does not appear when the Macintosh user selects the server's zone.

Figure 62 Server Name Does Not Appear in Chooser



Another type of error condition can occur in which no zone names appear in the Chooser, or zones that you just specified in a newly configured server do

not appear. In either this case or the case depicted in Figure 62, you can begin to troubleshoot the problem by verifying these conditions:

1. Can the client can see other AppleTalk services?

   First, choose another AppleTalk service on the same network as the problem Macintosh.

   If the Macintosh cannot see any AppleTalk services (or any AppleTalk zones) and you know that other services or zones exist, then the workstation itself or the cable to which it is connected are suspect. See "Macintosh Client Solutions" on page 218 and "Network Cabling Solutions" on page 220.

   If the name of another service appears, you know that the Macintosh is capable of communicating on the AppleTalk network. In this case, the problem is more likely to be a router or cabling problem. See "AppleTalk Solutions on the NetWare Server" on page 219 and "Network Cabling Solutions" on page 220.

2. Can another Macintosh client see the NetWare server?

   Go to another Macintosh client, select the file server's zone in the Chooser, and see whether the server's name appears. The physical proximity of the client to the server and thus the actual network cable may be a factor.

   If the Macintosh client at the second location can see the NetWare server, swap the problem Macintosh to that network connection and see whether you can still see the server. If so, the network connection at the original problem location is suspect. See "Network Cabling Solutions" on page 220.

   If the second Macintosh client can't see the NetWare server either, then the server's AppleTalk configuration is suspect. See "AppleTalk Solutions on the NetWare Server" on page 219.

3. Can the NetWare server see the Macintosh?

   Use the Echo test function in ATCON. Or, if you have a copy of the Macintosh Responder application, install it in the client Macintosh and then use the Lookup service function in ATCON from the server console. See "Looking Up an AppleTalk Service" on page 278.

   If the server can "see" the Macintosh but not vice versa, then the network software in the Macintosh is suspect. Step 4 will verify whether the problem originates with the Macintosh, but it helps to narrow the problem if the server *cannot* see the Macintosh client running Responder.

4. Can the server see another Macintosh on the same network?

   Use the Echo test function in ATCON. Or, if you have a copy of the Macintosh Responder application, install it in the client Macintosh and then use the Lookup service function in ATCON from the server console. If the server can "see" the second Macintosh but could not see the original problem Macintosh, then there could be a problem with the connectors at the Macintosh client or the Macintosh network interface board.

Macintosh Client Solutions

This section provides a checklist to rule out possible problems on Macintosh clients that cannot see the NetWare server. In most cases, a problem with one of the items in this section prevents any AppleTalk zones from showing in the Chooser.

- Cabling connections are secure and correct.

  If the network hardware in the Macintosh is loose or incorrect, the Macintosh will not be up on the AppleTalk network, so no zones will show in that workstation's Chooser.

  If you are using an Ethernet or Token Ring board for the Macintosh, check that the network connection to the Macintosh network board is secure, and properly connected to the board and the cable. On Ethernet, make sure the Thick/Thin switch is set correctly on the network board. Also, make sure that any Ethernet cable is properly terminated.

  If the client Macintosh is connected to LocalTalk, make sure the LocalTalk cable is connected to the Macintosh printer port, not the modem port, and that the LocalTalk cable connections are not loose or unplugged. LocalTalk cable connections can work loose if you don't secure them with cable ties.

- The network CDEV is set correctly.

  If you have set the network CDEV in the Macintosh Control Panel incorrectly, the Macintosh will not be up on the AppleTalk network, so no zones will show in the Chooser.

  In the Network area of the Macintosh Control Panel, the selected network connection software icon indicates the network CDEV. This *must match* the type of network configured in the router for the cable supporting the Macintosh. A common mistake is to confuse EtherTalk Phase 1 and EtherTalk Phase 2. See the *Using the NetWare for Macintosh Client* guide for more information.

- The Macintosh network drivers are correctly installed.

  Network drivers are provided with Macintosh network boards. Please see the documentation for the board to verify that you installed the driver properly.

- AppleTalk is enabled in the Chooser.

  If AppleTalk is not enabled in the Chooser, the Macintosh will not be up on the AppleTalk network, so no zones will show in the Chooser.

- Token Ring Source Routing is either enabled or disabled to be consistent with the server.

  If you are using Token Ring Source Routing, make sure that you use it consistently on all Token Ring interfaces, including TokenTalk boards in Macintosh clients. Please see the documentation for the TokenTalk board to verify that you enabled Source Routing if appropriate.

- The Macintosh client is OK when disconnected from the network.

  Disconnect the Macintosh client from the network cable and connect it to a printer via a single LocalTalk connection. Verify that its peripheral devices (if any) and power source are operating correctly.

AppleTalk Solutions on the NetWare Server

This section provides a checklist to rule out possible problems in the NetWare server.

- AppleTalk is bound to the network board in the server.

  You can check which protocols you bound to the network board by using the CONFIG command at the console prompt. You should see "lan protocol: AARP" and "lan protocol: AppleTlk."

- The network board works with AppleTalk.

  The list of AT-compatible and Micro-Channel network boards that are known to work with AppleTalk is continually being updated. The list as of this printing is included in the README.1ST file on the *NWMAC* diskette. You can obtain the most up-to-date information on these boards from your dealer or through NetWire.

- The Macintosh NLMs are installed.

  You can check which modules are loaded by using the MODULES command at the console prompt. If the NetWare for Macintosh v3.12 modules fail to load and you see an error message that begins with

  ```
  Loader cannot find public ...
  ```

  you are probably loading the modules in incorrect order. The load order is critical to the Macintosh NLMs. *You must load the AppleTalk module first*. That is, you must load the APPLETLK NLM before any others, such as AFP, ATPS, or ATCON.

- Token Ring Source Routing is either enabled or disabled to be consistent with other routers on the internet.

  If you are using Token Ring Source Routing, make sure that you use it consistently on all Token Ring interfaces, including TokenTalk. Novell's *NetWare Supplement* for IBM Token Ring boards documents Token Ring Source Routing. See "Using Token Ring with Macintosh Clients" on page 104.

- The server can communicate with other AppleTalk devices.

  Use the ATCON utility to see whether the server can communicate on the AppleTalk network and to determine where it runs into problems. Please see "Using ATCON to Diagnose the AppleTalk Network" on page 277 for an introduction and the subsequent sections in Appendix C, "Using ATCON," on page 275 for details.

Network Cabling Solutions

This section provides a checklist to rule out possible problems with the network cabling between the Macintosh client and the NetWare server.

If there is a bridge or router between the server and Macintosh client(s), make sure that this condition is true:

- The intervening router or bridge is configured properly and is routing AppleTalk.

  If there is more than one router or bridge between the server and the Macintosh client, first try to isolate the problem by using the ATCON utility to verify communication through each router/bridge, one by one, using the Echo test and/or Lookup services. Please see "Using ATCON to Diagnose the AppleTalk Network" on page 277 for an introduction, and the subsequent sections in Appendix C for details.

If the network cable is either twisted-pair or thin Ethernet, make sure that this condition is true:

- The cable adheres to the Ethernet 10BASE2 specification.

If the network cable is twisted-pair Ethernet, make sure that this condition is true:

- The ports on the concentrator are working properly.

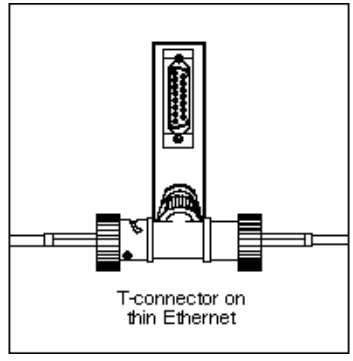
  Some twisted-pair concentrators have link-status lights to indicate that a connection is functioning properly.

If the cable is thin Ethernet, make sure that these conditions are true:

- Each node is connected via a T-connector.

  Make sure all nodes on the cable have a T-connector connecting the node to the thin Ethernet segment, as shown in Figure 63.

Figure 63 T-connector Connecting to a Macintosh



- Each segment end is terminated with a 50-ohm terminator.

  On thin Ethernet, the last node on a segment must have the open end of its T-connector terminated.

If the cable is thick Ethernet, make sure that this condition is true:

- The transceiver and drop cable are working properly.

  If you have packet-analyzer software, you can verify that the transceiver and cable are passing packets. Some transceiver boxes have a status light that verifies that packets are moving properly across the cable.

If the cable is Token Ring, make sure that these conditions are true:

- The Medium Access Unit (MAU) is functioning properly.

  You should see a console message if the Token Ring MAU is not working.

- All cards are configured for the same speed.

  Many Token Ring cards support both 4 and 16 MBs. Make sure that all nodes on the cable are operating at the same speed.

If you have checked the above conditions and still suspect the network cabling or connectors, follow these steps:

- Check for cable breakage by using a resistance meter.

  If you have a resistance meter, use it to look for intermittent faults in the cable and connectors.

- Swap the cable and connectors.

  Swapping the equipment with another cable and set of connectors will definitely verify whether the cable or connectors are at fault.

Symptom: Reconfigured Zones Continue to Show in the Chooser

This problem results from the way in which AppleTalk maintains routing tables and zone information on the internet. The reasons for this problem are explained in "How Zone Information Is Maintained on an Internet" on page 260.

If this problem is occurring at your site, and the reconfigured router is the only router directly connected to the network supporting new zones, bring down the router again and allow it to stay off the network for at least twenty minutes. When you bring up the router again, the new zones will be in effect.

Of course, if more than one router is connected to the network supporting new zones, all of them must be reconfigured to support the same zones. Make sure that other networks don't support the old zones. If they do, bring down all the routers, reconfigure the zones, and leave them down for at least twenty minutes. When you bring up the routers, the new zones will be in effect.

Please see "Changing the AppleTalk Zone Name or Zones List" on page 134 and "How Zone Information Is Maintained on an Internet" on page 260.

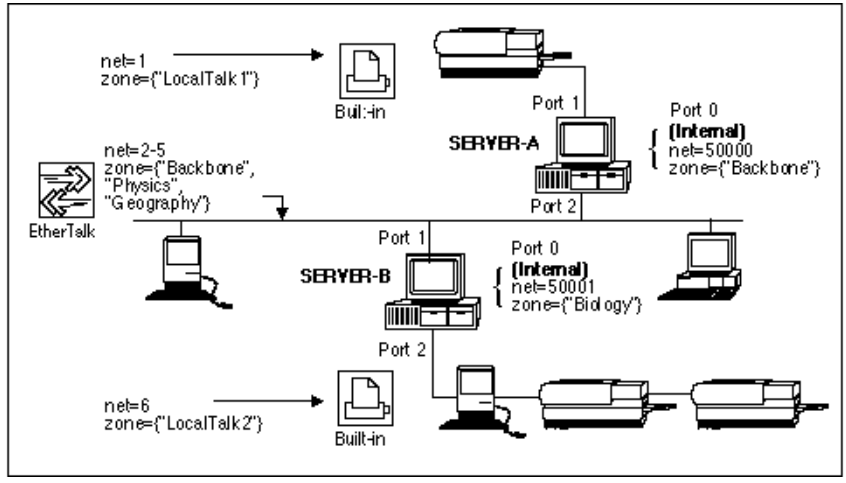
Symptom: Messages about Mismatched Network Numbers

You must correctly configure AppleTalk network numbers for the router to function correctly on an internet. If you see errors about mismatched or conflicting network numbers in the system log, select View Router Interfaces in ATCON to see what each server is advertising as its network numbers.

NOTE: The DISPLAY NETWORK command shows only IPX network numbers. Use ATCON to view the AppleTalk network numbers.

The example internet shown in Figure 64 demonstrates the basic principles of correct configuration:

Figure 64 Consistent Network Numbers on an Internet



- *Port 2 in SERVER-A* and *Port 1 in SERVER-B* connect to the Ethernet backbone.

  These ports must both use exactly the same network and zone configuration for the backbone. The first name in the zones list (default zone) must be consistent in both routers.

- *Port 1 in SERVER-A* and *Port 2 in SERVER-B* connect to two different LocalTalk networks.

  These ports must use different network numbers, because they are two different cables.

- *Port 0 in SERVER-A* and *Port 0 in SERVER-B* represent the servers' connection to their internal networks.

  These ports must use different network numbers, because they represent two different networks.

All facets of checking for consistent and unique network numbers on an internet cannot be covered here, but you can use the following general checklist for router configurations.

For each AppleTalk port in a router, make sure that these conditions are true:

- *The network number or range is unique on the internet.*

  This condition does not imply that each AppleTalk port must be configured with a unique network number or range. It means that the network number or range of the network in which the AppleTalk port is configured must be unique among networks in the internet. Multiple AppleTalk ports in a single network will be configured with the same network number or range.

- *All routers on the cable agree about the network number or range.*
- *All routers on the cable agree about the zone name or zones list and default zone.*

For a router in Transition Mode (for a description of Transition Mode, see Appendix B, "Transition Mode Routing," on page 263), make sure that these conditions are true:

- The `-t` option is enabled on the LOAD APPLETLK command line.
- The extended network range of the router in Transition Mode has one element (such as 1-1).
- The extended network range is unique on the internet.
- All routers on a cable agree about the network range.
- The extended network's zones list has only one name, and all routers on a cable agree about that name.
- The non-extended network number is unique on the internet.
- All routers on a cable agree about the network number.
- All routers on a cable agree about the zone name.

  NOTE: One of the most effective ways to insure against mismatched network numbers or conflicting zone names is to take advantage of seed routing when you configure your internetwork. For more information about seed routing and its

benefits for configuring your internetwork, see "Learning Network and Zone Configurations from Seed Routers" on page 34.

Symptom: Device Names Appear and Disappear in the Chooser

The most common reason for this error condition is a conflicting AppleTalk configuration on the internet, but this error can also derive from low memory conditions or a Chooser limitation on the number of devices that can be visible.

If you are seeing this symptom at Macintosh clients, load the ATCON utility at the server console and check the system log.

If the system log contains messages about mismatched network numbers, refer to "Symptom: Messages about Mismatched Network Numbers" on page 223 for additional information.

If the system log contains messages about low memory, see "AppleTalk Stack/ Router Memory Requirements" on page 253.

If the system log does not contain AppleTalk error messages, the problem could be caused by too many device names (or device names that are too long) in the Chooser.

The exact limitation in the Chooser depends on the number of characters in each device name. To fix this problem, you can either divide the AppleTalk network into zones containing fewer services (LaserWriters or file servers), or reduce the number of characters in some or all of the device names.

Symptom: Zone Names Do Not Match Existing Zone Names

If additional zone names show up in the Chooser or ATCON after you have brought up a file server on the AppleTalk network, check that these conditions hold in the NetWare for Macintosh v3.12 router configuration:

- You typed the same zone names in different configuration files using the same case.

  Zone names are case-sensitive, and variations in case in the same words will result in different zone names. This can occur when you create individual ATZONES.CFG files for different routers in the internetwork. It can also occur when you have inconsistent AUTOEXEC.NCF files for the routers in your internetwork.

- There are no trailing blanks in zone names.

  Trailing blanks in zone names could exist on other routers, if not on the current router that you are checking. Because space characters are permitted in zone names, these must also be checked.

- You specified special characters in terms of their decimal values.

Special characters that are allowed in zone names are shown in Table 27.

Table 27 Decimal Codes for Eight-bit Character Mapping in AppleTalk

Character	Value	Character	Value	Character	Value
Ä	128	(Dagger)	160	¿	192
Å	129	°	161	¡	193
Ç	130	(U.S. Cent)	162	¬	194
É	131	(U.K. Pound)	163		195
Ñ	132	§	164	f	196
Ö	133		165		197
Ü	134	¶	166		198
á	135	ß	167	«	199
à	136	®	168	»	200
â	137	©	169	...	201
ä	138	TM	170	(blank)	202
ã	139		171	À	203
å	140	¨	172	Ã	204
ç	141		173	Õ	205
é	142	Æ	174	OE	206
è	143	Ø	175	oe	207
ê	144		176	-	208
ë	145		177	—	209

Character	Value	Character	Value	Character	Value
í	146	<=	178	"	210
ì	147	>=	179	"	211
î	148	(Yen)	180	`	212
ï	149		181	'	213
ñ	150		182	/	214
ó	151		183		215
ò	152		184		216
ô	153		185	(Apple)	240
ö	154		186		
õ	155	ª	187		
ú	156	º	188		
ù	157		189		
û	158	æ	190		
ü	159	ø	191		

You can enter the characters shown in Table 27 in the ATZONES.CFG file by using any text editor that lets you enter numerical character codes; for example, you can use the editor called by the INSTALL module, the EDIT NLM, or the EDLIN text editor on a DOS client.

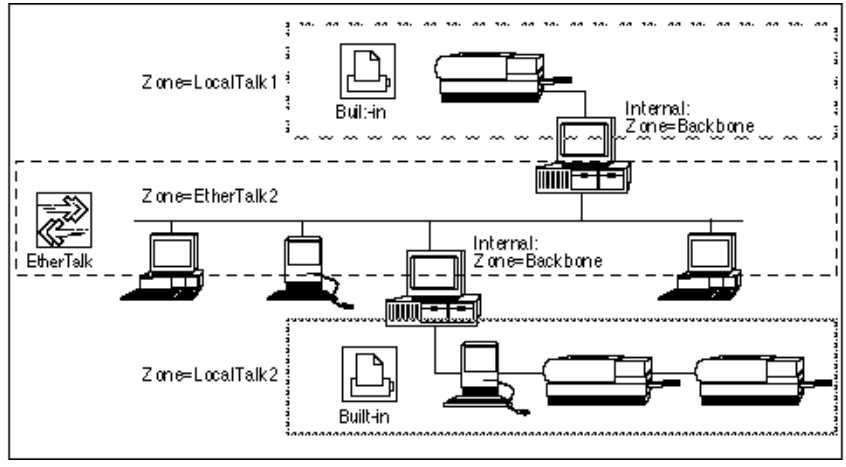
In EDLIN, you can enter these special characters by holding down <Alt> and entering the decimal value for the character. (Note that the character that displays on the screen of the DOS client does not look like the Macintosh character above. However, the specified decimal value matches the Macintosh character in existing zone names.)

Symptom: Spoolers and Printers Do Not Show in the Same Zone

This symptom is not a problem. ATPS always advertises its print queues in the zone of the internal network, or if multiple zones are configured on the internal network, it advertises print queues in the default zone or a specified zone of the internal network. The printers themselves appear in the zone configured for the LocalTalk network to which they are physically connected.

For example, Figure 65 shows an internet where there is one LaserWriter in the *LocalTalk1* zone and two LaserWriters in the *LocalTalk2* zone. Both file servers have the zone name *Backbone* for their internal network:

Figure 65 Spoolers and Printers in Different Zones



In this case, the print queues supported on both of these servers appear in the *Backbone* zone in the Chooser, while the individual LaserWriters appear in the *LocalTalk1* and *LocalTalk2* zones.

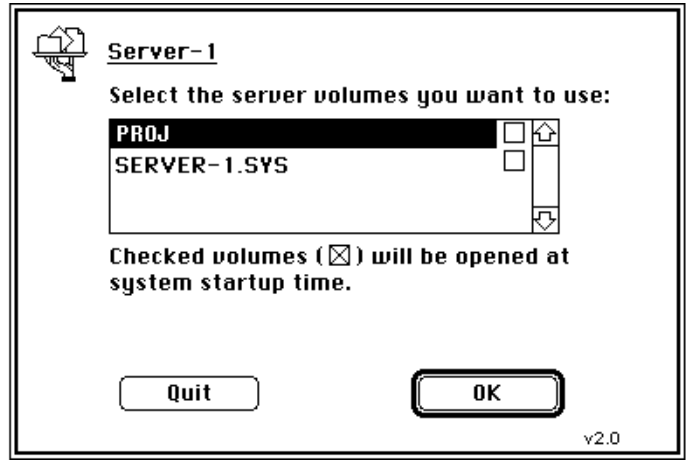
Diagnosing Problems with File Services

This section describes specific symptoms you might see when logging in to or using a NetWare v3.12 file server running NetWare for Macintosh. It also presents one or more solutions for the possible causes.

Symptom: Macintosh Client Can't See Server's Volume Name

In this error condition, Macintosh users can see the NetWare server and begin the login process, but they cannot see the volume name they need.

Figure 66 Volume Name Does Not Appear in the Dialog Box



The most likely cause for this symptom is either that you did not add the Macintosh name space to the volume, or that you did not load the MAC.NAM support module; *you must do both*. At the file sever console, verify the following:

- You loaded the MAC support module in STARTUP.NCF.
- You added the Macintosh name space to the volume.

If you must add the Macintosh name space to a volume at this point (after AppleTalk is active in the server), type the following commands:

```
LOAD MAC <Enter>
ADD NAME SPACE MACINTOSH TO VOLUME vol-name <Enter>
UNLOAD AFP <Enter>
LOAD AFP <Enter>
```

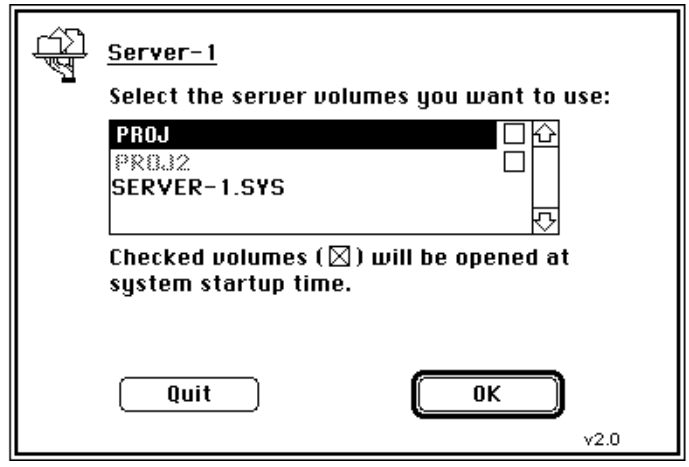
The **ADD NAME SPACE** command is explicitly required; its functionality is *not* included in the **LOAD MAC** command.

vol-name is the name of the volume. You should also note that once you have added the Macintosh name space to a volume, you cannot remove it unless you run VREPAIR (this feature is supported only in NetWare 3.11 or above). In addition, the volume will not mount unless you load the MAC.NAM supportmodule.

Symptom: Volume Name Is Dimmed in the Chooser

In this error condition, Macintosh users can see the NetWare server and begin the login process, but a volume name is dimmed, so they cannot select it.

Figure 67 Volume Name Is Dimmed in the Dialog Box



The most likely cause for this condition is that the DESKTOP.AFP directory doesn't exist or is corrupted for that volume. You can remedy the problem by using the CDT option to clear the desktop. Type these command lines:

```
UNLOAD AFP <Enter>
LOAD AFP CDT <Enter>
```

You should then rebuild the desktop as described in "The Desktop Database" on page 142.

Another possible cause for a dimmed volume name is that the Macintosh user has no access privileges on the volume. In most cases, the group EVERYONE

is made trustee of each volume, which ensures that all users who have login accounts are able to mount the volume. However, if you remove this trustee from the volume and the user has no explicit trustee assignments, he or she cannot mount the volume.

Symptom: Macintosh Client Can See the Server but Cannot Log In

This symptom can derive from several different conditions.

- The user doesn't have a login account.

  The simplest case is that the user does not have a login account on the server. In this case, the Macintosh user is likely to see an error message such as this one:

Figure 68 Incorrect Password Prevents Login

- System accounting is turned on, but the user does not have a balance.

  When you create new users by using the NCC and accounting is active on the file server, you must use SYSCON to assign an accounting balance to the user before he or she can log in.

- The NetWare UAM is not correctly installed in on the Macintosh client, but you loaded the AFP module with the **ENCRYPT** option.

  Another possible cause is that you did not install the NetWare User Authentication Method (UAM) software in a folder named "AppleShare Folder" below the Macintosh System Folder (System 6.x) or in the Extension folder (System 7.0), but AFP has enforced password encryption using the **ENCRYPT** option. To fix this condition, install the NetWare UAM in the proper location.

- There are no available AFP connections.

  Another possible cause for this problem is that the maximum number of users have already logged in to the file server. The maximum number of users can be from 20 to 100, depending on the version of NetWare for Macintosh you installed. If the user number has reached its maximum, users will see a message such as the one shown in Figure 69:

Figure 69 AFP Connections Used Up

To fix this problem, one Macintosh user must log out of the server before another can log in.

Symptom: AppleShare Icon Does Not Show in the Chooser

This condition means that you have not installed the AppleShare Workstation software on the Macintosh client. Please see the *Using the NetWare for Macintosh Client* guide for instructions.

Symptom: File Creation and Modification Dates Are Wrong

If Macintosh users are losing "Last Modified" and "Created" information when they copy Macintosh folders and files to the NetWare file server, check that this condition is true:

- The system clock on the Macintosh shows the same date and time as the system clock on the server.

  Open the Control Panel (in System 6) or choose the Control Panels option in the Apple menu (in System 7) and check the General icon (System 6) or General Controls icon (System 7) to see that the system clock displays the correct time.

Figure 70 General Controls Icons for Systems 6 and 7

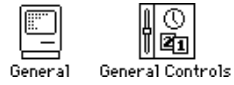


Figure 71 Macintosh System Clock for Systems 6 and 7

If the Macintosh system clock is correct, check the time on the file server and, if necessary, reset it.

Symptom: Finder Cannot Locate Applications

If Macintosh users report that double-clicking an application icon produces a message stating that the application could not be found, you should clear the desktop and rebuild it from a Macintosh client. Please see "The Desktop Database" on page 142 for details.

You should also verify that the application is actually installed on the network volume; if it is not, re-install the application. Then, rebuild the desktop for that volume from a Macintosh client.

Symptom: Macintosh Icons Do Not Appear in Server's Folders

If Macintosh users report that Macintosh document and application icons appear as generic icons, this is another indication that you should clear and rebuild the desktop folder. Please see "The Desktop Database" on page 142 for details.

If Macintosh icons appear as DOS file icons when copied to the server, this can be the result of an incorrect process of copying. This usually happens when Macintosh files or applications are copied to the server volume with a DOS **`COPY`** command. If the Macintosh files or applications are copied with the NetWare **`NCOPY`** command, the icons should appear as proper Macintosh icons to Macintosh clients.

Macintosh files or applications copied to a server volume from a Macintosh client with the drag-copy method generally do not appear as DOS icons.

Diagnosing Problems with Print Services

This section describes specific symptoms you might see when using AppleTalk print services, and presents one or more solutions for the possible causes.

Turning On ATPS Verbose Mode

The ATPS module can be made to operate in Verbose Mode for diagnosing conditions or verifying queue operations. *If you have a problem with AppleTalk print services, it is a good idea to start diagnosing the problem by using Verbose Mode.*

You can turn on Verbose Mode at the console prompt by typing

```
ATPSV ON <Enter>
```

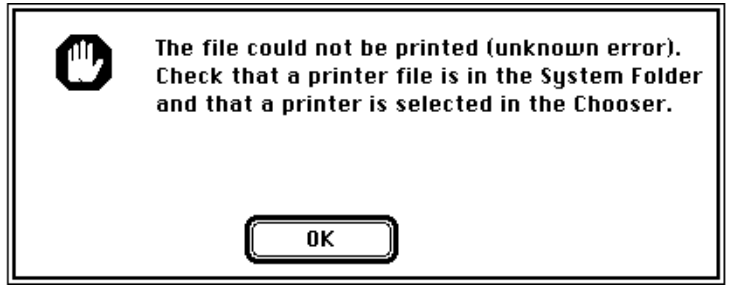
To see ATPS messages as they are being generated, send print jobs to a queue, and then go to the system console and view the ATPS error window by pressing <Alt>+<Esc>. If there are several console windows open, you can press <Alt>+<Esc> more than once to cycle through the console windows until you see the ATPS window.

In the ATPS console window, you can view messages about what is occurring when the print server attempts to communicate with the printer. You can review these messages again by viewing the system log in the ATCON utility. When you wish to turn off Verbose Mode, type

```
ATPSV OFF <Enter>
```

Symptom: Macintosh Error Message When Printing to a Queue

Macintosh users send a print job to a queue by selecting an AppleTalk print spooler in the Chooser, and see this error message:



First, check that these conditions are true:

- The printer software is in the System Folder (System 6.x) or System Folder:Extensions (System 7.0).
- The AppleTalk print spooler is selected in the Chooser.

- If the spooler has been configured with the **-a** option, the user is logged in to the server and is a designated Queue User.
- The NetWare volume on which the print queues reside is not out of space.

After verifying these conditions, check the SYS$LOG.ERR file for error messages related to the print spooler. Please see "Viewing Systemand Volume Messages in the Log Files" on page 286 for instructions.

Symptom: Print Jobs Submitted to a Queue Do Not Print Out

This problem indicates that the AppleTalk print server is not working correctly. This problem can have many causes. Make sure that you set up the queue correctly in the ATPS.CFG file, and that ATPS is loaded. Then, use the **ATPSV ON** command to print informational messages, as well as standard error messages, to the system log and to the ATPS console window. See "Turning On ATPS Verbose Mode" on page 235.

Symptom: Print Spoolers Don't Show in the Chooser

After setting up print queues in the ATPS.CFG file, make sure you reload the ATPS module on the server. Any changes to the ATPS.CFG file do not take effect until you reload the ATPS module. If you executed the **LOAD ATPS** command and you still don't see the Macintosh queues in the Macintosh Chooser, verify that ATPS is actually loaded. If any information is syntactically incorrect in ATPS.CFG, the ATPS module fails to load and displays error messages.

For example, suppose you used the following configuration line in your ATPS.CFG file:

```
LaserWriter1:LocalTalk1 -o MacQ1
```

If the printer ("LaserWriter1") is the source of the font list file (that is, you did not use **-f** on the configuration line), check that the AppleTalk print server can find the printer on the network to obtain its list of fonts. To do so, turn on ATPS verbose mode and view messages in SYS$LOG.ERR. See "Turning On ATPS Verbose Mode" on page 235 and "Viewing Systemand Volume Messages in the Log Files" on page 286 for more information.

If the printer cannot be located and queried on the AppleTalk network, make sure that these conditions are true:

- The printer name is LaserWriter1.

  Make sure that you typed the name in the ATPS.CFG file exactly as you typed it appears in the Macintosh Chooser; for example, make sure that there are no unintended spaces in the name (including trailing blanks), and so forth.

- The LaserWriter1 printer is located in the LocalTalk1 zone.

  Make sure that the zone name is correct and that the printer actually resides in that zone.

- The printer is turned on and is not in an error condition.

  Unless you used the **-f** option on the configuration line, the spooler does not appear in the Chooser if a PostScript printer is off-line, has a paper jam, is out of paper, or is in any other error condition when you load the ATPS module, until the error condition is cleared.

- The object name MacQ1 is not already in use in the server's internal zone.

Symptom: Printer Sends Multiple Error Messages

Failure to select the PostScript Binary Graphics mode when printing PostScript files that contain binary data from a DOS workstation (using NPRINT or CAPTURE) can cause the server to break the file into several sections with an error message generated in the system error log for each section. This error occurs because ATPS interprets Control-D characters ($04) as End-Of-File (EOF) markers.

You can verify that ATPS is interpreting characters as EOF by using the **ATPSV ON** command. When ATPS is in Verbose Mode, a message is generated for each control character interpreted as an End-Of-File.

See "PostScript Binary Graphics Mode" on page 208 for a description of how to select the PostScript Binary Graphics mode.

Symptom: A Non-Apple Printer Isn't Working

Only Apple LaserWriters and ImageWriters have been tested and certified to work with NetWare print queues. This statement does not mean that third-party printers won't work, but it does mean that there can be timing and driver

issues that the vendor of the printer must resolve for the printer to work with NetWare print queues.

When configuring the queue in ATPS.CFG, make sure that these conditions are true:

- *The printer type as specified with the* **-t** *option is correct.*

  You can verify the printer type by using ATCON or some other type of network management software. The type listed in ATCON for the printer is the type of printer that should be listed in the ATPS.CFG file.

- *If the printer is PostScript and its NBP type is not "LaserWriter," the* **-s***option is specified on the queue configuration line.*

  The **-s** option instructs the AppleTalk print spooler and server that the printer will behave like a LaserWriter, even if the printer's NBP type is different.

Symptom: Macintosh Print Jobs Contain Incorrect Characters

This problem is most likely to occur on printers that are directly connected to a serial port. It is caused by sending 8-bit data over a 7-bit channel. A serial communications channel may be configured to use only 7 bits of data per byte, which causes the high-order bit of each byte transmitted on that channel to be lost. This can change the meaning of the byte if it is in the range of 0x80-0xFF. From Macintosh clients, this can show up as incorrect characters in the printed output; for example, double-quote characters (") can be replaced by "R."

The Apple LaserWriter's default mode for serial communications is 7-bit. When you connect a LaserWriter to a serial port, you should use NPRINT to download the PostScript utility SERIAL.PS, which instructs the LaserWriter to use 8-bit serial communication. See “Technical Note about Printer Communication Channels” on page 179 for more details.

Symptom: Printer Substitutes Bitmap Fonts for Fonts

When a bitmap font is substituted for a font you know to be supported by the printer, it means that the font list maintained by the AppleTalk print spooler does not include the full set of fonts resident on the printer.

To update the AppleTalk print spooler's font list for a spooler not using the **-f** option, type this command at the console prompt:

ATPSQUERY ***spooler-name*** **<Enter>**

To update the font list for all spoolers that derive their font list from a particular AppleTalk printer, type this command at the console prompt:

ATPSQUERY *printer-name* <Enter>

If you want to force an update of all font lists for all spoolers not using the **-f** option, type

ATPSQUERY ALL <Enter>

If you are using the **-f** option, the font list file you specified may be unrepresentative of the printer. Please see "PostScript Font Lists: *.FNT Files" on page 191 for details.

Symptom: Macintosh Clients Download Fonts Unnecessarily

If, when printing a document, a Macintosh client downloads fonts that are known to be resident on the printer, it means that the font list maintained by the AppleTalk print spooler does not include the full set of fonts resident on the printer.

For corrective actions you can take in this situation, see "Symptom: Printer Substitutes Bitmap Fonts for Fonts" on page 239.

Symptom: PostScript Jobs Use the Wrong Font

If the font list maintained by a spooler includes a font that the PostScript printer does not currently support, the spooler does not force a download of the font from the Macintosh, and the printer improvises by substituting a default font, often Courier, for the missing font.

For corrective actions you can take in this situation, see "Symptom: Printer Substitutes Bitmap Fonts for Fonts" on page 239.

Symptom: ATPS Cannot Find the AppleTalk Printer

If ATPS cannot find the AppleTalk printer associated with a queue, it prints this message:

```
can't find printer printer-name:type@zone-name retrying
```

If you see this message, make sure that these conditions are true:

- The printer is on.

  First, check the printer and make sure it has not been turned off or is not in an error state (such as a paper jam).

- You can see the printer in the ATCON Lookup service.

  If you cannot see the printer name in ATCON, you should check the AppleTalk internet configuration, as described in "Symptom: Macintosh Client Can't See Server in the Chooser" on page 216.

  If you can see the printer in ATCON, check for a trailing space character at the end of the printer's name. (The Apple Namer software sometimes adds a trailing blank to a printer's name.) This situation does not affect the Chooser, which displays all services of a particular type, but it does affect the ATPS module, which searches for the printer by name.

  For information on looking up an AppleTalk printer using ATCON, see "Looking Up an AppleTalk Service" on page 278.

  The easiest way to check the printer's name for trailing blanks is to choose the printer in the Chooser and then initiate a Macintosh print job. The name of the printer appears in quotes at the top of the print dialog.

A AppleTalk Configuration Concepts

This appendix provides background information about AppleTalk and about how to configure the AppleTalk router in NetWare for Macintosh.

For an explanation of each step in installing and configuring the router in NetWare for Macintosh, see "Configuring the Router in NetWare for Macintosh" on page 243. This section describes the LOAD and BIND command lines, correlating standard AppleTalk configuration information with the requirements of the NetWare for Macintosh software.

If you are unfamiliar with AppleTalk networks, see "AppleTalk Basics" on page 255 for an introduction to the AppleTalk protocols and how they operate on a network.

Configuring the Router in NetWare for Macintosh

You can specify the LOAD and BIND command lines described in this section at the console prompt, but you should include them in AUTOEXEC.NCF to make sure the system executes them in the proper order.

The NetWare file server's AUTOEXEC.NCF file is a batch file containing commands executed each time you reboot the file server.

Loading the AppleTalk Module

When you load the AppleTalk module (APPLETLK.NLM), you specify flag options and parameters as follows:

```
load appletlk [-z] [-t] [-c] net=number [zone={"name"}]
```

The parameters and flag options are shown in Table 28.

Table 28 LOAD APPLETLK Parameters and Flag Options

Option	Explanation
`-z`	Opens and reads the ATZONES.CFG file in SYS:SYSTEM at load time. If you specify this option, the ATZONES.CFG file must exist in SYS:SYSTEM and must contain valid zone configuration lines; otherwise, the AppleTalk module does not load. f you specify the `-z` flag, and you supply the ZONE parameter on the LOAD APPLETLK or on a BIND command line, the name you specify on the command line is used. Please see "Using the ATZONES.CFG Configuration File" on page 249.
`-t`	Turns on transition routing. You must use this option (and the other configuration requirements for Transition Mode) when Phase 1 routers are present on the internet. See Appendix B for details. This option causes the router to check that extended networks are configured with constrained network ranges and zones lists. This option also modifies the behavior of the router to operate with AppleTalk Phase 1 routers when a Phase 1 router is present on one of its interfaces. If a Phase 1 router is present and you do not use this option, multiple error messages appear in the system log.
`-c`	Turns on DDP packet checksums. This option causes the router to calculate checksums and compare them with checksums contained in AppleTalk packets. It is intended for use on internets where all nodes and routers use checksums. See "Using DDP Checksum Verification in the Router" on page 253.
`net=`*number*	*number* is the AppleTalk network number of the internal network. See "Internal Network and Zone Configuration" on page 33 and the example LOAD comand lines in Chapter 3, "Simple Network Configurations," on page 43 and Chapter 4, "More Complex Network Configurations," on page 81 for more information.
`zone={"`*name1*`" [,"`*name2*`"...]}`	*name1* is the default zone of the internal network, in which AFP file services will be advertised. If *name2* is specified, it can be used as an alternative to the default zone of the internal network for advertising print queues. See "Internal Network and Zone Configuration" on page 33 and "Advertising a Queue in a Specified Zone: -o" on page 170 for more information.

Loading LAN Drivers with AppleTalk Frame Types

In NetWare v3.12, a LAN driver is a loadable module that communicates between the network board and a protocol stack, in this case, AppleTalk. When you load a LAN driver, you specify parameters that allocate a specific interrupt and port (I/O address) to the network board. These parameters uniquely identify the board to the system. For example, if there are two boards of the same type, each board must have a unique interrupt and port, as shown in these command lines:

```
load ne2000 int=3 port=200
load ne2000 int=5 port=320
```

The interrupt and port values indicate hardware settings on the actual board. See the documentation accompanying the network board for hardware settings, and NetWare v3.12 *System Administration* for more information about the driver parameters that you can specify on the LAN driver LOAD command line.

AppleTalkPacket Frames

To allow an Ethernet or Token Ring LAN driver to handle AppleTalk packets, you must specify a packet frame type when you load the LAN driver. When loading the LAN driver, you must add one of these phrases to the LOAD command line:

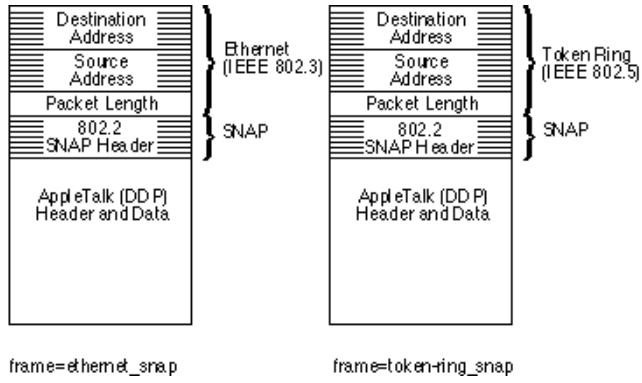
```
frame=token-
  ring_snapframe=ethernet_snapframe=ethernet_ii
```

For example, the LOAD command lines for two extended networks might look like one of these:

```
load token int=2 ls=32 frame=token-ring_snap
load ne2000 int=5 port=320 frame=ethernet_snap
```

The **`frame`** parameter causes the router to add certain kinds of information to each AppleTalk packet. The first type of information is required by the IEEE 802.3 (Ethernet) or 802.5 (Token Ring) specification. The second type is required by the SubNet Access Protocol (SNAP) specification. The process of adding information results in EtherTalk 2.0 or TokenTalk packets like those shown in Figure 72.

Figure 72 SNAP Frames for Extended Networks



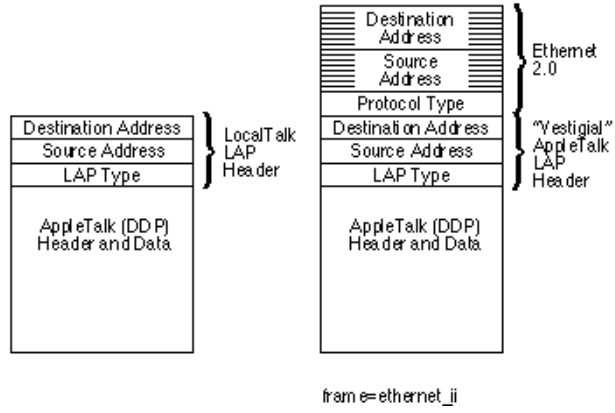
For nonextended AppleTalk networks, EtherTalk 1.0 requires a packet frame specification. LocalTalk cable (designed to support AppleTalk) uses the Link Access Protocol (LLAP) to transmit AppleTalk packets. ARCnet uses the default frame type used by IPX, so if you have loaded IPX on a LAN driver, you do not need to reload the driver for AppleTalk on ARCnet.

EtherTalk 1.0 networks use the "Ethernet Type 2" frame, shown in Figure 73. For example, the LOAD command line for a nonextended Ethernet network might look like this:

```
load ne2000 int=3 port=200 frame=ethernet_ii
```

This specification causes the router to add information required by the Ethernet 2.0 specification to AppleTalk packets being transmitted on the EtherTalk 1.0 interface. Figure 73 shows a LocalTalk packet (which does not require a frame) and an EtherTalk 1.0 packet with the "ETHERNET_II" frame type.

Figure 73 Frames for Nonextended Networks



If you are using both EtherTalk 1.0 and EtherTalk 2.0 on a single Ethernet cable, you must load the LAN driver with both types of frame; for example, the command lines might look like this:

```
load ne2000 int=3 port=200 frame=ethernet_ii
load ne2000 int=3 port=200 frame=ethernet_snap
```

In this case, you are binding a LAN driver with two different frames to the same NE2000 Ethernet board, because the interrupt and port values are the same. When you load a LAN driver more than once, the driver loads "re-entrantly." Later, when you use the MODULES command, you will see only one NE2000 LAN driver loaded; however, both frame types are associated with it. Please see NetWare v3.12 *Installation*for details.

Binding AppleTalk to a LAN Driver

As described in NetWare v3.12 *System Administration*, the syntax for the BIND command is:

```
bind protocol [to] LAN_driver [driver_parameters]
  [protocol_parameters]
```

The first two parameters for binding AppleTalk to a LAN driver are shown in Table 29.

Table 29 BIND Command Line Parameters

Parameter	Acceptable Values
protocol	**APPLETLK**
LAN_driver	The name of any Ethernet, Token Ring, or LocalTalk driver that has been certified for NetWare v3.11 or above; for example, **ne2000**.

Driver Parameters on the BIND Command Line

The *driver parameters* enclosed in square brackets following the *LAN_driver* name on the BIND command line uniquely identify the board and/or network interface. These parameters must match one or more of the parameters supplied on the LAN driver LOAD command line.

For example, an interrupt value can uniquely identify a network board, as shown in the following partial BIND command lines:

```
bind appletlk to ne2000 int=3...
bind ipx to ne2000 int=5...
```

Because the interrupt values are different, these command lines identify two separate Ethernet boards, one supporting an AppleTalk network interface and the other supporting an IPX network interface.

In the case where a single network board supports more than one network interface, an additional parameter must be supplied to identify each interface uniquely. The frame type, as a rule, uniquely identifies an interface, as shown in the following partial BIND command lines:

```
bind appletlk to ne2000 int=3 frame=ethernet_snap ...
bind appletlk to ne2000 int=3 frame=ethernet_ii ...
```

Because the interrupt values are the same, these command lines identify two separate interfaces (EtherTalk 2.0 and EtherTalk 1.0) on the same Ethernet board. Please see "Example 7: An EtherTalk 1.0 and EtherTalk 2.0 Network" on page 95 for more information.

Please see BIND in NetWare v3.12 *System Administration* for more information on the driver parameters that you can use.

Using a Driver Name Instead of Specifying Parameters

NetWare v3.12 supports the NAME option that allows you to assign a name on the LAN driver LOAD command line, such as this one:

```
load dl2000 int=2 port=320 name=ltalk
```

After assigning a name with the NAME option, you can refer to the driver on the BIND command line by name, rather than by interrupt value and/or frame type, such as in this example:

```
bind appletlk ltalk net=100 zone={"printers"}
```

Please see NetWare v3.12 *System Administration* for a more complete discussion of the NAME option.

AppleTalk Protocol Parameters on the BIND Command Line

The *protocol parameters* required at the end of each BIND command line define the AppleTalk network configuration on that interface. This syntax is used at the end of the BIND command line:

```
net=n1[-n2] [zone={"name1" [,"name2"] [,...,"nameN"]}]
```

NOTE: There is an 82-character limit on BIND command lines. See "Using the ATZONES.CFG Configuration File" on page 249 for information on configuring zones lists that would cause a BIND command line to exceed 82 characters.

Using the ATZONES.CFG Configuration File

NetWare imposes an 82-character limit on BIND command lines. If a zones list causes the BIND command line to exceed 82 characters, you *must* use the **-z** flag when loading the AppleTalk module, and provide all zone names for the current file server in the SYS:SYSTEM\ATZONES.CFG configuration file.

NOTE: If you specify the **-z** option on the LOAD APPLETLK command line, and ATZONES.CFG does not reside in SYS:SYSTEM, the AppleTalk module fails to load. If you specify the **-z** flag, and you supply the ZONE parameter on the LOAD APPLETLK or on a BIND command line, the name you specify on the command line is used. (However, the ATZONES.CFG file must still exist in SYS:SYSTEM.)

Entries in the ATZONES.CFG file provide a correspondence between network numbers (or ranges) and zone names. If you load the AppleTalk module with the **-z** flag and you do not specify zone names on the LOAD APPLETLK or BIND command lines, the installation procedure supplies the missing zone names from the ATZONES.CFG file. If the LOAD APPLETLK

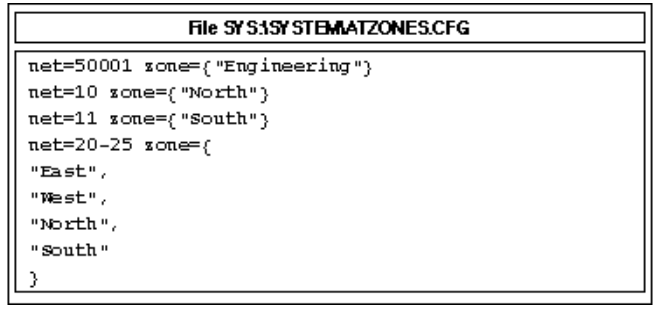
and/or a BIND command line *does* specify one or more zone names, the installation procedure does not access ATZONES.CFG for that network and uses any names specified on the command line.

Creating or Modifying ATZONES.CFG

You can create or modify the ATZONES.CFG file while using the INSTALL program. To do so, load INSTALL and select Product Options, then press <Enter> on the line specifying NetWare for Macintosh. To create or modify ATZONES.CFG, select it in the "Editable Configuration Files" window and then press <Enter>.

To configure zones, add command lines in the format shown in Figure 74.

Figure 74 Sample ATZONES.CFG file



ATZONES.CFG ignores blank spaces and blank lines, so you can use white space to organize the file by network. The network numbers or ranges you enter in this file must match those on the LOAD and BIND command lines in AUTOEXEC.NCF.

When you have configured the zones you need in ATZONES.CFG, press <Esc> and then <Enter> to save your changes and then press <Esc> as necessary to exist INSTALL.

NOTE: Remember that for the router in NetWare for Macintosh, the first name in a zones list is the default zone. All Macintosh clients reside in the default zone unless they choose to belong to another zone in the zones list. See "What Is the Phase 2 Default Zone?" on page 260 if you would like more information.

ATZONES.CFG Syntax

The ATZONES.CFG file uses the same syntax for specifying networks and zones as that used on the LOAD APPLETLK and BIND command lines:

net=*n1*[-*n2*] [zone={"*name1*" [,"*name2*"] [,...,"*nameN*"]}]

There are two keywords, NET and ZONE. Any amount of blank space and blank lines are acceptable in ATZONES.CFG. Therefore, you can organize the file as you wish, provided that the syntax arguments occur in the proper order.

This sample ATZONES.CFG file contains zone configuration lines for three extended networks and two nonextended networks:

```
net=1-10 zone={"A zone", "B zone", "C zone"}
net=11-20 zone={
"X zone",
"Y zone",
"Z zone"
}
net=21-21 zone={"X zone"}
net=22 zone={"A zone"}
net=23 zone={"B zone"}
```

The syntax rules are listed below:

- The first non-blank (non-white-space) character following the keyword NET must be an equal-sign (**=**), followed by a valid AppleTalk network number or a valid network range (a number followed by a hyphen and another number).
- If the keyword NET precedes any other characters, the system ignores the line.
- If the keyword NET is absent, the AppleTalk module does not load.
- The first non-blank (non-white-space) character following the keyword ZONE must be an equal-sign (**=**), followed by a left brace (**{**), followed by a double-quote (**"**).
- The double-quote character must be followed by a string (up to 32 characters, which can include spaces) that represents the zone name. The zone name must be followed by a closing double-quote (**"**). If the zone name is longer than 32 characters, the system truncates it and generates an error message.

- After the enclosing double-quote, the syntax allows either a comma (`,`) or a right brace (`}`). If the next character is a comma, it must be followed by a double-quote, another zone name, a closing double-quote, and so forth.
- If the keyword ZONE precedes any other sequence of characters, the system ignores the line.
- If the keyword ZONE is absent, the AppleTalk module does not load.

How the System Opens and Reads the ATZONES.CFG File

When the NetWare v3.12 operating system is loading the AppleTalk module and encounters the `-z` option, it looks for ATZONES.CFG in SYS:SYSTEM. If it does not find the file, it does not load the AppleTalk module. If it finds the file, it scans the file looking for the keywords NET and ZONE, and checks the syntax as specified above.

NOTE: If you specify the `-z` option and specify a zone name on the LOAD APPLETLK and/or BIND command lines, the system uses the zone name specified on the command line and not the configuration specified in ATZONES.CFG for that network.

When it has checked the entire ATZONES.CFG file, NetWare v3.12 reads the file contents into memory and begins executing the LOAD APPLETLK command line. When it encounters the keyword NET on the LOAD APPLETLK command line, the operating system first checks for the keyword ZONE and a zone name on the current line. If it finds one, it uses that zone name and proceeds to the BIND command lines. If it does not find a zone name on the current command line, it checks its memory for a matching network number and reads the corresponding zone name (the internal zone) into the AppleTalk zones list maintained by the router.

After loading the AppleTalk module, the operating system continues executing the commands in the AUTOEXEC.NCF file. When NetWare begins to execute the BIND command lines, it reads the network configuration beginning with the keyword NET, and checks for the keyword ZONE and a zone name on the current command line. If it finds one, it uses that zone name. If it doesn't find one, it compares the network number or range with the data in memory obtained from ATZONES.CFG. When NetWare finds a matching network number or range, it reads the corresponding zones list into the zones list maintained by the router.

Using DDP Checksum Verification in the Router

When you load the AppleTalk module, you can specify the **-c** (checksums) flag option:

```
load appletlk -c net=number zone={"name"}
```

When you specify the **-c** option while loading the AppleTalk module, all AppleTalk packets that the router generates contain a DDP checksum, and all packets that the router receives containing a checksum have that checksum verified. (Examples of packets that the router generates are Echo responses and NBP responses.) This option is primarily intended for use on existing AppleTalk networks where DDP checksums are already in use by most nodes and routers.

When checksums are enabled, the router fills or verifies the checksum field in all RTMP data packets, NBP LkUp and FwdReq packets, ZIP query and response packets, Echo responses, and so forth, that are sent out or received by the router as an end-point. That is, if the router is simply passing the AppleTalk packets to another node or router, the router performs no verification. For this reason, nodes (such as Macintosh workstations) must also support checksums for checksum verification to be useful.

NOTE: A checksum field of zero (0) indicates "no checksum."

AppleTalk Stack/Router Memory Requirements

The AppleTalk stack/router requires 200 Kbytes of memory to load, and has a varying requirement for short-term memory and Event Control Blocks (ECBs, also called packet-receive buffers) during normal operation. The exact requirement for short-term memory and ECBs depends on the server load, the number of NLMs loaded, and the performance needs at your site. If there is insufficient short-term memory or installed memory, or if the number of ECBs available for the stack/router is too low, the router eventually starts dropping packets and closing user connections.

Short-Term Memory Allocation

If the server is in a low-memory condition, you usually see these console messages:

```
short term allocator failed, out of memory

cache buffers getting low

Out of cache buffers
```

If you see these messages, use the MONITOR console utility to get more information about the server's memory condition. If MONITOR indicates that the Cache Buffers are near zero, then you should install more memory in the server. If it indicates that the Alloc Memory Pool is near its maximum, you should increase the short-term memory allocation; for example, you might enter this command line:

```
set maximum alloc short term memory=2500000
```

Because short-term memory is not dynamically de-allocated, the *maximum* allocation is specified, with a default of 2 Mbytes. The command shown above increases the allocation from the default 2 Mbytes to 2.5 Mbytes.

Of course, the server must have enough memory installed for this command to have the desired effect.

Alternatively, you can reduce the number of connections you are using; for example, you might load the AFP module with the "Limit Sessions" option. See "Memory Issues: Limiting the Number of AFP Login Sessions" on page 152 for instructions.

Packet-Receive Buffers (ECBs)

You must allocate a minimum of 100 packet-receive buffers before the stack/router loads. Add this configuration line to the file server's STARTUP.NCF file:

```
set minimum packet receive buffers=100
```

To test that the router has sufficient ECBs allocated, use the MONITOR command to check the number of ECBs used after letting the router run for an hour or more. (The ECB number is in the upper right-hand corner of the screen in the MONITOR program.) If you see it incrementing rapidly, you should probably set the number of packet-receive buffers higher.

Like short-term memory, ECBs are not dynamically de-allocated, and the maximum allocation is usually specified, for example,

```
set maximum packet receive buffers=500
```

Servers that run for several days under variable load conditions in which "peaks" in server load occur may often encounter situations where they will want to break the 500 ECB maximum. In these instances of unusually high demand, the error message

```
Unable to allocate ECBs
```

may be generated in the system log. This is not a fatal condition, and it corrects itself when the "peak" has subsided. However, if the server consistently has a very high load with many IPX and AppleTalk connections, you can improve performance by increasing the maximum ECB allocation (provided, of course, that the server has sufficient memory installed).

AppleTalk Basics

This section lists the AppleTalk protocols implemented in NetWare for Macintosh and provides a brief description of their basic functionality. It also provides some information about how AppleTalk zones work on an internet that will be useful to AppleTalk internet administrators.

This section provides a basic introduction to the AppleTalk terms and concepts used in this guide. For a complete introduction as well as the complete technical specification for AppleTalk, please see *Inside AppleTalk, Second Edition*.

AppleTalk Protocol Layers

Figure 75 shows the AppleTalk protocols implemented in NetWare for Macintosh. The diagram below represents the standard AppleTalk protocols as described on page I-20 of Inside AppleTalk:

Figure 75 AppleTalk Protocols

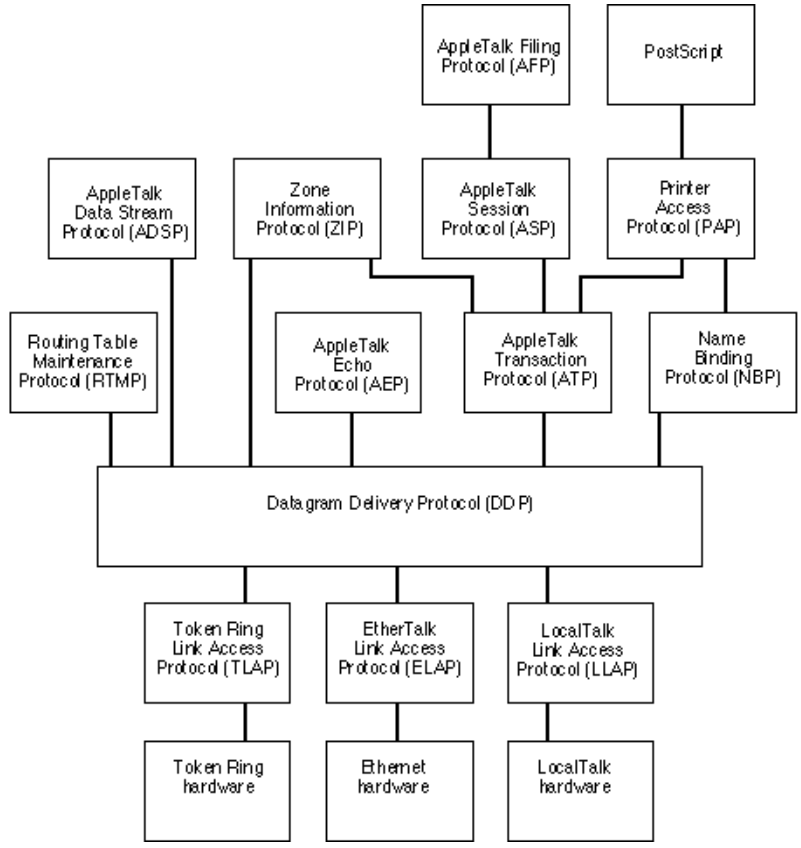


Table 30 explains the role of each of the AppleTalk protocols.

Table 30 AppleTalk Protocols

Protocol	Description
AFP	(AppleTalk Filing Protocol). AFP allows Macintosh users to share files by interacting directly with the NetWare file system, at the same level as NCP interaction.
PAP	(Printer Access Protocol). PAP allows Macintosh users to access printers or print queues on the AppleTalk network.
ADSP	(AppleTalk Data Stream Protocol). ADSP allows two programs to communicate via a full-duplex data stream connection in which either program can read or write data bytes with reliable delivery.
ZIP	(Zone Information Protocol). ZIP maps zone names to network numbers and uses queries to maintain this mapping when new zones are added to an internet. AppleTalk uses zones to logically subdivide the internet so that the names of services are easier for users to find. All service name- searching is done within one zone at a time. The ZIP protocol is used by routers to request and provide zone information when a router comes up with a new network configuration. Please see “How Zone Information Is Maintained on an Internet” on page 260.
ASP	(AppleTalk Session Protocol). ASP works with and extends ATP functionality (described below) by allowing two processes to exchange a sequence of transactions reliably.
RTMP	(Routing Table Maintenance Protocol). RTMP is used by routers to exchange routing information needed to build and maintain each router's routing table. When a router receives a packet, it consults the destination network number in the packet and compares it with the network numbers in its routing table; it can thereby find a way to route that packet to the destination network or to another router closer to the destination network. All AppleTalk routers on the internet continuously maintain their routing tables by exchanging RTMP packets. Please see for more information.
AEP	(AppleTalk Echo Protocol). AEP is a support protocol that provides a way for a node to "bounce" a packet off another node. In NetWare for Macintosh , both the router and the stack support the Echo protocol. The ATCON utility provides an Echo test function.
ATP	(AppleTalk Transaction Protocol). ATP is a basic transport protocol that provides loss-free transaction services. ATP detects errors and timeouts, providing reliable packet exchange.

Protocol	Description
NBP	(Name Binding Protocol). NBP maps names (user-designated character strings) to network addresses and to services. When users request an AppleTalk service such as a printer in the Chooser, NBP is responsible for broadcasting the request in the selected zone and displaying the names of responding services in the Chooser. One or more routers might forward the request to the appropriate zone. See “AppleTalk Zones” on page 258.
DDP	(Datagram Delivery Protocol). DDP opens sockets on AppleTalk nodes and permits datagram (packet) delivery between sockets. It provides a mechanism to address any node on an AppleTalk internet uniquely.
LLAP	(LocalTalk Link Access Protocol). LLAP is AppleTalk's data-link level protocol for LocalTalk. At this level, AppleTalk adds hardware-specific header information and sends packets out onto the specific hardware link. See “Frames for Nonextended Networks” on page 247.
ELAP	(EtherTalk Link Access Protocol). ELAP is AppleTalk's data-link level protocol for Ethernet. At this level, AppleTalk adds hardware-specific header information and sends packets out onto the specific hardware link. See “SNAP Frames for Extended Networks” on page 246.
TLAP	(Token Ring Link Access Protocol). TLAP is AppleTalk's data-link level protocol for Token Ring. At this level, AppleTalk adds hardware-specific address and other "packet-frame" information and sends packets out onto the Token Ring hardware. Please see “SNAP Frames for Extended Networks” on page 246.
AARP	(AppleTalk Address Resolution Protocol). This protocol maps AppleTalk addresses (network and node numbers) into Ethernet or Token Ring hardware addresses and is used to manage the process of each AppleTalk node acquiring its unique node address on these media.

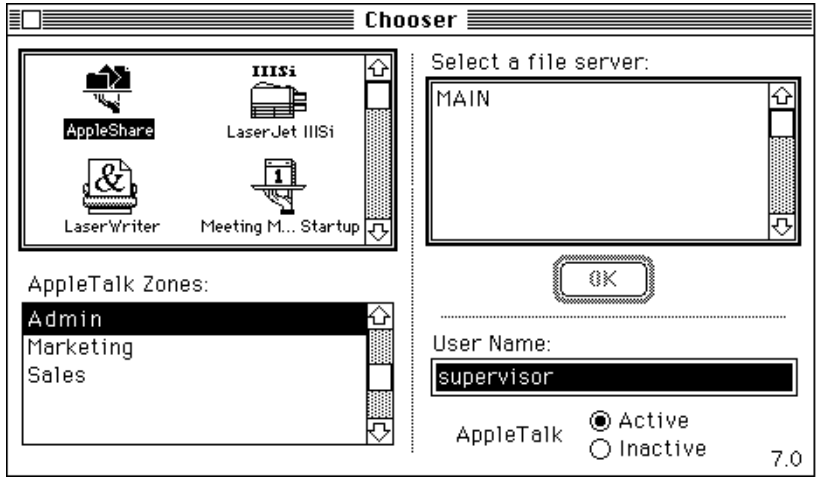
AppleTalk Zones

An AppleTalk zone is a logical grouping of devices that enables users to locate and access network services in the Chooser. A zone name is a logical name associated with some or all of the services on a network or a set of networks.

When you configure AppleTalk zone names in the router, the zone names act as a top-level organizer in the Chooser. A user selects the zone name that indicates where a service is located; for example, a zone named "Building 1" or "Engineering" could indicate where a printer or file server resides. After selecting a zone name, the user clicks a service icon (such as the file server or printer icon) and these events occur:

- The Macintosh sends out NBP Broadcast Request packets.
- The router sends the NBP request to the right networks, possibly forwarding it to other routers as appropriate.
- The routers directly connected to the network(s) associated with the selected zone broadcast the NBP request to all nodes in the zone.
- AppleTalk services in the selected zone send NBP reply packets back to the Macintosh that originated the request, which displays the services' names in the Chooser.

Figure 76 How Services Are Accessed in a Zone



What Is the Phase 2 Default Zone?

In NetWare for Macintosh, the default zone is always the first zone name entered in a zones list. Macintosh workstations always belong to the default zone until the Macintosh user explicitly chooses another zone in the Macintosh Control Panel.

The zone in which a Macintosh workstation is registered is the zone in which its services (if any) will be advertised. It does not restrict the Macintosh user's ability to view and access network services in other AppleTalk zones by using the Macintosh Chooser.

On an extended network, a Macintosh workstation is automatically registered in the default zone. To register in another zone, the Macintosh user should perform these steps:

1. Open the Network Control Panel.

   On System 6.x, select the network icon at the left side of the Control Panel.

2. Click the EtherTalk 2.0 or TokenTalk icon.

   This action displays the zones list configured on this network.

3. Select another zone, and close the Control Panel.

How Zone Information Is Maintained on an Internet

When you bring up an AppleTalk router on the network, it is initialized with its own zones and network numbers. It then begins to receive and send RTMP packets with every other router on the internet.

When other routers receive RTMP packets informing them of a new network on the internet, those routers send a query to the router that represents the new network, asking for the zone name or zones list associated with the network. The new router responds to this query with its zone information. Eventually, all routers on the internet have an updated global list of all zones on the entire internet. This global list allows all Macintosh users on the internet to see services in all AppleTalk zones.

Once one router has acquired zone information from another router, it does not query for zone information related to that particular network again. As long as the network has a good entry in the routers' RTMP tables, there is no way to force routers to query for its zone information again.

One of the side-effects of this situation is that routers are not automatically informed about changes to zone configurations. For example, if you delete a zone name from a router configuration for one AppleTalk network, routers connected to other networks still have the deleted zone name in their lists, so it continues to be visible in the Chooser. In addition, those routers are now inconsistent with the reconfigured router, because they are still maintaining the old zone information. This inconsistency can cause a zone name to show up in the Macintosh Chooser for some time after you have deleted it, and can even cause users to see zone names appearing and disappearing in the Chooser.

The only way to update zone information in all routers is to wait long enough for the RTMP tables in all routers to recognize that the relevant network is down. This usually takes between ten and twenty minutes, but it can take longer on a large internet. (Alternatively, you can down all routers on the internet and bring them up again — this action forces an update of the RTMP tables.)

If you must reconfigure zones on a network, remember that all routers directly connected to that network must be reconfigured. To assure that the old zone names disappear uniformly on the internet, follow these steps:

1. Down all AppleTalk routers directly connected to the network.

   To change the zone configuration in a server that already supports working AppleTalk ports, you must first bring down the AppleTalk router by unloading the AppleTalk module. To unload the AppleTalk module, type this command at the console prompt:

   ```
   UNLOAD APPLETLK <Enter>
   ```

   If there are third-party AppleTalk routers in use on the internet, bring them down following the usual procedure for that router.

   Note that when you unload the AppleTalk module, AppleTalk is automatically unbound from its interfaces.

2. Create the new zones list (or name) in a global ATZONES.CFG file, and copy the global file to SYS:SYSTEM on each file server.

   If you are not using ATZONES.CFG, you can manually edit the zone names in each server's AUTOEXEC.NCF file.

   NOTE: Make sure ten to twenty minutes have elapsed (or more, if your internet is very large) to allow other routers on the internet to recognize that the "old" zones are no longer there. If you are not sure that you have allowed enough time, check the RTMP table in one or more routers by using the ATCON utility, as described in “Viewing the RTMP Routing Table” on page 289.

3 Bring up the routers with the new configuration.

The easiest way to do this is to down the server and bring it up again. However, if you cannot down the server, you can manually enter at the console prompt the LOAD APPLETLK and BIND APPLETLK command lines exactly as they appear in AUTOEXEC.NCF.

NOTE: Alternatively, you can create the new zones list, and then down *all AppleTalk routers on the internet*. When you bring the routers back up, each router will create a new global zones list that contains only the current zone names.

B Transition Mode Routing

This appendix describes how to install NetWare for Macintosh on an internet that includes one or more AppleTalk Phase 1 routers.

If you don't know whether the internet at your site supports an AppleTalk Phase 1 router, check the network records. Phase 1 routers typically predate the introduction of AppleTalk Phase 2 and have not been upgraded to support Phase 2. You can connect Phase 1 routers only to nonextended networks (EtherTalk 1.0, ARCnet, or LocalTalk) because Phase 1 does not support extended networks. However, the fact that there are nonextended networks on an internet does *not* imply that a Phase 1 router is present.

If the internet supports Phase 1 routers and you wish to keep them installed and configured as Phase 1 routers (rather than upgrade them to Phase 2), you must configure all Phase 2 routers on the entire internet in Transition Mode.

When you configure an AppleTalk router in Transition Mode, the Phase 2 router modifies its behavior to operate with a Phase 1 router on the internet.

What Is Transition Mode?

Transition Mode is way of configuring Phase 2 routers that enables them to operate with Phase 1 routers on an internet. In Transition Mode, all Phase 2 routers observe these addressing constraints to avoid extended ranges and zones lists that are incomprehensible to a Phase 1 router:

- On extended networks, the first number in the network range is equal to the last number in the range, as in `10-10`.
- On extended networks, the zones list has only one name.

How Does Transition Mode Affect Extended Networks?

The addressing constraints in Transition Mode mean that extended networks are limited to 253 devices. If you must support more than 253 EtherTalk 2.0 or TokenTalk devices, you cannot use Transition Mode. Your alternative is to upgrade the Phase 1 routers to AppleTalk Phase 2.

What Does the Router Do in Transition Mode?

When you configure a router in Transition Mode, the router is prepared to send out Phase 1-compatible RTMP packets on its nonextended interfaces.

RTMP packets contain information about all networks known to the router. AppleTalk routers pass this information among themselves every ten seconds, updating and maintaining their view of the internet.

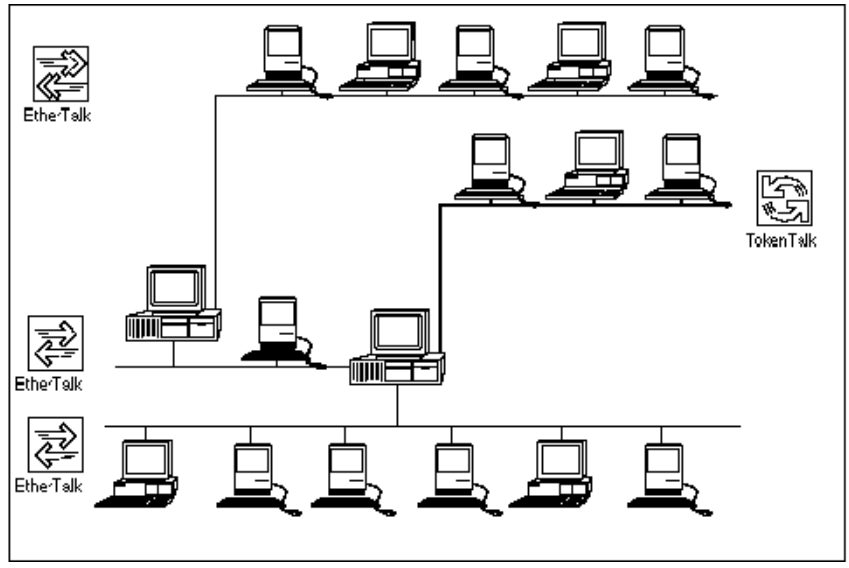
When the Phase 2 router is *not* in Transition Mode, it always sends out Phase 2 RTMP packets. Phase 2 RTMP packets are different from Phase 1 RTMP packets, and can contain information about extended networks. A Phase 1 router cannot read the Phase 2 packets and cannot incorporate the Phase 2 information into its routing tables.

When the Phase 2 router *is* in Transition Mode and it receives a Phase 1 RTMP packet on one of its nonextended interfaces, it sends out Phase 1-compatible RTMP packets on that network. The network information contained in these packets cannot include extended ranges and zones lists, which means that *all* extended networks (EtherTalk 2.0 or TokenTalk) on the entire AppleTalk internet must be configured with a network range of one (for example, `10-10`), and a zones list of one (for example, "My zone").

An Internet That Does Not Require Transition Mode

Figure 77 shows a basic AppleTalk Phase 2 internet, in which all routers support AppleTalk Phase 2. The routers on this internet do not require Transition Mode.

Figure 77 An Internet That Does Not Require Transition Routing

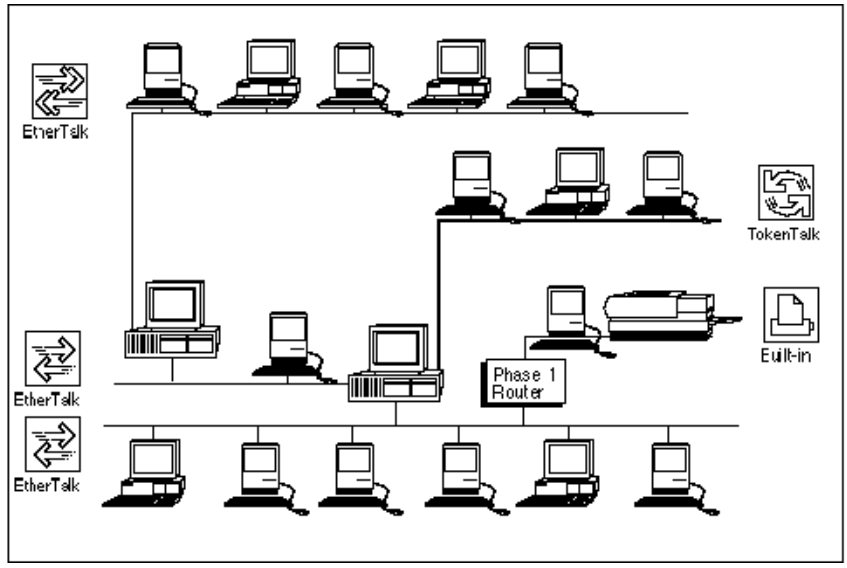


In Figure B-1, two servers are running NetWare for Macintosh, and each server supports multiple Phase 2 interfaces. The TokenTalk and EtherTalk 2.0 networks can use extended network ranges, so they can support as many devices as you need (see “AppleTalk Phase 2 Networks and Zones” on page 28for details.).

An Internet That Requires Transition Mode

Figure 78 shows an internet similar to the one shown in Figure 77, except that a Phase 1 router is present on the EtherTalk 1.0 network. The Phase 2 routers on this internet must be configured in Transition Mode.

Figure 78 Transition Routing Required for Phase 1 Routers



In Figure 78, two servers are running NetWare for Macintosh, and each server supports multiple Phase 2 interfaces. However, there is a Phase 1 router present on the EtherTalk 1.0 network. In this internet, both Phase 2 routers must be in Transition Mode. The TokenTalk and EtherTalk 2.0 networks cannot use extended network ranges, so they will be limited to 253 nodes on each network.

An Example Transition Mode Configuration

When you are configuring the AppleTalk router in NetWare for Macintosh in Transition Mode, these conditions must be in effect:

- The `-t` option is specified on the LOAD APPLETLK command line.
- On extended networks, the first number in the network range is equal to the last number in the range, as in `10-10`.

- On extended networks, the zones list has only one name.
- Nonextended networks are configured as usual.

As with all types of AppleTalk router configuration, the network number or range you assign to an interface must be unique on the internet and consistent for all routers on that cable. The zone name you assign to an interface must also be consistent for all routers on that cable.

Planning the Configuration

This example describes how to configure the two Phase 2 routers shown in Figure 78 in Transition Mode, using the configuration shown in Table 31:

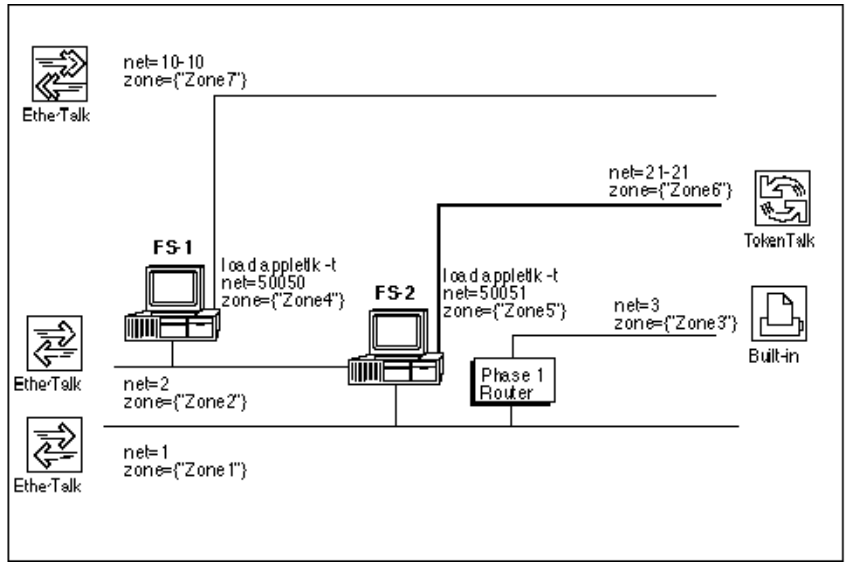
Table 31 Transition Routing Internet Configurations

Configurable Component	FS-1 Example Data	FS-2 Example Data
Internal AppleTalk network	`load appletlk -t net=50050 zone={"Zone4"}`	`load appletalk -t net=50051 zone={"Zone5"}`
EtherTalk 1.0	`net=2 zone={"Zone2"}`	`net=2 zone={"Zone2"}`
EtherTalk 1.0	N/A	`net=1 zone={"Zone1"}`
EtherTalk 2.0	`net=10-10 zone={"Zone7"}`	N/A
TokenTalk	N/A	`net=21-21 zone={"Zone6"}`

NOTE: This example does not load print services and create print queues. Please see "Managing AppleTalk Print Services" on page 155 for information about print services.

Figure 79 shows the AppleTalk network configuration. No clients are shown, to enable you to see the actual networks more clearly:

Figure 79 A Transition Mode Configuration



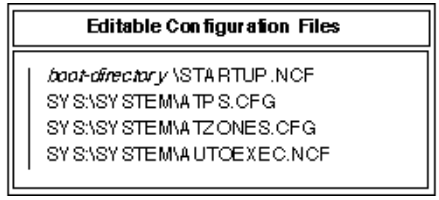
Note that the network ranges and zone names on the EtherTalk 2.0 and TokenTalk extended networks are constrained, and that both routers have the `-t` option enabled. When you specify the `-t` option on the LOAD APPLETLK command line, the router checks the addressing constraints on its nonextended networks and prints warning messages if you have forgotten to limit the range and zones list.

FS-1 in Transition Mode: EtherTalk 1.0 and TokenTalk

To enter a configuration that will be in effect when you bring up the server, follow these steps:

1. Load INSTALL, select Product Options in the main INSTALL menu, and then press <Enter> on the line specifying NW-MAC.

   When you press <Enter>, the Editable Configuration Files menu opens:



2. Press <Enter> to open a text editor window for STARTUP.NCF.

   Add these commands to the existing commands in STARTUP.NCF:

   ```
   load mac
   set minimum packet receive buffers=100
   ```

   These commands are explained in "The Macintosh Name Space" on page 140 and in "AppleTalk Stack/Router Memory Requirements" on page 253.

   Press <Esc>, then <Enter> to save your changes to STARTUP.NCF and to return to the Editable Configuration Files menu.

3. Use the arrow keys to select AUTOEXEC.NCF in the menu and then press <Enter>.

   Add the NetWare for Macintosh configuration commands to the existing commands in AUTOEXEC.NCF. The commands required for this example configuration appear in bold monospace type in Figure 80.

Figure 80 AUTOEXEC.NCF with Transition Mode

File SYS:SYSTEM\AUTOEXEC.NCF

```
file server name FS-1
ipx internal net C9000556

load appletlk -t net=50050 zone={"Zone4"}

load ne2000 int=3 port=300 frame=ethernet_ii name=etalk1
load ne2000 int=2 port=320 frame=ethernet_snap name=etalk2

bind appletlk etalk1 net=2 zone={"Zone2"}
bind appletlk etalk2 net=10-10 zone={"Zone7"}

load afp
```

NOTE: Before loading the AFP or ATPS modules, you must load the AppleTalk module and bind AppleTalk to one or more LAN drivers, as shown below.

4 Load the AppleTalk module and configure the internal network:

```
load appletlk -t net=50050 zone={"Zone4"}
```

The **-t**option enables Transition Mode. For more information, please see "Loading the AppleTalk Module" on page 243.

5 Load LAN drivers and AppleTalk frame types:

```
load ne2000 int=3 port=300 frame=ethernet_ii
  name=etalk1
load ne2000 int=2 port=320 frame=ethernet_snap
  name=etalk2
```

The NAME option is a NetWare driver-naming feature that enables you to specify a name referring to a full driver configuration; this option is described in the NetWare v3.12 *System Administration*manual. For more information, see "Loading LAN Drivers with AppleTalk Frame Types" on page 245.

6 Bind AppleTalk to the LAN drivers and configure AppleTalk networks:

```
bind appletlk etalk1 net=2 zone={"Zone2"}
bind appletlk etalk2 net=10-10 zone={"Zone7"}
```

Note that the network range and zones list on the extended EtherTalk 2.0 network must be constrained, as described in "What Is Transition Mode?" on page 263.

7 Load services:

```
load afp
```

For details on the AFP configuration options you can specify on the LOAD AFP command line, please see "Setting Up a Specialized Environment" on page 148.

8 Exit INSTALL, saving your changes.

9 Down the file server and bring it back up.

If you don't wish to down the file server at this time, re-enter at the console prompt all configuration commands specified in the STARTUP.NCF and AUTOEXEC.NCF files. This action brings up NetWare for Macintosh for the current server session. The next time you down the server, the specifications in STARTUP.NCF and AUTOEXEC.NCF will apply.

If you *can* down the server at this time, follow your usual procedure.

10 Use the MODULES command to verify that the NLMs loaded.

11 Check the router's interfaces in ATCON.

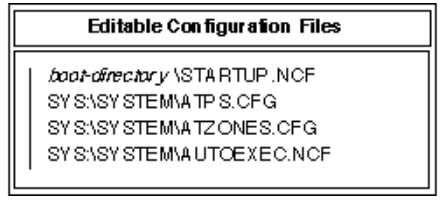
Please see Appendix C, "Using ATCON," for details on using this utility to verify conditions on the AppleTalk internet. The *Using the NetWare for Macintosh Client* guide describes how to check the configuration from a Macintosh client.

FS-2 in Transition Mode: EtherTalk 1.0 and TokenTalk

To enter a configuration that will be in effect when you bring up the server, follow these steps:

1. Load INSTALL, select Product Options in the main INSTALL menu, and then press <Enter> on the line specifying NW-MAC.

   When you press <Enter>, the Editable Configuration Files menu opens:



2. Press <Enter> to open a text editor window for STARTUP.NCF.

   Add these commands to the existing commands in STARTUP.NCF:

   ```
   load mac
   set minimum packet receive buffers=100
   ```

   These commands are explained in "The Macintosh Name Space" on page 140 and in "AppleTalk Stack/Router Memory Requirements" on page 253.

   Press <Esc> and then <Enter> to save your changes to STARTUP.NCF and to return to the Editable Configuration Files menu.

3. Use the arrow keys to select AUTOEXEC.NCF in the menu and then press <Enter>.

   Add the NetWare for Macintosh configuration commands to the existing commands in AUTOEXEC.NCF. The commands required for this example configuration appear in bold monospace type in Figure 81.

Figure 81 AUTOEXEC.NCF: LocalTalk and EtherTalk 2.0

File SYS:SYSTEM\AUTOEXEC.NCF

```
file server name FS-2
ipx internal net C9000566

load appletlk -t net=50051 zone={"Zone5"}

load ne2000 int=3 port=300 frame=ethernet_ii name=etalk1
load ne2000 int=5 port=320 frame=ethernet_ii name=Phase1
load token int=2  frame=token-ring_snap name=ttalk

bind appletlk Phase1 net=1 zone={"Zone1"}
bind appletlk etalk1 net=2 zone={"Zone2"}
bind appletlk ttalk net=21-21  zone={"Zone6"}

load afp
```

NOTE: Before loading the AFP or ATPS modules, you must load the AppleTalk module and bind AppleTalk to one or more LAN drivers, as shown below.

4 Load the AppleTalk module and configure the internal network:

```
load appletlk -t net=50051 zone={"Zone5"}
```

The **-t**option enables Transition Mode. For more information, please see "Loading the AppleTalk Module" on page 243.

5 Load LAN drivers and AppleTalk frame types:

```
load ne2000 int=3 port=300 frame=ethernet_ii
  name=etalk1
load ne2000 int=5 port=320 frame=ethernet_ii
  name=Phase1
load token int=2 frame=token-ring_snap name=ttalk
```

The NAME option is a NetWare driver-naming feature that enables you to specify a name referring to a full driver configuration; this option is described in the NetWare v3.12 *System Administration* manual. For details, see "Loading LAN Drivers with AppleTalk Frame Types" on page 245.

6. Bind AppleTalk to the LAN drivers and configure AppleTalk networks:

```
bind appletlk Phase1 net=1 zone={"Zone1"}
bind appletlk etalk1 net=2 zone={"Zone2"}
bind appletlk ttalk net=21-21 zone={"Zone6"}
```

   Note that the network range and zones list on the extended TokenTalk network must be constrained as described in "What Is Transition Mode?" on page 263.

7. Load services:

```
load afp
```

   For details on the AFP configuration options you can specify on the LOAD command line, please see "Setting Up a Specialized Environment" on page 148.

8. Exit INSTALL, saving your changes.

9. Down the file server and bring it back up.

   If you cannot down the file server at this time, re-enter at the console prompt all configuration commands specified in the STARTUP.NCF and AUTOEXEC.NCF files. This action brings up NetWare for Macintosh for the current server session. The next time you down the server, the specifications in STARTUP.NCF and AUTOEXEC.NCF will apply.

   If you *can* down the server at this time, follow your usual procedure.

10. Use the MODULES command to verify that the NLMs loaded.

11. Check the router's interfaces in ATCON.

    Please see Appendix C, "Using ATCON," for details on using this utility to verify conditions on the AppleTalk internet. The *Using the NetWare for Macintosh Client* guide describes how to check the configuration from a Macintoshclient.

C Using ATCON

This appendix describes the ATCON console utility. You can use ATCON at the server to monitor activity in the AppleTalk network portions of your LAN. ATCON's functions enable you to diagnose operational problems in the networks that support AppleTalk.

At the server console, type

```
LOAD ATCON <Enter>
```

ATCON's main menu opens:

Figure 82 ATCON Main Menu

The main menu contains the functions listed in Table 32.

Table 32 ATCON Main Menu Functions

Menu Option	Function Performed
Lookup and Echo Services	With the Lookup service, you can execute an NBP lookup test for an AppleTalk service, such as a file server, LaserWriter, or ImageWriter. You can use this test to verify that all services, or all services of a particular type, are currently available. If you specify a name, such as a printer or a server name, you can use this test to verify that the specified service is available. You can also use the Lookup service to specify the node you will use for the Echo test. Executing an Echo test enables you to verify node-to-node communication on the AppleTalk network.
View AppleTalk Statistics	View statistics about the packets that the AppleTalk router received, dropped, or transmitted. These statistics are dynamically updated as the router functions.
View Logs	View the system and volume log files, which shows informational and error messages received from the NetWare operating system and from the modules.
View Router Interfaces	View the AppleTalk network numbers assigned to the internal network as well as to external interfaces in the current file server.
View RTMP Table	View information about all AppleTalk networks accessible to the router, either directly (on one of its own network interface boards) or remotely, through one to fifteen other routers. The system checks the status of the networks every 10 seconds and verifies the status as "Good," "Susp," (Suspect) or "Bad," depending on how long it has been since information about the network was broadcast.
View Stack Interface	View the internal network configuration, including the internal zone name.
View Zones List	View the AppleTalk zones accessed by the AppleTalk stack.

Using ATCON to Diagnose the AppleTalk Network

This section suggests how to use ATCON to check the AppleTalk network if you think it has an error condition.

- Check the system log and volume log for errors or informational messages by choosing View Logs in ATCON. If either log contains many messages, you can skip to the bottom of the file by pressing <Ctrl>+<PgDn>.
- If you suspect that the internet has a "break" in it (that is, clients cannot reach services on a remote network), select View RTMP Table in ATCON. The RTMP table (or "routing table") is dynamically updated with information from all AppleTalk routers on the internet, and you can check this table to determine whether a remote router is still up and running. Please see the sections on routing table maintenance in *Inside AppleTalk, Second Edition*, for a detailed understanding of how RTMP is used to inform routers about changes in internet connectivity.
- If you are experiencing a communication problem with a remote network, you can use the Lookup service function in ATCON to check that the router can communicate with other services on the internet. You can also use the Lookup service to find out network or node addresses (or both) without having to consult your network records. In addition, you can use the Echo test in ATCON to verify that the router can communicate with a particular node on a network. See "Looking Up an AppleTalk Service" on page 278 and "Using Echo to Verify Connectivity" on page 281.
- If you suspect a problem with the router in the current file server, select View AppleTalk Statistics in ATCON to view the number of packets received and the number of packets dropped by the router since it began operating. These fields are described in "CheckingAppleTalkStatistics" on page 284. You can also use the MONITOR program at the server console to view the packets received and dropped at the network board level. See NetWare v3.12 *System Administration* for details on MONITOR.

Looking Up an AppleTalk Service

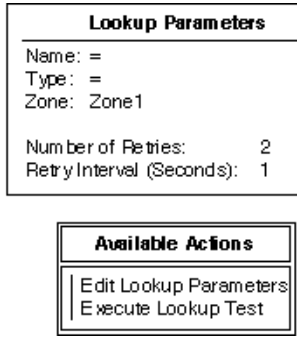
The Lookup function in ATCON performs similarly to looking up a service in the Macintosh Chooser. When you use the Lookup function, the router sends NBP broadcast requests to the specified zone. AppleTalk services (such as printers or file servers) respond to the request by sending NBP responses to the requester. If an NBP lookup test executes successfully, a window opens, showing the name of the service and its network address.

An NBP lookup is a simple way to test that the router can communicate with services (or a specific service) in an AppleTalk zone. If the lookup succeeds, you know that both the router and the responding service are active on the AppleTalk internet. If the selected zone is one or more hops away, you also know that the routers in-between are working.

To check the status of all AppleTalk services in a zone, follow these steps:

1. Choose Lookup and Echo Services in the ATCON main menu.

   The Lookup Parameters window opens, with the Available Actions menu below it:

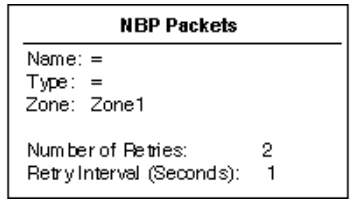


   The Lookup Parameters window contains the default values that NetWare for Macintosh uses when performing the lookup.

2. In the Available Actions menu, use the arrow keys to select Edit Lookup Parameters and then press <Enter>.

   The NBP Packets menu opens, showing a number of parameters for the Lookup service.

Figure 83 NBP Packets



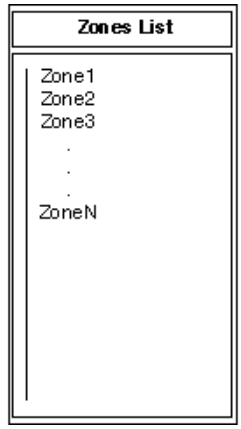
The lookup parameters you can edit are described in Table 33.

Table 33 Lookup Test Parameters

Parameter Name	Description
Name	The default equals sign (=) means "all." For example, if you specify a type of service in the next field and leave the equals sign here, the Lookup service test asks for the names of all services of that type within a zone. You can enter the name of any service on your internet; for example, you might enter the name of a server, a printer, or a print queue.
Type	The default equals sign (=) means "all." In this case, the Lookup service test asks for the names of all services of all types within a zone. You can specify a particular type, such as "LaserWriter" or "AppleShare." (The type of service for a server is "AppleShare.")
Zone	Press <Enter> in this field to pop up a list of available zones on the internet. You can use the arrow keys to select a zone in this list and press <Enter> to enter the zone name into the field.
Number of Retries & Retry Interval	The default number of Retries is 2, and the default interval between retries is 1 second. The router sends out NBP requests up to two times if it receives no responses.

3 Use the arrow keys to position the cursor on the Zone field and then press <Enter>.

This action brings up a list of available zones on the internet:



4. Use the arrow keys to select a zone name in the list and press <Enter>.
5. If you wish, enter a service name or type.

   Alternatively, you can leave the default equals sign (=) for a more general Lookup service test.
6. Press <Esc> and answer Yes to use these settings.
7. Use the arrow keys to select Execute Lookup Test in the Available Actions menu, and then press <Enter>.

   After a few seconds, you should see the results of the Lookup service. For example, Figure 84 shows the results of a Lookup for a service named "LW-MAIN" of type "LaserWriter."

Figure 84 Results of a Lookup Service

NBP Service Lookup

Name	Type	Net	Node	Socket
LW-main	LaserWriter	91	216	218

The router reports the network and socket address of the service. If the Lookup fails, the name of the service won't appear. If no services are available, a message is displayed.

Using Echo to Verify Connectivity

When you execute an Echo test, the router sends a specified number of packets across the network to a specified node; the node then returns the same number of packets back. If an Echo test executes successfully, the number of packets that the router receives is equal to the number of packets it sent.

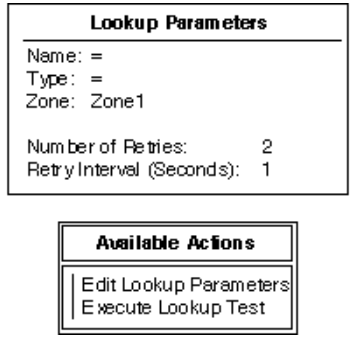
Using an Echo test, you can carry out either of these tests:

- You can check to see whether the router can communicate with a particular node on one of its networks. If the communication is successful, you know that AppleTalk is working on that interface, and that the specified node is up and running.
- You can check to see whether the router can communicate with a node on a "remote" AppleTalk network (a network that is not directly connected to the file server). If the communication is successful, you know that the router can reach another AppleTalk network and that all AppleTalk routers in between must be routing correctly.

To verify that the router can communicate with a node on a local or remote AppleTalk network, follow these steps:

1. Choose Lookup and Echo Services in the ATCON main menu.

   The Lookup Parameters window opens, with the Available Actions menu below it:

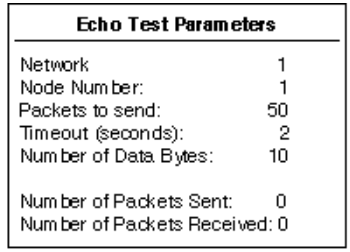


2. Use the Lookup service to find the node you want use for the Echo test.

   Follow the steps described in "Looking Up an AppleTalk Service" on page 278.

3 In the NBP Service Lookup window, highlight the node to use for the Echo test. Then, press Enter.

The Echo Test Parameters window opens, with the Available Actions menu below it:

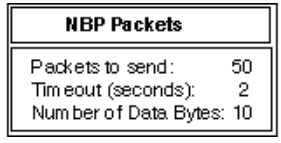


The Echo Test Parameters window displays the default setting for the Echo test, as well as the network and node number of the service you highlighted in the NBP Service Lookup window.

4 In the Available Actions menu, use the arrow keys to select Edit Echo Parameters and then press <Enter>.

A menu opens, showing a number of parameters for the Echo test (Figure 85).

Figure 85 Echo Test Parameters



The test parameters you can edit are listed in Table 34.

Table 34 Echo Test Parameters

Parameter	Description
Packets to send	The default number of Echo packets sent out is 50. You can specify the number of packets you want to echo in the "Packets to Send" field. The maximum number of packets allowed is 65,535. If you wish to check throughput speed, you can specify a relatively high number and time the procedure.
Timeout (seconds)	The default Timeout value is two ticks (a tick is approximately 1/18 of a second). If you wish, specify the number of ticks that ATCON waits for response packets. The maximum number of ticks allowed is 9,999, but we recommend that you do not set the Timeout value too high. At 9,999 ticks, ATCON waits approximately 9 minutes for an Echo reply.
Number of Data Bytes	The default Echo packets contain 10 data bytes, which are always included in Echo packets. If you wish, specify the number of data bytes in each packet. Each packet can contain from 0 to 581 bytes

5. Modify one or more parameters, or leave the default values.
6. Press <Esc> and answer Yes to use these settings.
7. Choose Execute Echo Test in the Available Actions menu.

   When you select Execute Echo Test, the Echo protocol in the AppleTalk stack sends out the specified number of Echo packets to the specified address. The "Number of Packets Sent" and "Number of Packets Received" fields should increment as described in Table 35.

Table 35 Incrementing Echo Test Parameters

Parameter	Description
Number of Packets Sent	As ATCON sends out packets, the "Number of Packets Sent" field should increment. ATCON sends out the next packet only when the response to the previous packet has returned, or when the Timeout value has expired.
Number of Packets Received	If Echo receives a response before the Timeout value, the value in the "Number of Packets Received" field increases. If the "Number of Packets Received" field does not increase, the router did not receive any Echo packets.

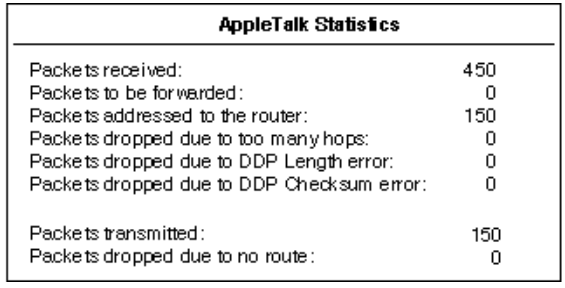
If the "Number of Packets Received" field does not increment, the AppleTalk connection may still be functioning properly. The problem might be as simple as an AppleTalk router accidentally switched off, or a cable connection worked loose. If the value in the "Number of Packets Received" field does not increase, carry out these tasks:

- Check that there are other AppleTalk nodes on the network you specified.
- Make sure that the routers (if any) between the local Macintosh and the target network are plugged in and switched on.
- Check the network board in the file server to make sure it is connected properly to the network.

CheckingAppleTalkStatistics

The AppleTalk router keeps track of the number of packets it receives, forwards, and transmits, as well as the number of packets dropped due to some network or server condition. To view these statistics, use the arrow keys to select View AppleTalk Statistics in the main ATCON menu, and then press <Enter>. A window opens, listing the current values for packet statistics maintained by the router (Figure 86).

Figure 86 AppleTalk Statistics



These router statistics are described in Table 36.

Table 36 AppleTalk Statistics

Field Name	Description
Packets received	This field indicates the total number of packets received by the router since it began operating.
Packets to be forwarded	This field indicates the number of packets that were received by the router and destined for another node. These are the packets that the router forwards to a node or to another router closer to the destination node address.
Packets addressed to the router	Some packets are destined for the router itself; for example, broadcast packets, Echo packets that specify the router's node address, RTMP packets, and so forth. This field shows the number of such packets that the router has received.
Packets dropped due to too many hops	A "hop" represents a packet being received and forwarded by a router. If a packet must go through three routers to reach its destination, then the destination is three hops away from the source node. If the router receives a packet with a destination address more than 15 hops away, it drops the packet. In most cases, the value of this field is zero.
Packets dropped due to DDP Length error	This field indicates the number of packets received and dropped with an error in the DDP header. Specifically, the DDP header length did not match the actual length of the packet. Such an error could indicate a hardware problem somewhere on the internet, or an application that is creating packets incorrectly. In most cases, the value of this field is zero.
Packets dropped due to DDP Checksum error	This field indicates the number of packets received and dropped because the checksum calculated by the router did not match the checksum in the packet. The value of this field increases only if you specify the `-c` option on the LOAD APPLETLK command line as an active router option.
Packets transmitted	This field indicates the number of packets transmitted by the router.
Packets dropped due to no route	This field increases when the router fails to transmit packets because it does not find a route to the destination address. This means that the router checked its RTMP tables and did not find an entry for the packet's destination address. In most cases, this indicates that a network is down or has been removed from an internet, but that nodes on some networks continue to see it. (This situation will correct itself with time.)

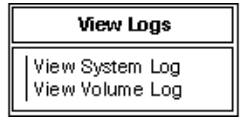
Viewing Systemand Volume Messages in the Log Files

The system log file contains system error and informational messages. You can use the system messages to help you diagnose and troubleshoot system problems. Messages generated by the NetWare operating system are documented in the NetWare System Messages manual. The error messages generated by the AppleTalk stack/router and the AFP module are listed with explanations in Appendix D.

The volume log file reports volume events, such as the date and time the volume was mounted and dismounted. A separate volume log is maintained for each server volume.

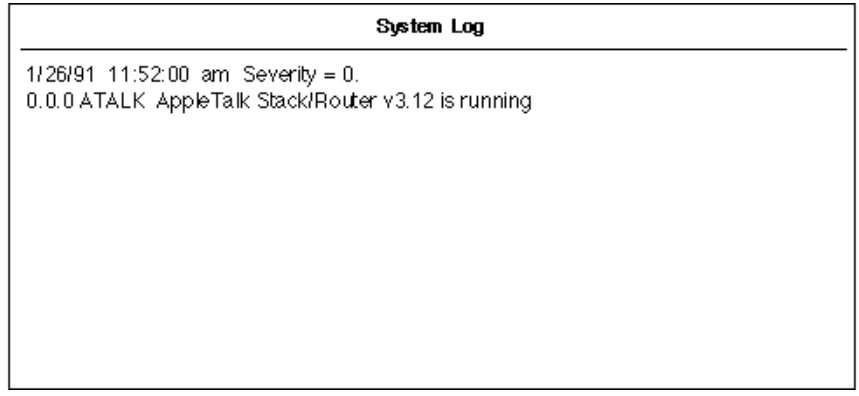
To view the log files, select View Logs from the main ATCON menu. The View Logs window appears (Figure 87).

Figure 87 The View Logs Window



When you select View System Log, the system log file (SYS:SYSTEM\SYS$LOG) appears (Figure 88).

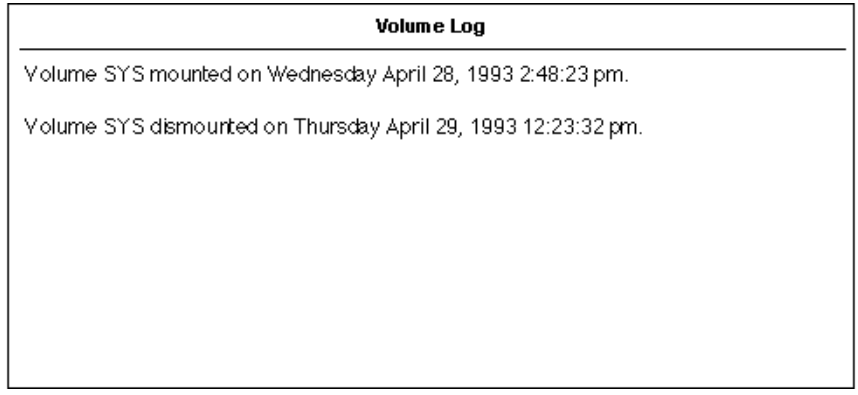
Figure 88 The System Log File



The system log file contains all error messages generated by the server itself and all of its NLMs. If there are many messages in the file, you can skip to the bottom of the file to view the most recent messages by pressing <Ctrl>+<PgDn>.

When you select View Volume Log, the volume log file appears (Figure 89).

Figure 89 The Volume Log File

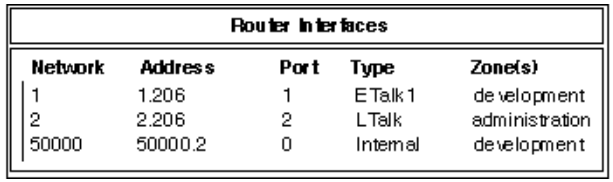


If either the system log or volume log is empty, a message informs you that the file does not exist. When you exit a log file, you are asked whether you wish to clear it. If you select Yes, the file is cleared and remains empty until an event occurs that generates a message and writes it to the file.

Checking the Router's Configuration and Function

After you configure the router, you should use ATCON to check that the configuration is the one you expect. To check the network interfaces configured in the router, use the arrow keys to select View Router Interfaces in the main ATCON menu, and then press <Enter>.

Figure 90 Router Interfaces Window



The fields in the window show the information in Table 37.

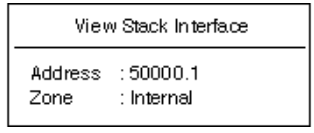
Table 37 Information about Router Interfaces

Field Name	Description
Network & Address	These two fields show the AppleTalk network number and the node address of the router on a given network interface. On the internal network, the router's node number is always 2. It is possible for the router's address on external interfaces to change when you bring up the file server, because the router acquires the address dynamically.
Port	The AppleTalk port number is the interface between the router and an AppleTalk network. Port 0 is associated with the internal network. The first AppleTalk BIND command line in the router's configuration is associated with Port 1, the second AppleTalk BIND command line is associated with Port 2, and so forth.
Type	The Type field indicates the type of AppleTalk network associated with a given port. The possible values for Type include: ETalk1 (EtherTalk 1.0) ETalk2 (EtherTalk 2.0) TTalk (TokenTalk) LTalk (LocalTalk) Internal (the internal network).
Zone(s)	The Zone(s) field indicates the zone configuration for a given interface. If you configured more than one zone on a Phase 2 network, the zones list is arranged vertically in line with the network number. The first zone in the list is the default zone. (See "What Is the Phase 2 Default Zone?" on page 260 for the implications of a default zone.)

Viewing the Stack's Interface

The View Stack Interface option in the ATCON main menu provides a way to check the configuration of the internal network. The stack has only one interface, which is always to the internal network.

To check the internal network configuration, use the arrow keys to select View Stack Interface in the main menu, and then press <Enter>.

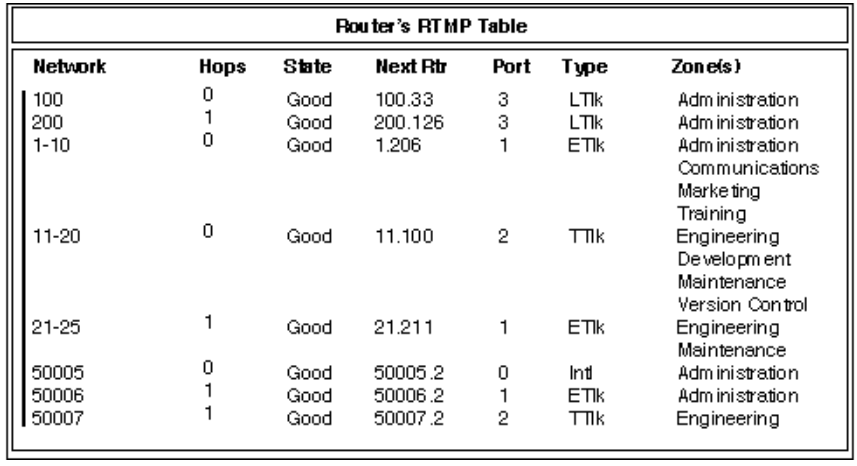


This window shows the internal network address and zone name. Note that the stack will always be node 1 on the internal network.

Viewing the RTMP Routing Table

Viewing the router's RTMP table in ATCON is one of the easiest ways to get a global picture of the AppleTalk internet as the router perceives it. The RTMP table contains entries for all networks and zones that the router can see. To view the RTMP table, use the arrow keys to select View RTMP Table in the main ATCON menu, and then press <Enter>. A text version of the actual RTMP table maintained by the router appears (Figure 91).

Figure 91 Example RTMP Table



Router's RTMP Table

Network	Hops	State	Next Rtr	Port	Type	Zone(s)
100	0	Good	100.33	3	LTlk	Administration
200	1	Good	200.126	3	LTlk	Administration
1-10	0	Good	1.206	1	ETlk	Administration Communications Marketing Training
11-20	0	Good	11.100	2	TTlk	Engineering Development Maintenance Version Control
21-25	1	Good	21.211	1	ETlk	Engineering Maintenance
50005	0	Good	50005.2	0	Intl	Administration
50006	1	Good	50006.2	1	ETlk	Administration
50007	1	Good	50007.2	2	TTlk	Engineering

How Routing Tables Are Maintained

All AppleTalk routers on an internet maintain complete routing tables (RTMP tables), which show all networks on the AppleTalk internet.

When a router comes up on the internet, it broadcasts packets containing entries for its own networks and receives broadcasts from other routers showing all networks they can reach. From these packets, each router builds a table, adding entries for new networks as it finds out about them, and broadcasts this information every ten seconds.

When the tables have stabilized to show an accurate picture of all networks on the internet, they contain a single entry for each network that AppleTalk routers can reach. Each entry in an RTMP table contains this information about a network, as listed in Table 38.

Table 38 Fields in the RTMP Table

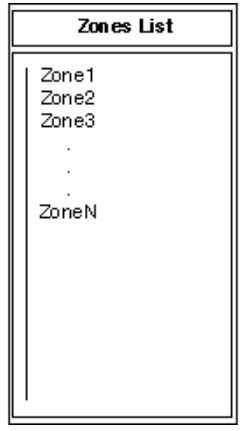
Field Name	Description
Network	This field indicates the AppleTalk number or range associated with a destination network (a network that can be reached on the internet).
Hops	The system measures distance to the network in terms of "hops." Each hop represents one AppleTalk router that lies between the current router and the destination network (that is, a router that must forward a packet from the current router to the destination network). A router always chooses the shortest path to its destination. In some cases, depending on the configuration of the internet, a router can use alternate routes to a network if one router goes down. In this case, the hop count to that network increments in the RTMP table.
State	Each routing table entry has a state associated with it: "Good," indicating that the network continues to appear in all RTMP packets, "Susp" (Suspect), indicating that the network has not appeared in RTMP packets for some time, or "Bad," indicating that the network (or the router connecting to it) is down. In ATCON you see the State field in the RTMP table constantly going to "Susp," then back to "Good" on an internet where all routers are functioning normally. If a router goes down or is switched off, this field will go from "Susp" to "Bad."
Next Router	This field indicates the node address of the closest router between the current router and the destination network.
Zone(s)	This field indicates the AppleTalk zones configured on the network. In addition, the router in keeps track of its own interfaces with the following fields, which also appear in the RTMP tables viewed in ATCON:
Port	This field indicates the AppleTalk port number in the current router through which a packet must be transmitted to reach the destination network. The AppleTalk port number is the interface between the router and an AppleTalk network. Port 0 is associated with the internal network. The first AppleTalk BIND command line in the router's configuration is associated with Port 1, the second AppleTalk BIND command line is associated with Port 2, and so forth.
Type	This field indicates the type of AppleTalk network associated with a given interface. The possible values for Type include these: ETlk (EtherTalk 1.0 or 2.0) TTlk (TokenTalk) LTlk (LocalTalk)

Viewing the Zones List

ATCON allows you to check the global list of all AppleTalk zones in the internet by choosing View Zones List in the main ATCON menu. This list should be identical to the zones list that appears in the Macintosh Chooser.

To view the zones list known to the router, select View Zones List in the ATCON main menu. This action opens the Zones List window (Figure 92).

Figure 92 Global Zones List



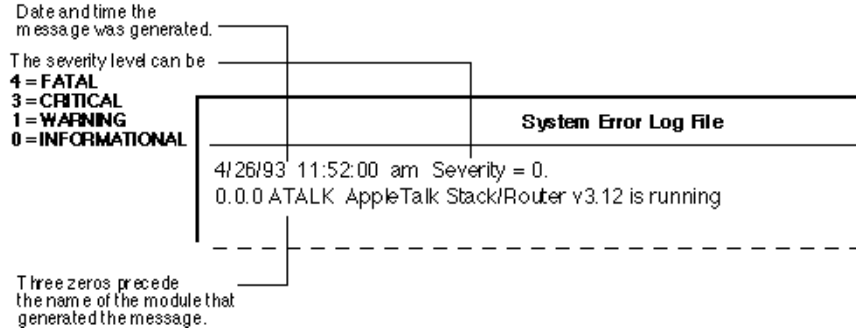
Viewing the zones list in ATCON is a useful way to verify that the router is receiving zone information from other routers and that it can "see" zones configured in other areas of the internet.

D System Messages

This appendix lists the system messages that can be generated by NetWare for Macintosh.

If a message has a status of FATAL or ERROR (CRITICAL), it is displayed on the console as well as logged in the system log file. Most messages that are not considered FATAL appear only in the system log file, unless you are using the ATPS module in Verbose Mode; then these messages also appear in the ATPS console window. When these messages are displayed in the system log file, they use this format:

Figure 93 NetWare Server Error Message Format



The messages in this appendix are listed alphabetically. A page number reference appears after eachmessage, indicating where to look for a detailed explanation.

The following table lists the messages related to NetWare for Macintosh print services that can appear at the console or in the system logs. You can use this table as an index to text about each of these messages.

Table 39 NetWare for Macintosh Messages

Error Message	Page Number
AFP registered with NBP after volume SYS was mounted	“AFP registered with NBP after volume SYS was mounted” on page 320
AFP unregistered with NBP because SYS volume was dismounted	“AFP unregistered with NBP because SYS volume was dismounted” on page 322
AFP registered with NBP during AFP initialization	“AFP registered with NBP during AFP initialization” on page 321
All responses may not be able to be displayed	“All responses may not be able to be displayed” on page 337
Already bound to board *N*	“Already bound to board N.” on page 308
Attaching print server to queue *queue-name*	“Attaching print server to queue queue-name” on page 333
AppleTalk Stack/Router v3.01 is running	“AppleTalk Stack/Router v3.12 is running” on page 307
ASP initialization failure. Error: *N*	“ASP initialization failure. Error: N” on page 318
ATPS: create config failed, out of memory	“ATPS: create config failed, out of memory ATPS: create directory failed, out of memory ATPS: create spooler name failed, out of memory ATPS: parse printer name failed, out of memory” on page 328
ATPS: create directory failed, out of memory	“ATPS: create config failed, out of memory ATPS: create directory failed, out of memory ATPS: create spooler name failed, out of memory ATPS: parse printer name failed, out of memory” on page 328
ATPS: create spooler name failed, out of memory	“ATPS: create config failed, out of memory ATPS: create directory failed, out of memory ATPS: create spooler name failed, out of memory ATPS: parse printer name failed, out of memory” on page 328
ATPS: parse printer name failed, out of memory	“ATPS: create config failed, out of memory ATPS: create directory failed, out of memory ATPS: create spooler name failed, out of memory ATPS: parse printer name failed, out of memory” on page 328

Error Message	Page Number
ATPS console-command: no parameter specified	“ATPS: no parameter specified” on page 328
ATPS: invalid printer/spooler name name	“ATPS: invalid printer/spooler name name” on page 328
ATPSHide: a spooler name is not a valid parameter	“ATPSHide: a spooler name is not a valid parameter” on page 329
ATPSHide: printer printer-name has been hidden	“ATPSHide: printer printer-name is a type that can't be hidden” on page 329
ATPSHide: printer *printer-name* is a type that can't be hidden	“ATPSHide: printer printer-name is a type that can't be hidden” on page 329
ATPSHide: printer *printer-name* could not be found	“ATPSHide: printer printer-name could not be found ATPSHide: lost connection with printer printer-name” on page 329
ATPSHide: lost connection with printer *printer-name*	“ATPSHide: printer printer-name could not be found ATPSHide: lost connection with printer printer-name” on page 329
ATPSHide: printer *printer-name* busy, try again later	“ATPSHide: printer printer-name busy, try again later” on page 329
ATPSQuery: printer *printer-name* font query OK	“ATPSQuery: printer printer-name font query OK” on page 330
ATPSQuery: *printer-name* is not a PostScript printer	“ATPSQuery: printer-name is not a PostScript printer” on page 330
ATPSQuery: can't find printer *printer-name*, query failed	“ATPSQuery: can't find printer printer-name, query failed ATPSQuery: couldn't connect to printer printer-name, query failed ATPSQuery: printer printer-name: couldn't get font list, query failed” on page 330
ATPSQuery: couldn't connect to printer *printer-name*, query failed	“ATPSQuery: can't find printer printer-name, query failed ATPSQuery: couldn't connect to printer printer-name, query failed ATPSQuery: printer printer-name: couldn't get font list, query failed” on page 330

Error Message	Page Number
ATPSQuery: printer *printer-name*: couldn't get font list, query failed	“ATPSQuery: can't find printer printer-name, query failed ATPSQuery: couldn't connect to printer printer-name, query failed ATPSQuery: printer printer-name: couldn't get font list, query failed” on page 330
ATPSQuery: printer *printer-name* busy	“ATPSQuery: printer printer-name busy” on page 330
ATPSQuery: queue *spooler-name* does not support a printer	“ATPSQuery: queue spooler-name does not support a printer” on page 330
ATPSQuery: printer *printer-name*'s font list is not used	“ATPSQuery: printer printer-name's font list is not used” on page 331
ATPSQuery: invalid printer name *printer-name*	“ATPSQuery: invalid printer/spooler name name” on page 331
ATPSRem: a printer name is not a valid parameter	“ATPSRem: a printer name is not a valid parameter” on page 331
ATPSRem: spooler *spooler-name* has already been removed	“ATPSRem: spooler spooler-name has already been removed” on page 331
ATPSRem: Error: *string*	“ATPSRem: Error: string” on page 331
ATPSRem: removed spooler *spooler-name*	“ATPSRem: removed spooler spooler-name” on page 331
ATPSRes: a printer name is not a valid parameter	“ATPSRes: a printer name is not a valid parameter” on page 331
ATPSRes: spooler *spooler-name* is not removed	“ATPSRes: spooler spooler-name is not removed” on page 332
ATPSRes: Error: *string*	“ATPSRes: Error: string” on page 332
ATPSRes: restored spooler *spooler-name*	“ATPSRes: restored spooler spooler-name” on page 332
ATPSShow: a spooler name is not a valid parameter	“ATPSShow: a spooler name is not a valid parameter” on page 332
ATPSShow: printer *printer-name* is not hidden	“ATPSShow: printer printer-name is not hidden” on page 332

Error Message	Page Number
ATPSShow: printer *printer-name* is a type that can't be hidden	“ATPSShow: printer printer-name is a type that can't be hidden” on page 332
ATPSShow: printer *printer-name* could not be found	“ATPSShow: printer printer-name could not be found ATPSShow: lost connection with printer printer-name” on page 332
ATPSShow: lost connection with printer *printer-name*	“ATPSShow: printer printer-name could not be found ATPSShow: lost connection with printer printer-name” on page 332
ATPSShow: printer *printer-name* busy, try again later	“ATPSShow: printer printer-name busy, try again later” on page 333
ATPSV: no parameter specified	“ATPSV: no parameter specified ATPSV: invalid parameter” on page 333
ATPSV: invalid parameter	“ATPSV: no parameter specified ATPSV: invalid parameter” on page 333
ATPSV: verbose mode is already OFF	“ATPSV: verbose mode is already OFF” on page 333
Attaching print server to queue *spooler-name*	“Attaching print server to queue queue-name” on page 333
Attempt to create AFP process failed	“Attempt to create AFP process failed” on page 318
string: bad config parameter: *string* legal parameters are:	“Conflicting information: local default zone = zone-name; zone-name reported on port N” on page 315
Bad RTMP format, port *N*	“Bad RTMP format, port N” on page 314
Begin job *N*	“Begin job N” on page 334
Board *N* does *frame-type* frames	“Board N does frame-type frames” on page 307
Can't log in as *number*	“Can't log in as number” on page 326
Can't create ATPS directory *dir-name*	“Can't create ATPS directory dir-name” on page 326
Can't find printer *printer-name*:*type*@*zone-name* retrying	“Can't find printer printer-name:type@zone-name retrying” on page 327

Error Message	Page Number
Can't open query file *file-name*	“Can't open query file file-name” on page 327
Can't service halted queue	“Can't service halted queue” on page 327
Checking job for EOF characters	“Checking job for EOF characters Sending PAP EOF because EOF marker seen” on page 334
Conflicting information: local net=*N*; *N* reported on port *N*	“Conflicting information: local net=N; N reported on port N Conflicting information: local range=N-N; N-N reported on port N Mismatched net numbers: local=N; N reported on port N Mismatched range numbers: local=N-N; N reported on port N” on page 314
Conflicting information: local default zone = *zone-name*; *zone-name* reported on port *N*	“Conflicting information: local default zone = zone-name; zone-name reported on port N” on page 315
Couldn't allocate packet buffers	“Couldn't allocate packet buffers” on page 319
Could not create desktop file (*file-name*) on volume #*N* (*vol-name*)	“Could not create desktop file (file-name) on volume #N (vol-name)” on page 322
Could not create directory DESKTOP.AFP on volume #*N* (*vol-name*)	“Could not create directory DESKTOP.AFP on volume #N (vol-name)” on page 322
Could not initialize AFP support on volume #*N*	“Could not initialize AFP support on volume #N” on page 319
Could not open file (*file-name*) on volume #*N* (*vol-name*)	“Could not open file (file-name) on volume #N (vol-name)” on page 322
Could not properly initialize desktop file (*file-name*) on volume #*N* (*vol- name*)	“Could not properly initialize desktop file (file-name) on volume #N (vol-name)” on page 323
Could not read volume icon definition file (SYS:SYSTEM\VOLICON.AFP) File does not exist or icon data format is invalid. Using internal default icon	“Could not read volume icon definition file (SYS:SYSTEM\VOLICON.AFP). File does not exist or icon data format is invalid. Using internal default icon” on page 321
Create queue *spooler-name*'s AppleTalk interface failed	“Create queue spooler-name's AppleTalk interface failed” on page 326
Created directory DESKTOP.AFP on volume #*N* (*vol-name*)	“Created directory DESKTOP.AFP on volume #N (vol-name)” on page 321

Error Message	Page Number
Created file *file-name* on volume #*N* (*vol-name*)	“Created file file-name on volume #N (vol-name)” on page 321
Creating queue *queue-name*	“Creating queue queue-name” on page 334
Deleting desktop file *file-name* on volume #*N* (*vol-name*) because CLEARDESKTOP is in effect	“Deleting desktop file file-name on volume #N (vol-name) because CLEARDESKTOP is in effect” on page 321
Desktop files are invalid or damaged on volume #*N* (*vol-name*)	“Desktop files are invalid or damaged on volume #N (vol-name)” on page 323
Dictionary *file-name* not present	“Dictionary file-name not present” on page 334
Error binding APPLETALK to board *N* (ERR=*N*)	“Error binding APPLETALK to board N1 (ERR=N2)” on page 308
Error updating APPL record in desktop file APPLDATA.AFP	“Error updating APPL record in desktop file APPLDATA.AFP.Error code=N Error updating ICON in desktop file ICONDATA.AFP. Error code=N Error updating ICON INDEX in desktop file ICONINDX.AFP. Error code=N” on page 323
Error updating ICON in desktop file ICONDATA.AFP	“Error updating APPL record in desktop file APPLDATA.AFP.Error code=N Error updating ICON in desktop file ICONDATA.AFP. Error code=N Error updating ICON INDEX in desktop file ICONINDX.AFP. Error code=N” on page 323
Error updating ICON INDEX in desktop file ICONINDX.AFP	“Error updating APPL record in desktop file APPLDATA.AFP.Error code=N Error updating ICON in desktop file ICONDATA.AFP. Error code=N Error updating ICON INDEX in desktop file ICONINDX.AFP. Error code=N” on page 323
Extended net range (*N-N*) is in the Startup Range	“Extended net range (N-N) is in the Startup Range Nonextended net number (N) is in the Startup Range” on page 308
Failure making NBP entity	“Failure making NBP entity Failure registering with NBP” on page 324
Failure registering with NBP	“Failure making NBP entity Failure registering with NBP” on page 324

Error Message	Page Number
Font list query of printer *printer-name* failed, retrying	“Font list query of printer printer-name failed, retrying” on page 327
Getting an initial spooler font list from printer *printer-name*	“Getting an initial spooler font list from printer printer-name” on page 334
Initializing existing queue *queue-name*	“Initializing existing queue queue-name” on page 334
Invalid character in zone name converted to ?	“Invalid character in zone name converted to ?” on page 316
Insufficient memory to allocate a session	“Insufficient memory to complete initialization of AFP!” on page 319
Legal parameters are: [`-v`] [`-d` *pathname*]	“SYS:SYSTEM\ATPS.NLM: bad config parameter: string legal parameters are: [-v] [-d pathname]” on page 326
Mismatched net numbers: local=*N*; *N* reported on port *N*	“Conflicting information: local default zone = zone-name; zone-name reported on port N” on page 315
Mismatched range numbers: local=*N-N*; *N* reported on port *N*	“Conflicting information: local default zone = zone-name; zone-name reported on port N” on page 315
More than *N* zone name(s) given with ZONE parameter	“More than N zone name(s) given with ZONE parameter” on page 309
NBP lookup error	“Can't find printer printer-name:type@zone-name retrying” on page 327
NBP registering spooler *spooler-name*`:`*type*`@`*zone-name*	“NBP registering spooler spooler-name:type@zone-name” on page 334
No entities were found	“No entities were found” on page 336
No memory when entering range *N-N*	“No memory when entering range N-N” on page 312
No zone file entry found for net *N*	“No zone file entry found for net N No zone file entry found for net range N-N” on page 309
No zone file entry found for net range *N-N*	“No zone file entry found for net N No zone file entry found for net range N-N” on page 309

Error Message	Page Number
Nonextended net number (*N*) is in the Startup Range	“Extended net range (N-N) is in the Startup Range Nonextended net number (N) is in the Startup Range” on page 308
Option "-z" (use zone file) is in effect, but ZONE parameter was given — OVERRIDING zone file	“Option "-z" (use zone file) is in effect, but ZONE parameter was given — OVERRIDING zone file” on page 307
Printer *printer-name* Hardware Error: *string*	“Printer printer-name Hardware Error: string” on page 328
Printer *printer-name* illegal NBP name	“Printer printer-name:type@zone illegal NBP name” on page 328
Printed job *N* on printer *printer-name*	“Printed job N on printer printer-name” on page 335
Printer *printer-name* busy - *status*	“Printer printer-name busy - status” on page 335
Range start is greater than range end (*N-N*)	“Range start is greater than range end (N-N)” on page 310
Received job *N*	“Received job N” on page 335
Received zip reply with invalid character in zone name	“Received zip reply with invalid character in zone name” on page 316
RTMP packet shows range *N-N*, which is in the startup range Ignoring RTMP packet	“RTMP packet shows range N-N, which is in the startup range. Ignoring RTMP packet” on page 316
Sending LaserPrep file (*file-name*)...	“Sending Laser Prep file (file-name)...” on page 335
Sending PAP EOF because EOF marker seen	“Checking job for EOF characters Sending PAP EOF because EOF marker seen” on page 334
Sent *N* bytes to printer	“Using directory dir-name” on page 335
Servicing print job *N*	“Servicing print job N” on page 335

Error Message	Page Number
SYS:SYTEM\ATPS.NLM: bad config parameter: *string* legal parameters are: [*printer-name*`:`*zone*] [`-p` *printer-name*] [`-z` *zone-name*] [`-o` *spooler-name*] [`-t` *type*] [`-s`] [`-c`] [`-n`[*maxconnect*]] [`-b`] [`-e`] [`-a`] [`-f` *filename*] [`-h`] [`-l`] [`-wb`] [`-wf`]	"SYS:SYTEM\ATPS.NLM: bad config parameter: string legal parameters are: [printername:zone] [-p printername] [-z zone-name] [-o spoolername] [-t type] [-s] [-c] [-n[maxconnect]] [-b] [-e] [-a] [-f filename] [-h] [-l] [-wb] [-wf]" on page 325
SYS:SYSTEM\ATPS.NLM: bad config parameter: *string* legal parameters are: [`-v`] [`-d` *pathname*]	"SYS:SYSTEM\ATPS.NLM: bad config parameter: string legal parameters are: [-v] [-d pathname]" on page 326
System log file does not exist	"System log file does not exist System log file is empty" on page 337
System log file is empty	"System log file does not exist System log file is empty" on page 337
There are no nodes on this AppleTalk network	"There are no nodes on this AppleTalk network" on page 336
There are too many possible volumes to use this version of AFP NLM	"There are too many possible volumes to use this version of the AFP NLM" on page 324
Too many zone names given in zone file entry	"Too many zone names given in zone file entry" on page 310
Transition routing option is on and Phase-1 router present on port *N*	"Transition routing option is on and Phase-1 router present on port N" on page 307
Transition routing option is ON but found range *N-N*	"Transition routing option is ON, but the range is more than one (N-N)" on page 310
Transition routing option is ON, but there is more than one zone name	"Transition routing option is ON, but there is more than one zone name" on page 311
Transition-router option is on and there is more than one zone name	"Transition-router option is on and there is more than one zone name" on page 317
Unable to allocate ECB	"Unable to allocate ECB" on page 313
Unable to allocate *string*	"Unable to allocate string Unable to allocate memory (DTVPTR). FATAL ERROR! Unable to allocate SessionTable" on page 319

Error Message	Page Number
Unable to allocate memory (DTVPTR).FATAL ERROR!	“Unable to allocate string Unable to allocate memory (DTVPTR). FATAL ERROR! Unable to allocate SessionTable” on page 319
Unable to allocate SessionTable	“Unable to allocate string Unable to allocate memory (DTVPTR). FATAL ERROR! Unable to allocate SessionTable” on page 319
Unable to create default volume icon file:SYS:SYSTEM\VOLICON.AFP	“Unable to create default volume icon file: SYS:SYSTEM\VOLICON.AFP Unable to create default volume mapping file SYS:SYSTEM\VOLNAMES.AFP” on page 324
Unable to create default volume mapping file SYS:SYSTEM\VOLNAMES.AFP	“Unable to create default volume icon file: SYS:SYSTEM\VOLICON.AFP Unable to create default volume mapping file SYS:SYSTEM\VOLNAMES.AFP” on page 324
Unable to delete desktop file *file-name* on volume #*N* (*vol-name*)	“Unable to delete desktop file file-name on volume #N (vol-name). Error code=N” on page 324
Unable to get memory for AFP callback	“Unable to get memory for AFP callback Unable to get memory for AFP service Process Unable to get memory for AFP polling process Unable to get memory for compression process” on page 320
Unable to get memory for AFP polling process	“Unable to get memory for AFP callback Unable to get memory for AFP service Process Unable to get memory for AFP polling process Unable to get memory for compression process” on page 320
Unable to get memory for AFP service Process	“Unable to get memory for AFP callback Unable to get memory for AFP service Process Unable to get memory for AFP polling process Unable to get memory for compression process” on page 320
Unable to get memory for compression process	“Unable to get memory for AFP callback Unable to get memory for AFP service Process Unable to get memory for AFP polling process Unable to get memory for compression process” on page 320

Error Message	Page Number
Unable to get session from ASP. Error: *N*	“Unable to get session from ASP. Error: N Unable to initialize ASP. Error N” on page 320
Unable to initialize ASP. Error *N*	“Unable to get session from ASP. Error: N Unable to initialize ASP. Error N” on page 320
Unable to open server listening socket. Error *N*	“Unable to open server listening socket. Error N” on page 320
Unbind of AARP from board *N* failed (ERR=*N*)	“Unbind of APPLETALK from board N1 failed (ERR=N2) Unbind of AARP from board N1 failed (ERR=N2)” on page 318
Unbind of APPLETALK from board *N* failed (ERR=*N*)	“Unbind of APPLETALK from board N1 failed (ERR=N2) Unbind of AARP from board N1 failed (ERR=N2)” on page 318
Using directory *dir-name*	“Using directory dir-name” on page 335
Using font list file *file-name*	“Using font list file file-name” on page 335
Volume icon file (SYS:SYSTEM\VOLICON.AFP) did not exist and was created	“Volume icon file (SYS:SYSTEM\VOLICON.AFP) did not exist and was created Volume mapping file (SYS:SYSTEM\VOLNAMES.AFP) did not exist and was created” on page 325
Volume mapping file (SYS:SYSTEM\VOLNAMES.AFP) did not exist and was created	“Volume icon file (SYS:SYSTEM\VOLICON.AFP) did not exist and was created Volume mapping file (SYS:SYSTEM\VOLNAMES.AFP) did not exist and was created” on page 325
Volume #*N* (*vol-name*) is unavailable to AFP clients. The desktop files could not be opened	“Volume #N (vol-name) is unavailable to AFP clients. The desktop files could not be opened” on page 325
Warning! printer *printer-name* unexpectedly hidden	“Warning! printer printer-name unexpectedly hidden Warning! printer printer-name unexpectedly not hidden” on page 336
Warning! printer *printer-name* unexpectedly not hidden	“Warning! printer printer-name unexpectedly hidden Warning! printer printer-name unexpectedly not hidden” on page 336

Error Message	Page Number
You must first edit the test parameters to select a node number	"You must first edit the test parameters to select a node number" on page 336
Zone names can have a maximum of 32 characters	"Zone names can have a maximum of 32 characters" on page 311
Zone names must have at least one character	"Zone names must have at least one character" on page 312

AppleTalk Stack: Informational Messages

These messages appear in response to dropped or severely corrupted packets, or both. Packets can be severely corrupted in transit or at their source. Packets corrupted in transit will degrade network performance because the node expecting the corrupted packet will request a retry, causing delays of as much as two seconds per corrupted packet. Packets corrupted at their source and sent out at random on the network can degrade performance generally, by crowding the wire with unproductive, incomprehensible data. In either case, the source of the corrupted packets should be identified and corrected as quickly as possible.

ATALK Warning: [*xx*] Req with unknown session id *yy* on SCB *zzzzzz*

Explanation: A packet from an existing AFP connection with Session ID xx, being maintained by Session Control Block *zzzzzz*, was received with a Session ID of *yy*.

Action: The packet will be ignored. The session ID is the ASP session ID, which is part of the ASP "header"; the ASP header can aid in finding the network fault.

ATALK Warning: ATP returned error *xx* on OpenConn reply

Explanation: *xx* is a standard NetWare error. This error indicates that ATPS has dropped the connection from a Macintosh client to an ATPS queue; *xx* indicates the error code returned.

ATALK Warning: Bad ConnID, got *xx*, expect *yy*

Explanation: This message indicates that a packet from an existing PAP connection, using Connection ID *yy*, was received with a Connection ID of *xx*.

Action: The packet will be ignored, and the originator should re-send the packet with its original contents. For a similar condition, see message "ATALK Warning: [xx] Req with unknown session id yy on SCB zzzzzz" on page 305.

ATALK Warning: ASP - Dropped getreq type *xx* from wrong source

Explanation: This message normally appears because a Macintosh client determines a session to be active while the server determines the session to be closed. Another possible cause for this message to appear is a network fault. *xx* is the ASP request type, for example, 6 (write).

Explanation: ASP keeps track of which remote workstation nodes are attached to which sockets. When ASP receives a packet from a different node, it rejects the packet. Note that ATP rejects the packet if the ATP header is incorrect.

ATALK Warning: PAP connection 0x*YY* died due to tickle timeout

Explanation: The connection that was established between an ATPS print queue and the AppleTalk printer has failed. *YY* indicates the connection ID that was lost. This could indicate a hardware problem with the printer, the server, or a cable problem. In any case, the print job that established the connection will be retried.

ATALK LAPGetNet Type - Board does ETHERNET_SNAP frames. Attempt to bind APPLETLK LAN protocol to *driver name* failed. (error=FFFFFFFF)

Explanation: The BIND line that was entered has a syntax error. Usually, this message indicates that a network range for a Phase II network has been specified incorrectly.

Informational Messages from the AppleTalk Router

AppleTalk Stack/Router v3.12 is running

Explanation: When the router is coming up on the AppleTalk network, the system generates this message to indicate that APPLETLK.NLM is loaded and running.

Board *N* does *frame-type* frames

Explanation: The system generates this informational message when the router is coming up on the AppleTalk network. *N* is a device ID that the system assigns, and *frame-type* is an abbreviation for the AppleTalk frame type bound to the board. For example, E_SNAP stands for ETHERNET_SNAP. You can use this message to verify that you specified the correct frame type for the board's LAN driver.

Transition routing option is on and Phase-1 router present on port *N*

Explanation: This message indicates that you correctly configured the router in Transition Mode, and that the router has detected a Phase 1 router on the specified port. **`port`** *N* is the AppleTalk port number. The system assigns the port number in the same order as the BIND command lines. For example, if you have two BIND APPLETLK command lines in AUTOEXEC.NCF, there will be two AppleTalk ports; port 1 is associated with the network created by the first BIND command line, and port 2 is associated with the network created by the second BIND command line.

Option "-z" (use zone file) is in effect, but ZONE parameter was given — OVERRIDING zone file

Explanation: This message indicates that you specified the **`-z`** option on the LOAD APPLETLK command line, and that you also specified a zone name on the LOAD APPLETLK or a BIND APPLETLK command line in AUTOEXEC.NCF. Usually the zone name is specified in only one of these ways, so check the actual configuration. The zone name in AUTOEXEC.NCF takes precedence.

Configuration Problems

Already bound to board *N*.

Explanation: *N* is a device ID that the system assigned to the board. This error message indicates that you have a redundant BIND APPLETLK command line for the specified network board, causing the second BIND to fail.

Action: To fix this condition, follow these steps:

- Edit SYS:SYSTEM\AUTOEXEC.NCF to remove the redundancy; the redundant BIND APPLETALK command is specified there.
- Unload and reload APPLETLK.NLM. For convenience, you can use a custom NCF file to accomplish this.

Error binding APPLETALK to board *N1* (ERR=*N2*)

Explanation: *N1* is a device ID assigned by the system, and *N2* is a standard NetWare error code; consult the NetWare 3.12 *System Messages* manual for explanations of NetWare errors. This message indicates that AppleTalk failed to BIND to one of the boards.

Action: Make sure that the board is firmly seated in its slot, that the connectors are secure, and that the board has been verified to work with AppleTalk.

Extended net range (*N-N*) is in the Startup Range Nonextended net number (*N*) is in the Startup Range

Explanation: Either of these errors will cause the LOAD APPLETLK or BIND APPLETLK command line for that network to fail. The first message indicates that you configured an extended network (an EtherTalk 2.0 or TokenTalk network) with a range contained in the startup range. The second message indicates that you configured a nonextended network (EtherTalk 1.0 or LocalTalk) with a number contained in this range. *N-N* is a range, or *N* is a number, between 65280 and 65534. AppleTalk Phase 2 reserves the network numbers 65280—65534 as a default "startup range" for nodes that boot up on the network when no router is available.

Action: To fix this condition, follow these steps:

- Edit SYS:SYSTEM\AUTOEXEC.NCF, if this is where the network range has been assigned, to assign a different network range to that network.

- Unload and reload APPLETLK.NLM. For convenience, you can use a custom NCF file to accomplish this.

More than *N* zone name(s) given with ZONE parameter

Explanation: This message indicates that you entered more than one zone name for a nonextended network or more than 255 zone names for an extended network on the LOAD APPLETLK or BIND APPLETLK command line in AUTOEXEC.NCF. This condition causes the LOAD or BIND command line for that network to fail. *N* can be "1" for nonextended networks or "16" for extended networks.

Action: To fix this condition, follow these steps:

- Edit SYS:SYSTEM\AUTOEXEC.NCF, if this is where the zone names are specified, to reduce the number of zone names on the appropriate network.
- Unload and reload APPLETLK.NLM. For convenience, you can use a custom NCF file to accomplish this.

No zone file entry found for net *N* No zone file entry found for net range *N-N*

Explanation: N is a network number configured on either the LOAD APPLETLK or a BIND APPLETLK command line, or *N-N* is a network range configured on a BIND APPLETLK command line, in AUTOEXEC.NCF. This message indicates that you specified the **-z** option on the LOAD APPLETLK command line, but the ATZONES.CFG file did not contain an entry for the specified network. Therefore, the LOAD or BIND command will fail. If the LOAD command fails, AppleTalk will not be loaded. If the BIND command fails, AppleTalk will not be active on that interface.

Action: To fix this condition, follow these steps:

- Edit the ATZONES.CFG file and add a zone configuration for the specified network number, using the syntax

  net=*n1* zone={"*Zone1*"}

  or

  net=*n1-n2* zone={"*Zone1*", "*Zone2*", ..., "*ZoneN*"}

- When you have entered the zone configuration, unload and reload APPLETLK.NLM. For convenience, you can use a custom NCF file to accomplish this.

Range start is greater than range end (*N-N*)

Explanation: *N-N* is an invalid network range because the first number is greater than the second one. An extended network range must be a contiguous range of decimal numbers, such as 1-10. If the first number is greater than the second one, the BIND command will fail.

Action: To fix this condition, follow these steps:

- Edit SYS:SYSTEM\AUTOEXEC.NCF, if this is where the network range is configured, to reconfigure the network range correctly.
- Unload and reload APPLETLK.NLM. For convenience, you can use a custom NCF file to accomplish this.

Too many zone names given in zone file entry

Explanation: This message indicates that you entered more than one zone name for a nonextended network, or more than 255 zone names for an extended network, in the ATZONES.CFG file. This condition causes the LOAD APPLETLK or BIND APPLETLK command for that network to fail.

Action: To fix this condition, follow these steps:

- Edit SYS:SYSTEM\ATZONES.CFG, if this is where zone names are given, to reduce the number of zone names for the appropriate network.
- Unload and reload APPLETLK.NLM. For convenience, you can use a custom NCF file to accomplish this.

Transition routing option is ON, but the range is more than one (*N-N*)

Explanation: *N-N* is an extended network range where the first number is less than the second one. When you specify the **-t** option on the LOAD command line, the router is in Transition Mode and will check range constraints on all extended interfaces. If it finds a BIND command line with a network range where the range start is less than the range end, the BIND command will fail.

Action: If you did not intend to use Transition Mode, modify AUTOEXEC.NCF to remove the **-t** option from the LOAD APPLETLK command line; then, down the file server and bring it up again.

If you need Transition Mode, modify AUTOEXEC.NCF (and ATZONES.CFG, if you are also using the **-z** option) to constrain the network range on all BIND command lines; then, unload and reload APPLETLK.NLM. For convenience, you can use a custom NCF file to accomplish this.

Transition routing option is ON, but there is more than one zone name

Explanation: When you specify the `-t` option on the LOAD APPLETLK command line, the router is in Transition Mode and will limit zones lists to a single zone name on all extended interfaces. If the router finds a BIND command line with a zones list containing more than one name, the BIND command will fail.

Action: If you did not intend to use Transition Mode, modify AUTOEXEC.NCF to remove the `-t` option from the LOAD APPLETLK command line; then, down the file server and bring it up again.

If you need Transition Mode, modify AUTOEXEC.NCF (or ATZONES.CFG) to make sure that no networks have a zones list with more than one name; then, unload and reload APPLETLK.NLM. For convenience, you can use a custom NCF file to accomplish this.

Zone names can have a maximum of 32 characters

Explanation: This message indicates that you entered a zone name longer than 32 characters, or that you used an incorrect syntax when specifying zone names, causing the stack/router to interpret a string longer than 32 characters as a zone name. In either case, the LOAD APPLETLK or BIND APPLETLK command line will fail.

For example, suppose you neglect to enter closing quotes in a zones list, and enter a command line such as

```
zone={"Zone1, Zone2, Zone3, Zone4, Zone5, Zone6"}
```

The entire string contained within double-quotes is interpreted as a single zone name.

Action: To fix this condition, follow these steps:

- Check AUTOEXEC.NCF (or ATZONES.CFG) for zone names that are too long, or that are entered with incorrect syntax.
- Correct the error.
- Unload and reload APPLETLK.NLM. For convenience, you can use a custom NCF file to accomplish this.

Zone names must have at least one character

Explanation: This message indicates that you entered the string

```
zone={""}
```

in a network specification, causing the LOAD APPLETLK or BIND APPLETLK command line to fail.

Action: To fix this condition, follow these steps:

- Check AUTOEXEC.NCF or ATZONES.CFG for a null zone name.
- Correct the error.
- Unload and reload APPLETLK.NLM. For convenience, you can use a custom NCF file to accomplish this.

Memory Shortages

The messages in this section indicate a low-memory condition in the file server. Please see "AppleTalk Stack/Router Memory Requirements" on page 253 if you would like recommendations about server memory.

No memory when entering range *N-N*

Explanation: This message indicates that the router was unable to create an entry for the specified network range in its RTMP table.

If *N-N* is a network range configured on a BIND APPLETLK command line in AUTOEXEC.NCF, that BIND command will fail.

Action: To fix this condition, you need to increase the short-term memory allocation, or increase the amount of memory installed in the file server, or both. For example, to increase the short-term memory allocation to 2.5 Mbytes, you can use the command

```
set maximum alloc short term memory=2500000
```

at the console prompt, or in AUTOEXEC.NCF. If you enter this command in a startup file, you must down the server and bring it up again before the command has an effect.

If *N-N* is a network range configured in another router, the current router is unaware of that network. This condition could correct itself within a few minutes if the server's demand for short-term memory was uncharacteristically high when the message was generated, and the high demand for this memory subsides. Otherwise, you need to increase the memory as described above.

Unable to allocate ECB

Explanation: This message can occur at any time after you bring up the router. It indicates that the router was unable to acquire sufficient packet-receive buffers (also called Event Control Blocks or ECBs). *Running out of ECBs is not a fatal condition*.

If you see this message after the server has been running for some time, here is how to interpret the message: Servers that run for several days under conditions where high loads occur in "peaks" may exceed the default 500 ECB maximum, causing the system to generate this message. If these situations are caused by peaks in the memory demand, it is a good idea to keep the 500 ECB maximum limitation and allow the message to be generated at those times.

In some situations, however, such as a server load that is consistently very high, with many IPX and AppleTalk routines, 500 ECBs might not be enough as a maximum. In any case, the decision to raise the maximum is a performance/memory trade-off.

If you see this message repeated quickly when the router is initially brought up, this guide recommends that you specify at least 100 packet-receive buffers in the file server's STARTUP.NCF file:

```
set minimum packet receive buffers=100
```

If the number is consistently too low for the server's needs, the router could start dropping packets and closing AFP connections (although the latter is unlikely), and you will notice performance problems on the file server.

Action: To check the memory conditions on the server, follow these steps:

- Use the MONITOR command to check the number of ECBs used after the router has run for an hour or more. (The ECB number is in the upper right-hand corner of the screen in the MONITOR program.)
- If you see the ECB number incrementing rapidly, set the initial number of packet-receive buffers higher. You set this value in the STARTUP.NCF file; for example, you might specify this command line:

  ```
  set minimum packet receive buffers=300
  ```

Of course, you must have sufficient memory installed in the file server to allocate the packet-receive buffers, each of which requires approximately 1 KB.

Inconsistent Configurations on the Internet

Bad RTMP format, port *N*

Explanation: This message indicates that at least one router or bridge on the internet is sending RTMP packets that use a format that is not supported. For example, there could be a bridge running software that predates Apple's introduction of EtherTalk. *N* is the AppleTalk port number, assigned in the same order as the BIND command lines.

Action: In this case, you should update the software on the host that is sending RTMP packets in an unsupported format. (For example, if two BIND APPLETLK command lines appear in AUTOEXEC.NCF, there will be two AppleTalk ports; port 1 will be associated with the network created by the first BIND command line, and port 2 will be associated with the network created by the second BIND command line. Port 0 is always associated with the internal network.)

Conflicting information: local net=*N*; *N* reported on port *N* Conflicting information: local range=*N-N*; *N-N* reported on port *N* Mismatched net numbers: local=*N*; *N* reported on port *N* Mismatched range numbers: local=*N-N*; *N* reported on port *N*

Explanation: These messages indicate that an inconsistency in the network number or range has been found among routers connected to the cable associated with the specified port number. *N* is the AppleTalk port number, assigned in the same order as the BIND command lines. (For example, if you have two BIND APPLETLK command lines in AUTOEXEC.NCF, there will be two AppleTalk ports; port 1 will be associated with the network created by the first BIND command line, and port 2 will be associated with the network created by the second BIND command line. Port 0 is always associated with the internal network.)

Action: It is very important that you correct this type of inconsistency by reconfiguring one of the routers. Inconsistent network numbers will cause confusion on the entire internet. To fix the situation, follow these steps:

- Check the router configurations in all routers connected to the cable identified by the port number. Port numbers are assigned dynamically at

BIND time, so other routers might have different port numbers assigned to that cable.

If you have a packet analyzer, you can use it to acquire this information.

- Bring down the inconsistent router.
- Correct the configuration in the inconsistent router.
- Bring up the router with its new configuration.

Please see "Changing the AppleTalk Network Number or Range" on page 132 if you would like more details.

Conflicting information: local default zone = *zone-name*; *zone-name* reported on port *N*

Explanation: This message indicates that an inconsistency in the zones list has been found among routers connected to the cable associated with the specified port number. Specifically, this message indicates that the first zone name in the list (the default zone) differs between routers. *N* is the AppleTalk port number, assigned in the same order as the BIND command lines. (For example, if you have two BIND APPLETLK command lines in AUTOEXEC.NCF, there will be two AppleTalk ports; port 1 will be associated with the network created by the first BIND command line, and port 2 will be associated with the network created by the second BIND command line. Port 0 is always associated with the internal network.)

Action: It is very important that you correct this type of inconsistency by reconfiguring one of the routers. To fix this condition, follow these steps:

- Check the router configurations in all routers connected to the cable identified by the port number. (Remember that port numbers are assigned dynamically at BIND time, so other routers might have different port numbers assigned to that cable.)
- Bring down the inconsistent router.
- Correct the configuration in the inconsistent router.
- Bring up the router with its new configuration.

Please see "Changing the AppleTalk Zone Name or Zones List" on page 134 if you would like more details.

Invalid character in zone name converted to ?

Explanation: The router considers a character invalid in a zone name if its ASCII value is less than hex 20 or equal to hex 7F. This message indicates that the router has detected an illegal character in a zone name and converted it to ASCII 3F (a question mark).

Received zip reply with invalid character in zone name

Explanation: The router considers a character invalid in a zone name if its ASCII value is less than hex 20 or equal to hex 7F. This message indicates that another router has sent a ZIP packet with an illegal character in the zone name.

Action: To fix this condition, you should locate the incorrectly configured router and replace the invalid character in the zone name. See "Symptom: Zone Names Do Not Match Existing Zone Names" on page 225 for information on how to enter legal control characters in a zone name, and "Changing the AppleTalk Zone Name or Zones List" on page 134 for more details on modifying zone configurations.

RTMP packet shows range *N-N*, which is in the startup range. Ignoring RTMP packet

Explanation: *N-N* is a range between 65,280 and 65,534. AppleTalk Phase 2 reserves the network numbers 65,280-65,534 as a default "startup range" for nodes that boot up on the network when no router is available. This message indicates that a remote EtherTalk 2.0 or TokenTalk network (a network not directly connected to the router in the current file server) has been configured with a network range contained in the startup range.

Action: To fix this condition, follow these steps:

- Check the RTMP table in ATCON and try to locate the misconfigured network.
- Bring down the misconfigured router.
- Correct the router's network range.
- Bring up the router with its new configuration.

  Please see "Changing the AppleTalk Network Number or Range" on page 132 for more details.

Transition routing option is ON but found range *N-N*

Explanation: When you specify the `-t` option on the LOAD APPLETLK command line, the router is in Transition Mode. This mode requires that all extended network ranges on the entire internet be constrained to only one element, where the range start is equal to the range end. This message indicates that a remote network (a network not directly connected to the router in the current file server) was configured with an extended range. This condition prevents full internet connectivity, and may cause unpredictable results (such as device names appearing and disappearing rapidly in the Chooser). However, some services may continue to function if the disconnection is only partial.

Action: To fix this condition, follow these steps:

- Check the RTMP table in ATCON and try to locate the misconfigured network.
- Bring down the incorrectly configured router(s).
- Correct the router's network range. (If other routers are connected to the same cable with the same configuration, they must also be reconfigured before you bring up any of the routers on the network.)
- Bring up the router with its new configuration.

  Please see "Changing the AppleTalk Network Number or Range" on page 132 for more details.

Transition-router option is on and there is more than one zone name

Explanation: When you specify the `-t` option on the LOAD APPLETLK command line, the router is in Transition Mode. This mode requires that the zones list on all extended networks on the entire internet be limited to only one name. This message indicates that a remote network (which is not directly connected to the router in the current file server) was configured with more than one zone name. This condition will prevent full internet connectivity, and may cause unpredictable results (such as device names appearing and disappearing rapidly in the Chooser). However, some services may continue to function if the disconnection is only partial.

Action: To fix this condition, follow these steps:

- Check the RTMP table in ATCON and try to locate the misconfigured network.
- Bring down the incorrectly configured router(s).

- Correct the router's zones list, and wait ten to twenty minutes for the old zone information to stop propagating among routers. (If other routers are connected to the same cable with the same configuration, they must also be reconfigured before you bring up any of the routers on the network.)
- Bring up the router with its new configuration.

  Please see "Changing the AppleTalk Zone Name or Zones List" on page 134 for more details.

Unbind of APPLETALK from board *N1* failed (ERR=*N2*) Unbind of AARP from board *N1* failed (ERR=N2)

Explanation: *N1* is a device ID assigned by the system, and *N2* is a standard NetWare error code. These messages indicate that an internal error occurred when you unbound AppleTalk from a board or unloaded the AppleTalk module. (Unloading the AppleTalk module automatically does an UNBIND).

AFP Memory or Socket Shortages

Attempt to create AFP process failed

Explanation: This message indicates that the AFP module will not load, or will not function correctly if it does load, because a required resource was unavailable. The most probable cause is insufficient memory in the file server.

Action: If you see this message, try to load AFP again from the console prompt. If the message is displayed again, run memory diagnostics and, if necessary, add more memory to the file server.

ASP initialization failure. Error: *N*

Explanation: The AppleTalk Session Protocol (ASP) provides the basic level of transport services for AFP file requests and responses between the Macintosh workstation and the file server. This message indicates that ASP failed to initialize; the AppleTalk stack might need more memory or the number of available sockets may be used up.

Action: Please see "AppleTalk Stack/Router Memory Requirements" on page 253 for more information on memory usage.

Couldn't allocate packet buffers

Explanation: This message is displayed when a call to allocate memory fails. It indicates that the system buffers used to store information received from the AppleTalk stack have been over-utilized.

Action: Please see "AppleTalk Stack/Router Memory Requirements" on page 253 for more information on memory usage.

Could not initialize AFP support on volume #*N*

Explanation: #*N* is the volume number. The SYS volume number is always 0.

This message indicates that an internal call to allocate memory failed. It is unlikely that this condition will cause AFP to fail; however, volume *N* will be inaccessible to Macintosh clients. If this condition occurs, unload the AFP module and load it again from the console prompt.

Action: Please see "AppleTalk Stack/Router Memory Requirements" on page 253 for more information on memory usage.

Insufficient memory to allocate a session

Explanation: This message indicates that a login attempt failed because the AFP module could not access enough system memory. This condition usually means that the file server needs more memory.

Insufficient memory to complete initialization of AFP!

Explanation: This message indicates that the AFP module could not access enough system memory to complete its own initialization process. This condition usually means that the file server needs more memory.

Unable to allocate *string* Unable to allocate memory (DTVPTR). FATAL ERROR! Unable to allocate SessionTable

Explanation: *string* can be "short term memory," "packet-receive buffers," or other strings indicating memory shortages.

These messages indicate that the AFP module was unable to allocate enough resources to complete its initialization process, and therefore the AFP module cannot load. This condition is most likely due to low memory in the file server.

Action: Please see "AppleTalk Stack/Router Memory Requirements" on page 253 for recommendations on memory usage.

Unable to get memory for AFP callback Unable to get memory for AFP service Process Unable to get memory for AFP polling process Unable to get memory for compression process

Explanation: These messages indicate that the AFP module was unable to obtain enough memory for its internal processes. This condition usually results from low memory.

Action: To remedy the problem, increase the memory in the file server. Please see "AppleTalk Stack/Router Memory Requirements" on page 253 for more information.

Unable to get session from ASP. Error: *N* Unable to initialize ASP. Error *N*

Explanation: The AppleTalk Session Protocol (ASP) provides the basic level of transport services for AFP file requests and responses between the Macintosh workstation and the file server. This message indicates that ASP failed to initialize, which could mean that the AppleTalk stack needs more memory or that the number of available connections are used up. Both of these messages are FATAL and indicate a condition that prevents AFP from loading.

Action: Please see "AppleTalk Stack/Router Memory Requirements" on page 253.

Unable to open server listening socket. Error *N*

Explanation: At this release, this message indicates that the 127 sockets available for dynamic allocation in the AppleTalk stack are all being used. The server was unable to allocate the Server Listening Socket (SLS) required to establish AFP login connections.

Action: To remedy this problem, you need to limit other uses of the AppleTalk stack; for example, you might need to limit the number of AppleTalk print queues or other applications that access the AppleTalk stack.

AFP: Informational Messages

AFP registered with NBP after volume SYS was mounted

Explanation: The AFP module generates this message if you dismount the SYS volume and mount it again while the AFP module is loaded. Because SYS is required for users to log in to the file server, the AFP module does not advertise on the AppleTalk network if the SYS volume is unavailable. Otherwise, Macintosh users could attempt to log in, but would receive a "password incorrect" message when AFP fails to find the bindery on SYS. The AFP module

registers with NBP and begins advertising as soon as the SYS volume is mounted again.

AFP registered with NBP during AFP initialization

Explanation: This informational message indicates that the AFP module is advertising on the AppleTalk network.

Could not read volume icon definition file (SYS:SYSTEM\VOLICON.AFP). File does not exist or icon data format is invalid. Using internal default icon

Explanation: If you use a text editor to modify the volume icon data contained in SYS:SYSTEM\VOLICON.AFP, you might see this informational message. It indicates that the changes you made resulted in an invalid data format. The system will use the standard NetWare file cabinet icon.

Created directory DESKTOP.AFP on volume #*N* (*vol-name*)

Explanation: This informational message indicates that the system mounted a volume that supports the Macintosh name space and created the DESKTOP.AFP folder.

Created file *file-name* on volume #*N* (*vol-name*)

Explanation: *file-name* is ICONDATA.AFP, ICONINDX.AFP, APPLDATA.AFP, VOLNAMES.AFP, or VOLICON.AFP. #*N* is the volume number, and *vol-name* is the volume name that Macintosh clients see. The SYS volume number is always 0. If you have assigned an AFP alias, then *vol-name* is the alias name.

This informational message indicates that the specified system file was created on the specified volume.

Deleting desktop file *file-name* on volume #*N* (*vol-name*) because CLEARDESKTOP is in effect

Explanation: *file-name* is ICONDATA.AFP, ICONINDX.AFP, or APPLDATA.AFP. #*N* is the volume number, and *vol-name* is the volume name that Macintosh clients see. The SYS volume number is always 0. If you have assigned an AFP alias, *vol-name* is the alias name.

This informational message indicates that the AFP module deleted the DESKTOP.AFP files because you used the CDT option. This message will display for each volume that supports the Macintosh name space and is currently mounted.

AFP: General Error Messages

AFP unregistered with NBP because SYS volume was dismounted

Explanation: The AFP module generates this message if you dismount the SYS volume after loading the AFP module. It indicates that AFP has stopped advertising on the AppleTalk network. Because SYS is required for users to log in to the file server, the AFP module does not advertise on the AppleTalk network if the SYS volume is unavailable. Otherwise, Macintosh users could attempt to log in, but would receive a "password incorrect" message when AFP fails to find the bindery on SYS.

Action: To fix this condition, you must mount the SYS volume.

Could not create desktop file (*file-name*) on volume *#N* (*vol-name*)

Explanation: *file-name* is ICONDATA.AFP, ICONINDX.AFP, or APPLDATA.AFP. *#N* is the volume number, and *vol-name* is the volume name that Macintosh clients see. The SYS volume number is always 0. If you have assigned an AFP alias, *vol-name* is the alias name.

This message could mean that a basic system resource, such as disk space, was unobtainable when the call to create *file-name* was executed, causing the call to fail. It could also mean that a directory exists with the same *file-name*.

Could not create directory DESKTOP.AFP on volume *#N* (*vol-name*)

Explanation: *#N* is the volume number, and *vol-name* is the volume name that Macintosh clients see. The SYS volume number is always 0. If you have assigned an AFP alias, *vol-name* is the alias name.

This message could mean that basic system resources, such as disk space, were unobtainable when the system tried to create the DESKTOP.AFP folder.

Could not open file (*file-name*) on volume *#N* (*vol-name*)

Explanation: *file-name* is ICONDATA.AFP, ICONINDX.AFP, or APPLDATA.AFP. *#N* is the volume number, and *vol-name* is the volume name that Macintosh clients see. The SYS volume number is always 0. If you have assigned an AFP alias, *vol-name* is the alias name.

The message indicates that AFP could not open the file. The file may not exist, and could not be created, due to the unavailability of a basic system resource, such as disk space. Or, there may be an existing directory by the same name.

Could not properly initialize desktop file (*file-name*) on volume #*N* (*vol-name*)

Explanation: When the AFP module creates DESKTOP.AFP, the files it contains must be initialized with basic data structures. This message indicates that the initialization process failed.

Action: If you see this message, unload AFP from the console prompt and load it with the CDT option:

```
UNLOAD AFP <Enter>LOAD AFP CDT <Enter>
```

The CDT option deletes the current DESKTOP.AFP folder and creates a new one on each volume that is currently mounted and that supports the Macintosh name space. You must rebuild the new desktop files from a Macintosh client, as described in "Maintenance Issues: Clearing and Rebuilding the Desktop" on page 146.

Desktop files are invalid or damaged on volume #*N* (*vol-name*)

Explanation: This message can display during AFP initialization or while the system is running. It indicates that internal consistency checks in the AFP module show that the information in the DESKTOP.AFP files is invalid. The problem might have occurred because of a system crash or because you brought down the system without using the DOWN command.

Action: If you see this message, unload AFP from the console prompt and load it with the CDT option:

```
UNLOAD AFP <Enter>LOAD AFP CDT <Enter>
```

The CDT option deletes the current DESKTOP.AFP folder and creates a new one on each volume that is currently mounted and supports the Macintosh name space. You must rebuild the new desktop files from a Macintosh client, as described in "Maintenance Issues: Clearing and Rebuilding the Desktop" on page 146.

Error updating APPL record in desktop file APPLDATA.AFP.Error code=*N* Error updating ICON in desktop file ICONDATA.AFP. Error code=*N* Error updating ICON INDEX in desktop file ICONINDX.AFP. Error code=*N*

Explanation: These messages indicate that a change being written by the Macintosh Finder to the DESKTOP.AFP files was not completed successfully. This condition can be caused by a lack of disk space, or by a system error condition.

Action: Because the file(s) are invalid after the incomplete write attempt, you should clear the desktop and rebuild it from a Macintosh client.

Failure making NBP entity Failure registering with NBP

Explanation: The AppleTalk Name Binding Protocol (NBP) layer of the AppleTalk stack was unable to create a visible entity for the AFP module. Therefore, the NetWare file server is not registered as a service on the AppleTalk network, and Macintosh users cannot log in via the Chooser.

Action: If you see either of these messages, you should unload AFP and load it again from the console prompt.

There are too many possible volumes to use this version of the AFP NLM

Explanation: Both NetWare 3.12 and the AFP module limit the number of volumes that you can create on a single file server to 64. This message indicates that more than 64 volumes are connected to the server.

Unable to create default volume icon file: SYS:SYSTEM\VOLICON.AFP Unable to create default volume mapping file SYS:SYSTEM\VOLNAMES.AFP

Explanation: These messages mean that the CREATE call failed when the AFP module tried to create the named files. AFP will work without these files, so these messages are informational; however, you should investigate the cause of the message.

Action: Check the amount of disk space on the volume and check SYS:SYSTEM to make sure that a directory does not exist with a file name used by AFP.

Unable to delete desktop file *file-name* on volume *#N* (*vol-name*). Error code=*N*

Explanation: *file-name* is ICONDATA.AFP, ICONINDX.AFP, or APPLDATA.AFP. *#N* is the volume number, and *vol-name* is the volume name that Macintosh clients see. The SYS volume number is always 0. If you have assigned an AFP alias, *vol-name* is the alias name.

This message appears if you load the AFP module with the CDT option and the system could not delete the desktop files. Inadequate NetWare rights cannot cause this condition.

Action: You should manually go into DESKTOP.AFP and delete the file.

Volume icon file (SYS:SYSTEM\VOLICON.AFP) did not exist and was created Volume mapping file (SYS:SYSTEM\VOLNAMES.AFP) did not exist and was created

Explanation: These messages are likely to appear when you load the AFP module for the first time, and the AFP module creates the VOLICON.AFP and VOLNAMES.AFP files in SYS:SYSTEM. These messages also appear if the files were deleted and AFP must create them again.

Volume #*N* (*vol-name*) is unavailable to AFP clients. The desktop files could not be opened

Explanation: #*N* is the volume number, and *vol-name* is the volume name that Macintosh clients see. The SYS volume number is always 0. If you have assigned an AFP alias, *vol-name* is the alias name.

If the AFP module is unable to open the files contained in DESKTOP.AFP, AFP will not advertise on the AppleTalk network, and Macintosh clients cannot log in to the file server via the Macintosh Chooser.

Action: If you see this message, unload AFP from the console prompt and load it with the CDT option:

```
UNLOAD AFP <Enter>LOAD AFP CDT <Enter>
```

The CDT option deletes the current DESKTOP.AFP folder and creates a new one on each volume that is currently mounted and supports the Macintosh name space. You must rebuild the new desktopfiles from a Macintosh client, as described in "Maintenance Issues: Clearing and Rebuilding the Desktop" on page 146.

ATPS Error Messages

SYS:SYTEM\ATPS.NLM: bad config parameter: *string* legal parameters are: [*printername*:*zone*] [-p *printername*] [-z *zone-name*] [-o *spoolername*] [-t *type*] [-s] [-c] [-n[*maxconnect*]] [-b] [-e] [-a] [-f *filename*] [-h] [-l] [-wb] [-wf]

Explanation: This message indicates that ATPS found an invalid queue configuration line in the ATPS.CFG file and did not load.

Action: You need to open the ATPS.CFG file and check all configuration command lines for invalid parameters. When you have finished editing the file, load the ATPS module at the console by typing

```
LOAD ATPS <Enter>
```

Please see "Print Services Configuration" on page 159 for details.

SYS:SYSTEM\ATPS.NLM: bad config parameter: *string* legal parameters are: [-v] [-d *pathname*]

Explanation: This message indicates that ATPS found an invalid option on its LOAD command line and did not load.

Action: To fix this condition, you can load the ATPS module at the console, making sure that if you specify any options, they are valid options as shown in the error message. To load the ATPS module with no options, type

```
LOAD ATPS <Enter>
```

Please see "Loading the ATPS Module" on page 158 for more information.

Create queue *spooler-name*'s AppleTalk interface failed

Explanation: This message indicates that ATPS was unable to register the specified AppleTalk print spooler. This could be result from an invalid spooler name, type, or zone having been specified in the ATPS.CFG file, or because there is a previously existing NBP object of the specified name and type in the specified zone. For more information, see "Assigning a Descriptive Name: -o" on page 170.

Can't log in as *number*

Explanation: This message means that ATPS is unable to log in to the server as ATPS_QUSER or ATPS_PSRVR. This may mean that the bindery is closed or that logins are otherwise disabled. It may also mean that the password of the ATPS_PSRVR has been changed in PCONSOLE.

Action: If this last condition is the case, delete ATPS_PSRVR from the Print Server Information window in PCONSOLE and reload ATPS. Otherwise, run BINDFIX and reload ATPS.

Can't create ATPS directory *dir-name*

Explanation: This message means that ATPS could not create the specified directory, probably because ATPS could not create the pathname you specified with the **-d** option. ATPS creates only one directory, not a hierarchy, so the command

```
LOAD ATPS -D PROJ:\NW\PRINT <Enter>
```

presumes that the NW directory on the PROJ volume already exists. This message can also mean that a volume does not exist or is out of disk space.

Action: Check your pathname and make sure that all directories except the last one already exist.

Can't find printer *printer-name*:*type*@*zone-name* retrying

Explanation: This message means that ATPS could not find the printer on the AppleTalk network. This condition could be caused by a configuration problem in an AppleTalk router or by an error in the printer's name.

Action: See "Symptom: ATPS Cannot Find the AppleTalk Printer" on page 240 for more information.

Can't open query file *file-name*

Explanation: A query file is a PostScript file containing PostScript shorthand commands and the PostScript Procedure Set (ProcSet) comments. Apple's dictionary file is called the Laser Prep file; third-party applications sometimes use their own dictionary files with different file names.

This message indicates that an ATPS queue could not find or open the specified query file. This condition could occur if the query file was inadvertently removed or had its NetWare rights changed in the ATPS directory.

Action: Please see "Files and Directories Used by ATPS" on page 190 for more details.

Can't service halted queue

Explanation: This message indicates that someone invoked PCONSOLE and entered "No" in the field "Servers can service entries in queue."

Action: To fix this condition, invoke PCONSOLE from a DOS client and change the value of this field to "Yes."

Font list query of printer *printer-name* failed, retrying

Explanation: This message indicates that ATPS has not received a reply to its initial font list query of the specified printer, probably because the printer is turned off or in an error state. ATPS will continue attempting to get the font list until the module is unloaded.

Action: To fix this condition, try turning the printer off and on.

Printer *printer-name* Hardware Error: *string*

Explanation: This message means that the printer is in an error state. *string* can be "off line," "out of paper," "paper jam," or other indications of the hardware state.

Printer *printer-name:type@zone* illegal NBP name

Explanation: This message indicates that the name, type, and zone you used to specify the printer in the ATPS.CFG file do not constitute a legal NBP name. This condition usually means that either you used illegal characters in these parameters (an at-sign (@) or a colon character (:)), or else one of the parameters is too long (greater than 31 characters).

ATPS Console Messages

ATPS: create config failed, out of memory ATPS: create directory failed, out of memory ATPS: create spooler name failed, out of memory ATPS: parse printer name failed, out of memory

Explanation: These messages are generated when ATPS is unable to complete the process of loading because the server is out of memory.

Action: To fix this problem, install more memory in the server, or decrease the number of modules that are loaded in the server.

ATPS: no parameter specified

Explanation: You used one of the ATPS console commands and did not specify the required parameter.

Action: Please see "ATPS Console Commands" on page 198 for an explanation of the console commands.

ATPS: invalid printer/spooler name *name*

Explanation: This message is generated when you enter a console command requiring a printer or spooler name as a parameter, and the argument was not a valid name from the ATPS.CFG file.

ATPSHide: a spooler name is not a valid parameter

Explanation: You specified the name of an AppleTalk print spooler instead of an AppleTalk printer.

Action: Try the command again, specifying a printer name.

ATPSHide: printer *printer-name* has been hidden

Explanation: You specified the name of a printer that has been successfully hidden.

Action: If you wish to make it visible, use ATPSSHOW.

ATPSHide: printer *printer-name* is a type that can't be hidden

Explanation: ATPSHIDE instructs a LaserWriter or ImageWriter to change its NBP type, so the printer will not respond to requests for type LaserWriter or type ImageWriter. If the printer does not use one of these types, ATPSHIDE does not instruct the printer to change its type.

ATPSHide: printer *printer-name* could not be found ATPSHide: lost connection with printer *printer-name*

Explanation: This message could mean that the AppleTalk network is down between the server and the specified printer, or that the printer has been turned off or disconnected.

ATPSHide: printer *printer-name* busy, try again later

Explanation: This message means that ATPSHIDE could not "hide" the printer because the printer was either already in use or was in an error state.

Action: Check the printer; if the printer is OK, try the command again in a few minutes.

ATPSQuery: printer *printer-name* font query OK

Explanation: This message means that ATPSQUERY obtained the font list from the printer and that the relevant spoolers' font lists are now up to date.

ATPSQuery: can't find printer *printer-name*, query failed ATPSQuery: couldn't connect to printer *printer-name*, query failed ATPSQuery: printer *printer-name*: couldn't get font list, query failed

Explanation: These messages mean that ATPSQUERY had difficulty communicating with a PostScript printer to obtain its font list. If ATPSQUERY was unable to obtain the font list from a PostScript printer, it usually means that the printer is off-line or is in an error state.

Action: To remedy this problem, try turning the printer off and on again.

ATPSQuery: *printer-name* is not a PostScript printer

Explanation: If this message appears, it means that the printer is not defined as a PostScript printer, and hence a query for a font list makes no sense.

ATPSQuery: printer *printer-name* busy

Explanation: This message means that ATPSQUERY could not obtain the printer's font list because the printer was already in use.

Action: Try the command again in a few minutes.

ATPSQuery: queue *spooler-name* does not support a printer

Explanation: This message means that you specified the name of a spooler and that queue is not being serviced by any AppleTalk printers.

Action: In this case, you need to specify the font list explicitly on the configuration line in ATPS.CFG. See “Specifying a PostScript Font List: -f” on page 167.

ATPSQuery: printer *printer-name*'s font list is not used

Explanation: This message means that no spooler is using the font list obtained by querying the specified printer. This can be a result of having multiple printers per queue.

ATPSQuery: invalid printer/spooler name *name*

Explanation: This message means that the printer or spooler name you specified on the ATPSQUERY command line is not a valid printer or spooler name from the ATPS.CFG file.

Action: Check the spelling of the printer name and try again.

ATPSRem: a printer name is not a valid parameter

Explanation: You specified a printer name instead of an AppleTalk spooler name.

Action: Try the command again, specifying an AppleTalk spooler.

ATPSRem: spooler *spooler-name* has already been removed

Explanation: You specified the name of a spooler that has already been removed.

Action: If you wish to restore the spooler, use ATPSRES.

ATPSRem: Error: *string*

Explanation: The ATPSREM command was not able to complete. More information is provided by *string*.

ATPSRem: removed spooler *spooler-name*

Explanation: The specified spooler has been successfully made invisible to Macintosh clients.

ATPSRes: a printer name is not a valid parameter

Explanation: You specified a printer name instead of an AppleTalk spooler name.

Action: Try the command again, specifying an AppleTalk spooler.

ATPSRes: spooler *spooler-name* is not removed

Explanation: You specified the name of a spooler that was not "removed," so it cannot be restored.

Action: If you wish to remove the spooler, use ATPSREM.

ATPSRes: Error: *string*

Explanation: The ATPSRES command was not able to complete. More information is provided by *string*.

ATPSRes: restored spooler *spooler-name*

Explanation: The specified spooler has been successfully made visible to Macintosh clients again.

ATPSShow: a spooler name is not a valid parameter

Explanation: You specified the name of an AppleTalk print spooler instead of an AppleTalk printer.

Action: Try the command again, specifying a printer name.

ATPSShow: printer *printer-name* is not hidden

Explanation: You specified the name of a printer that is not hidden.

Action: If you wish to hide it, use ATPSHIDE.

ATPSShow: printer *printer-name* is a type that can't be hidden

Explanation: You used the ATPSSHOW command on a printer type that is not "LaserWriter" or "ImageWriter."

ATPSShow: printer *printer-name* could not be found ATPSShow: lost connection with printer *printer-name*

Explanation: This message could mean that the AppleTalk network is down between the server and the specified printer, or that the printer has been turned off or is in an error state.

ATPSShow: printer *printer-name* busy, try again later

Explanation: This message means that ATPSShow could not make the printer visible on the AppleTalk network again, because the printer was either already in use or was in some error state.

Action: Check the printer; if the printer is OK, try the command again in a few minutes.

ATPSV: no parameter specified ATPSV: invalid parameter

Explanation: These messages mean that you used the ATPSV command incorrectly. The proper syntax to turn on Verbose Mode is

```
ATPSV ON <Enter>
```

The syntax to turn off Verbose Mode is

```
ATPSV OFF <Enter>
```

Action: See "Verbose Mode: Viewing Troubleshooting Messages" on page 198 for more information on Verbose Mode.

ATPSV: verbose mode is already OFF

Explanation: This message is displayed when you enter "ATPS OFF" and Verbose Mode is already turned off.

ATPS Informational Messages

Explanation: The messages in this section appear only if ATPS is in Verbose Mode.

Action: Please see "Verbose Mode: Viewing Troubleshooting Messages" on page 198 for details on Verbose Mode.

Attaching print server to queue *queue-name*

Explanation: This message indicates that the ATPS print server is beginning to service the specified queue.

Begin job *N*

Explanation: *N* is the job number in PCONSOLE or the Print Queue module in the NetWare DA. This message indicates that the specified print job is being sent across the network to an ATPS print spooler.

Checking job for EOF characters Sending PAP EOF because EOF marker seen

Explanation: The first message indicates that ATPS is going to check this print job for the presence of Control-D characters. The second message appears whenever the printer recognizes a Control-D in a non-binary PostScript job and replaces it with a PAP EOF sequence.

Action: Please see "Technical Note about Printer Communication Channels" on page 179 and "DOS PostScript Applications" on page 180 for more information.

Creating queue *queue-name*

Explanation: This message indicates that the specified queue is being created.

Dictionary *file-name* not present

Explanation: The message indicates that the queue does not have a particular version of the Laser Prep file (or other dictionary file) and will request the Macintosh application to download it.

Getting an initial spooler font list from printer *printer-name*

Explanation: ATPS is obtaining a font list for the AppleTalk spooler by querying the specified AppleTalk printer.

Initializing existing queue *queue-name*

Explanation: This message means that the specified queue already exists and is being modified for use by ATPS.

NBP registering spooler *spooler-name:type@zone-name*

Explanation: This message indicates that the AppleTalk spooler is being registered on the network as a printer. *spooler-name* is the name you specified by using the `-o` option on the configuration line, or "NW printer-name." *type* is the printer type, and *zone-name* is the zone in which the printer resides.

Printed job N on printer *printer-name*

Explanation: *N* is the job number in PCONSOLE or in the Print Queue module of the NetWare DA. This message means that the printer has finished printing the specified print job.

Printer *printer-name* busy - *status*

Explanation: *status* is a status string returned by the named printer; it can be "Printing job *file-name*," "Out of paper," "Paper jam," or "Waiting," among others. If you check the printer and the status printed here is inaccurate, try turning the printer off and on again. The status "Waiting" can indicate an error condition caused by PostScript jobs that do not contain the proper PostScript commands.

Received job *N*

Explanation: *N* is the job number in PCONSOLE or the Print Queue module of the NetWare DA. This message means that the AppleTalk print spooler has received the specified print job.

Sending Laser Prep file (*file-name*)...

Explanation: This message indicates that the queue is reinitializing the printer with the specified Laser Prep file.

Servicing print job *N*

Explanation: *N* is the job number in PCONSOLE or the Print Queue module of the NetWare DA. This message means that queue has begun sending the specified print job to the printer.

Using directory *dir-name*

Explanation: This message prints as ATPS is loading. *dir-name* is the name of the directory being used to contain print queues and other files used by ATPS.

Action: Please see "Specifying an Alternative Location for Queue Directories" on page 197 for more information.

Using font list file *file-name*

Explanation: The AppleTalk print spooler is using the specified font list file instead of querying an AppleTalk printer for its font list.

Action: See "Specifying a PostScript Font List: -f" on page 167 for more information.

Warning! printer *printer-name* unexpectedly hidden Warning! printer *printer-name* unexpectedly not hidden

Explanation: These messages indicate that the specified printers are not in the state ATPS expects. ATPS will try to hide visible printers that it expects to be hidden, but not vice versa.

ATCON Echo Test messages

There are no nodes on this AppleTalk network

Explanation: This message is displayed in these situations:

- The AppleTalk network number you specified in Edit Echo Parameters does not exist. Select Edit Echo Parameters again and check the number against your network records.
- The Echo packets reached the specified network but no nodes responded. This situation probably means that the router connected to the specified network doesn't support the Echo protocol, and there are no nodes on the specified network. (The router itself is a node on each of its networks, but some third-party routers might not support the AppleTalk Echo Protocol, in which case the Echo Test would not see the router as a node.)

You must first edit the test parameters to select a node number

Explanation: This message indicates that you chose "Execute Echo Test" before specifying the network and node number of the device you wish to test using Echo.

ATCON Lookup Service Messages

No entities were found

Explanation: This message indicates that no AppleTalk services responded to the Lookup Service. It could mean that there are no AppleTalk services located in the zone you selected, or that services or routers, or both, are down.

All responses may not be able to be displayed

Explanation: The Lookup service function can display a maximum of 400 devices. This message indicates that there may be more than 400 AppleTalk devices responding to the Lookup.

Action: To fix this condition, narrow the scope of the Lookup service in ATCON by specifying a certain type of service or the name of a particular server or printer.

ATCON: Errors When Viewing the System Log

System log file does not exist System log file is empty

Explanation: The system log file (SYS:SYSTEM\SYS$LOG) does not exist until a message is generated. If you clear the log file and then immediately attempt to access it in ATCON, you might see this message at the console.

Action: As soon as there is a message to view in the system log, you can access it without generating this message.

Glossary

administrator

The person who sets up a file server, creates user login accounts and passwords, creates groups, sets security, and maintains the server.

AppleTalk

Apple Computer's suite of protocols that enables the hardware and software on an AppleTalk network to interact and to route data.

AppleTalk module

(APPLETLK.NLM) The AppleTalk protocol stack and router, which is included as a NetWare Loadable Module in NetWare for Macintosh v3.x and in the NetWare AppleTalk Support Package.

AppleTalk router

See *router*.

AFP

(AppleTalk Filing Protocol) A protocol that provides communication and data transmission between file servers and clients in an AppleShare network.

AFP module

(AFP.NLM) A NetWare Loadable Module that processes AFP file requests from Macintosh workstations.

ATPS module

(ATPS.NLM) A NetWare Loadable Module that processes print requests from Macintosh and DOS workstations to an Apple printer.

ATCON utility

A diagnostic tool for use at the file server. ATCON provides information about the file server's AppleTalk stack and router, and about other AppleTalk networks on the internet.

CDEV

A program module accessed by a clicking an icon in the Control Panel.

Chooser

A desk accessory that lets you choose devices, such as file servers and printers, on the AppleTalk network.

Control Panel

A desk accessory that lets you change the speaker volume, mouse tracking, color display, network connection software, and other features.

client

A computer that has access to services on a network. The computers that provide services are called servers. A user at a client may request file access, remote login, file transfer, printing, or other available services from servers. See also *server*.

default zone

The first zone name in a zones list. See also *zone*, *zones list*.

desk accessory

A "mini-application" available from the Apple () menu, regardless of which application you are using—for example, the Macintosh Calculator, Scrapbook, Key Caps, and Chooser. NetWare provides a desk accessory for users to set security, view and manage jobs in print queues, and send messages. See also *NetWare desk accessory*.

Ethernet

A system of high-performance coaxial cables widely used in the communications industry. Ethernet cables can be part of an AppleTalk network. See also *EtherTalk*.

EtherTalk

An AppleTalk network on Ethernet. An EtherTalk network can be either "nonextended" (EtherTalk 1.0) or "extended" (EtherTalk 2.0). See also *Ethernet*.

extended network

An AppleTalk Phase 2 network on high-speed media, such as Ethernet or Token Ring. An extended network is capable of supporting the Phase 2 addressing extensions of a network range and zones list. See also *network range*, *zones list*.

file server

A combination of controller software and mass-storage devices that allows computer users to share common files and applications on a network. A file server on an AppleTalk network may be a Macintosh computer running AppleShare software or an IBM PC (or a compatible computer) running NetWare for Macintosh software.

Finder

The application that maintains the Macintosh desktop and starts up other programs at the request of the user. You use the Finder to manage documents and applications, and to get information to and from disks. You see the desktop upon starting up your computer, unless you have specified a different startup application.

folder

A holder of documents, applications, and other folders on the desktop. Folders act as subdirectories, allowing you to organize information. A folder is the secondary organizing unit on the file server. See also *volume*.

frame

A set of information added to a packet to ensure its proper transmission across the network. A frame consists of information in a format that is dependent upon the physical medium on which the data travels.

group

A named collection of one or more file server users. Groups are created for users who usually have common interests and share information.

internal network

A virtual network that consists of two software nodes: the AppleTalk protocol stack and the AppleTalk router. See also *network*.

internet

Any interconnected group of networks, such as an interconnected group of AppleTalk networks. Network users in an internet can share information and network devices. See also *network*.

LocalTalk

A system of cables, cable extenders, and connector boxes that connect computers and network devices as part of the AppleTalk network system. LocalTalk kits are manufactured by Apple Computer. Generally, where this manual refers to a LocalTalk connection, you can use any system of cable and connectors that supports AppleTalk protocols at 230.4 kbits/second to interconnect Macintosh computers and other AppleTalk devices.

MultiFinder

A first-generation multitasking operating system for Macintosh computers that makes it possible to have several applications open at the same time, including background applications that let you perform one task while the computer performs another.

Namer

An application on the *LaserWriter Installation Disk* or *ImageWriter Installation Disk* that you use to name and rename printers.

NetWare Control Center

(NCC) An administrative utility included with NetWare for Macintosh for managing users, groups, and security on a NetWare file server from a Macintosh client.

NetWare desk accessory

(NetWare DA) A Macintosh desk accessory that accesses four program modules; those four program modules enable a user at a Macintosh workstation to send a message to another user, to view or administer print jobs in a NetWare print queue, and to view or set NetWare access rights.

NetWare User Authentication Method

(NetWare UAM) Macintosh software that uses NetWare password encryption to encrypt users' passwords on the client before transmitting the passwords across a network to the server.

network

A collection of interconnected, individually controlled computers, together with the hardware and software used to connect them. See also *internal network*, *internet*.

network address

A unique number that represents a device on a network. See also *network number*, *node number*.

network administration

Management of the software and hardware that connects computers in a network. This task includes assigning addresses to devices, maintaining network data files across the network, and setting up internet routing. Network administration can also include system tasks on a file server, such as starting up and shutting down the system, adding and removing user accounts, and backing up and restoring data.

network number

An AppleTalk network number is a decimal integer between 1 and 65,279. You assign a network number to each nonextended network supporting AppleTalk. See also *network range*.

network range

An AppleTalk network range is a contiguous range of decimal integers between 1 and 65,279, such as 1-10. You assign a network range to each extended network supporting AppleTalk. See also *network number*.

node

On a network, a point where a device is connected; often used to refer to the device itself. Some examples of AppleTalk nodes are Macintosh computers, LaserWriter or ImageWriter printers, and NetWare file servers.

node address

A number that is dynamically acquired by each node when it comes up on a network. You cannot explicitly assign an AppleTalk node address. A device's node address is combined with the network number to form its unique network address. See also *node*.

packet

A unit of information that has been formatted for transmission on a network.

packet frame

See *frame*.

password

A unique word or set of characters a user must enter before he or she can access a volume on a file server.

port

(1) The logical point of contact between a LAN driver and a protocol that you bind to it. (2) Hardware that enables a component to communicate with a

peripheral, such as a parallel port. (3) A unique server I/O address assigned to a LAN driver in NetWare v3.11.

print queue

A file containing documents awaiting printing.

protocol

A set of rules for transmitting data within a network or internet. A protocol specifies the format, timing, and sequence in which the network transmits data. Common protocols include AFP, ALAP, RTMP, NCP, and IPX. See also *protocol stack*.

protocol stack

A complete suite of protocols that includes all layers required to handle transmission and receipt of packets. See also *protocol*.

router

A router connects multiple networks so that all the nodes on each network can access services and nodes on any other network. An AppleTalk router receives and forwards AppleTalk packets on the networks to which it is directly connected.

startup disk

A disk with all the necessary program files—such as the Finder and System files contained in the System Folder for the Macintosh—to set the computer into operation. A startup disk is sometimes called a boot disk.

TokenTalk

An AppleTalk network on Token Ring.

volume

A general term referring to a storage device or to part of a storage medium formatted to contain files; a source of or a destination for information. A volume can be an entire disk or only part of a disk. It is the primary organizing unit on the file server. See also *folder*.

workstation

A node through which a user can access a server or other nodes.

zone

A logical grouping of devices physically located on one or more networks. Each nonextended network must have exactly one zone name assigned to it.

Each extended network must have at least one zone name, and may have up to 255 zone names, assigned to it. See also *default zone*, *zones list*.

zones list

A list of up to 255 zone names. See also *default zone*, *zone*.