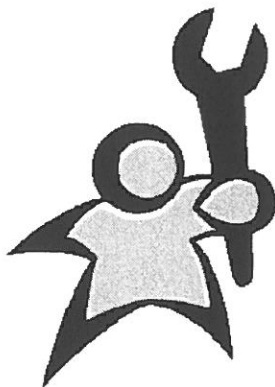


ACSE Update 1999 N&C



Notes

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2

Notes

AppleShare IP new features

- Current version: 6.1
- New for this version:
 - Support for TCP/IP printers (uses LPR protocol)
 - Web-based Management
 - Manage the server using a web-browser from a Macintosh or a PC
 - Manage the Server through the Internet from anywhere
 - Port Filters (Firewall)
 - FireWall function, hacker / misuse prevention
 - Filter out all ports not required
 - Multi-Hosting & Load Sharing
 - Support many Internet sites on one server
 - Allow many servers to support one Internet site



3

Notes

AppleShare IP version 6.1 has several new features and improvements over version 6.0. The most important ones are mentioned in the slide above.

Many commercially available PostScript printers which are used in PC and mixed Mac/PC environments do support TCP/IP but do not support the AppleTalk protocol. AppleShare IP can now support these printers. Printers which support TCP/IP use the LPR (LinePrinter Remote) protocol and act as LPD's (Line Printer Daemon). AppleShare IP can now act as an LPD and an LPD Client. This means that PC's can print to the AppleShare IP Print Spooler, and the Spooler can print to TCP/IP printers.

Note: While the LPR Client is standard in Windows NT, this is NOT the case with standard Windows 95 or Windows 98 PC's. To print to the AppleShare Print Spooler, an LPR/LPD Client software must be installed on the PC. One commonly used product is WinLPD, which can be obtained as shareware.

Another important feature of AppleShare IP 6.1 is the full support for Web-Based management. It is now possible to fully manage the AppleShare IP server using a Web-Browser such as NetScape Navigator or MS-Explorer. Management can be done on the local network, via a remote TCP/IP connection, or even through the Internet from anywhere in planet Earth.

An Internet connection allows use of AppleShare IP's function over the Internet, but also opens the possibility for "hackers" to interfere with the system. To provide basic protection from hackers and other forms of misuse, a "Port Filter" has been included, which allows the system manager to close specific TCP/IP Ports, or to close all ports except those required for World Wide Web (port 80) or other functions.

The power of the new G3 Macintosh systems allow the "hosting" of many web-sites on one and the same server. AppleShare IP now supports this feature. An AppleShare server can now host several web-sites, each with it's own domain address. To use this feature, you must configure MacDNS accordingly. Consult the MacDNS manual for more information before designing a web site if Multi-Hosting is required.

MacDNS now also supports "Load Sharing" by allowing several servers to host the same web-sties(s) and assigning each subsequent hit to a different server on a "round-robin" basis. Large web-sites with millions of hits per day can be built using this feature.

AppleShare IP and SMB support

- The SMB protocol
 - SMB = Server Message Block
 - Microsoft's protocol for File and Printer Sharing
 - Can run on top of NetBEUI or TCP/IP protocols
 - In Windows 95 networks, NetBEUI is more common
 - In Windows NT networks, TCP/IP is recommended
- Note:
 - AppleShare IP does NOT use the NetBEUI protocol
 - NetBEUI is an efficient but non-routable protocol
 - In AppleShare IP, only TCP/IP is used for SMB

Similar to Apple's AFP and PAP protocols

4

Notes

Support for PC's was included in AppleShare IP version 6.0, and has been improved in version 6.1. However there is still much confusion about what this support is and how it works. This page and the next are meant to help clarify the way PC's are supported by AppleShare IP and how to configure both the server and the client PC's.

The AppleShare IP File Server supports the SMB (Server Message Block) protocol. This protocol was created by Microsoft for File Services for Windows PC's. The SMB protocols can run on top of (be carried by) Microsoft's NetBEUI and the more universal TCP/IP protocols.

The NetBEUI protocol is a relatively simple and efficient protocol and is commonly used in Windows (95/98 and NT) environments. It is often assumed that because AppleShare supports SMB, that it also supports NetBEUI. This is NOT the case. AppleShare IP does NOT support the NetBEUI protocol.

One major disadvantage of the NetBEUI protocol is that it is not routable. This means that it cannot be used in large networks, or those networks which are divided or sub-divided using routers or servers with two or more network adapters. For this reason, TCP/IP is becoming more popular, and is quickly becoming a standard in both Windows NT and Novell Netware networks.

AppleShare IP supports SMB over TCP/IP. This means that AppleShare IP can very well integrate with Windows NT networks, and actually looks like a Windows NT server to a PC. To use a PC to log into an AppleShare IP server, no additional software other than the standard Windows TCP/IP network software and the Microsoft Client software is required. These are included on the Windows distribution CD at no additional cost.

Note:

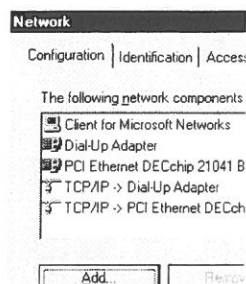
Before configuring a PC for use with AppleShare IP (or any other server), be sure to have the Windows CD in the CD player, or (even better) have the Windows *.CAB files on the PC's hard disk. This is required because Windows loads and unloads drivers and other files whenever the network configuration is changed.

Connecting PC's to AppleShare IP

• Setting up:

- On the AppleShare Server
 - Enable SMB in the Server Settings
 - Enter a server name and a "Workgroup"
- On the Client PC
 - In "Network Neighborhood" properties
 - Install and configure the TCP/IP protocol
 - Install the "Client for Microsoft Networks"
 - On the "Identification" tab
 - Enter a name for the PC
 - Enter the "Workgroup" name
 - Enter a description for the PC (optional)

Same
name



Notes

To allow a PC to connect to the AppleShare IP Server, both the Server and the PC must be configured correctly.

If the AppleShare IP Server has been set up for use by Macintosh clients, it may be set up to use only the AppleTalk protocol. To allow a PC to connect, the TCP/IP protocol must be used. So, first set up the AppleShare IP server for use with TCP/IP by configuring the TCP/IP control panel correctly for your network. You will need to enter an IP address, a subnet mask, and possibly the IP addresses of the DNS server and / or IP router.

Do not use BootP or DHCP to configure your server.

Note: To test the network connection, you can "Ping" the server from the PC. However, if the server software is not running, the TCP/IP drivers may not be loaded. To be certain that the drivers are always loaded, un-check the "Load only when needed" check box on the TCP/IP Control Panels -> Options window.

When TCP/IP has been set up correctly, you can enable SMB in the Server Manager "Server Settings" windows. You then need to enter a name for your server, and a "Workgroup". The server name can be any name as you wish the server to be known to the PC clients. The Workgroup name should be workgroup to which the PC's belong.

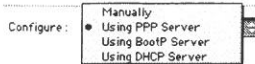
The PC network may already have a workgroup assigned, in which case your server should be in the same workgroup (in large networks this may not be the case). So, ask the PC network manager for the workgroup name. If there is no workgroup assigned, you can invent a suitable name.

On the client PC's you may need to configure the network settings. Remember, AppleShare IP does NOT use NetBEUI, but uses TCP/IP instead. If other servers DO use NetBEUI, you will need to have both protocols installed. If TCP/IP is not yet installed, you will need to install it by selecting the "Network Neighborhood" icon on the PC desktop and clicking on the right mouse button (the right one... the one on the right...) and selecting "Properties". This will display a window where you can see the drivers, protocols and client software installed.

"Add" the TCP/IP control panel and configure it by selecting the protocol and clicking on the "Properties" button. To connect to AppleShare IP, the "Client for Microsoft Networks" also needs to be installed. "Add" this if it is not yet installed.

On the Network Neighborhood Properties window, select the "Identification" tab and enter a name for the PC and the Workgroup name. This should be the same name that you entered in the AppleShare IP server. You can also add a description for your PC, but this is optional. After re-booting the PC, you should be able to log into the AppleShare IP server (if you have been added as a user, of course). Note: Because of the process of determining the "Master Browser" it can take up to 15 minutes before you can "see" the server. Use "Map Network Drive" and enter the path for immediate access (ex: \\server\share)

BootP and DHCP



- **BootP and DHCP**
 - are mechanisms for automatically assigning IP addresses
 - a system or device is configured as BootP or DHCP server
 - that system has a list of addresses it can issue
- **DHCP**
 - Dynamic Host Configuration Protocol
 - assigns IP addresses on a "lease" basis
 - if an address is not used for a specific period, it becomes available for assignment to another system
 - more suitable for laptop-, desktop-, or notebook systems
- **BootP**
 - Boot Protocol
 - assigns IP addresses on a "purchase" basis
 - once an address is issued, it is not re-issued
 - more suitable for hubs, switches, routers etc.

Notes

Eventually, all TCP/IP traffic takes place using IP addresses. So, in order to be able to use TCP/IP each system must have an IP address. Because it can be quite a lot of work configuring several hundred systems for use with TCP/IP, two systems have been devised to automatically assign IP addresses, and in some cases, also to include the IP addresses of the router and / or DNS servers for these systems.

Both DHCP and BootP servers can be any computer system, router or other device that has DHCP and / or BootP software running. In smaller networks a computer system is often used, and in larger networks a UNIX system or a router fills this role.

A DHCP server is used in situations where fixed addresses are not required, such as for desktop systems of laptops. The DHCP server is configured to be able to issue a range of IP addresses on a "lease" basis. By this we mean that the address is not owned by the requesting system. If a pre-determined period of time has passed between requests for that address from a particular system, that address becomes available to be issued to another system.

A BootP server is used to issue addresses for devices such as manageable hubs, switches, routers and other devices or systems that require fixed addresses. Once an address has been issued to a particular device, that address is marked as "issued" or "served" and cannot be re-issued without the administrator changing the status of that address. The BootP server is configured with a list of addresses and corresponding MAC addresses of the devices to whom the addresses are to be assigned.

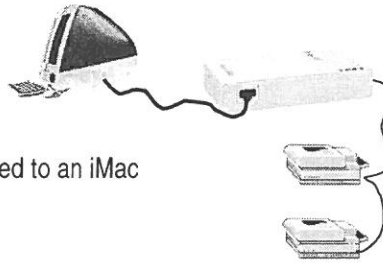
Both DHCP and BootP use the RARP (Reverse Address Resolution Protocol) to translate a request with a MAC address to a response with an IP address.

When you connect to the Internet, your ISP usually does not issue you an IP address, but assigns one when you log on. If this is the case, you must configure your TCP/IP control panel settings to assign an IP address "using PPP Server". In actual fact, the ISP's PPP server functions as a DHCP server and assigns all the required TCP/IP address except the address of the DNS server, which you must assign manually.

The NetBoot function of the MacOS-X Server operating has a similar function, which allows iMacs to boot from the network (from the server). When an iMac boots, it sends a BootP request to the network. If a BootP or DHCP server answers, IP addresses are assigned and the network boot can take place.

iMac Printers

- Perceived Problem:
 - Printers cannot be connected to an iMac
- Solutions available
 - USB printers
 - Epson, HP, others (eventually most printers will support USB)
 - Ethernet / LocalTalk adapters
 - AsantéTalk, Apple LaserWriter Bridge, others
 - Ethernet Printers
 - Apple, GCC, Xerox, HP, Epson, many others
 - USB-Parallel adapters
 - Infowave-PowerPrint, HP
 - USB-Serial adapters



Version 2.1
Not compatible
With MacOS-8.5

8

Notes

The iMac is proving to be one of the most popular computers ever. However an often-heard complaint is that there are not many printers available that can be connected to the iMac, and if you already have a printer, it cannot be connected to your new iMac.

In the past, printers were most often connected to the Macintosh using the LocalTalk network, a serial port, or the SCSI port. The iMac does not support any of these possibilities, and so these printers cannot be connected to the iMac. Or can they?

The future for locally connected printers is the USB-bus, and most printer manufacturers will soon support it, not only for the Macintosh but also for PC's. Most popular brands of PC's have had USB for some time, but it wasn't until the iMac became popular that manufacturers started supporting it.

Most older Macintosh printers such as ImageWriters, StyleWriters, LaserWriters, DeskJet's and others support LocalTalk connections. These printers can easily be connected to an iMac using an Ethernet-LocalTalk bridge or router, such as the AsantéTalk product. This particular product is a small, low-cost product that comes with direct-connect cables to connect the box to the iMac's Ethernet port, and the printer to the box. The box supports up to 8 LocalTalk devices, including other Macintoshes. An old(er) Macintosh with an Ethernet adapter and the Apple LaserWriter Bridge software can also be used. Remember that version 2.1 is not compatible with MacOS-8.5

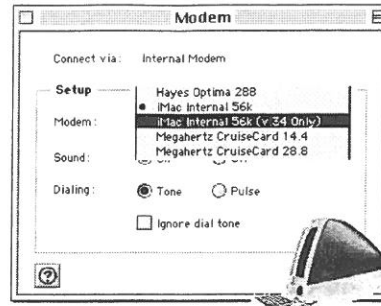
Most of the heavier-duty and / or faster PostScript printers support Ethernet directly, or through an Ethernet Print Server box. These printers can easily be connected to an iMac using the iMac's Ethernet port. The printers can be connected directly using an Ethernet cross-cable (a cable with pin connections 1 to 3 and 2 to 6) or by using regular Ethernet cables and a Hub.

For printers that have only a PC parallel port, there is a USB to parallel cable available. (Infowave's PowerPrint). With this cable almost all standard PC printers can be connected to the iMac. However, in some cases, the printed results can be poor, if the printer manufacturer does not have a suitable driver. For older printers that were connected to the Macintosh through a serial port, there is a solution in the form of a USB to Serial port adapter.

As can be seen from the above, almost all printers can be connected to an iMac. In some cases an adapter is required, in other cases only a cable. In most cases the price of an adapter is low and can be easily justified. This is however, dependent on the age, price and quality of the printer to be connected.

iMac Modems

- Standards
 - X.2 - US Robotics
 - K56Flex - Others
 - V.90 - ITU
- Problem:
 - Some ISP's support V.90, others X.2 and/or K56Flex
 - Automatic detection is not reliable
- Solution:
 - Eventually V.90 will fully supercede X2 and K56Flex
 - Where there are problems, slow down to V.34 (33.6k/s)
 - Use the "iMac v34 Only Modem Script"



Notes

The iMac's internal modem supports both the V.90 and the K56Flex standard. However, there have been a number of problems which have been reported as iMac problems but were sometimes telephone line or ISP related problems. In most cases the problem could easily be solved by "downgrading" the modem to 33.6kb/s.

There are three "standards" for using modems at 56Kb/s speeds. One standard is X.2, developed by a company called US Robotics. Another standard is K56Flex, developed by a consortium of companies opposing the X.2 standard. Because of the problems associated with having two, competing standards, another standard has been developed by the ITU (International Telecommunications Union) which is meant to replace both earlier standards. This standard is called V.90 and it has won the approval of all modem manufacturers.

Some ISP's (Internet Service Providers) support X.2, others support K56Flex and some support V.90. Some ISP's support V.90 and K56Flex or X.2, or all three.

There are two common problems associated with 56K modems:

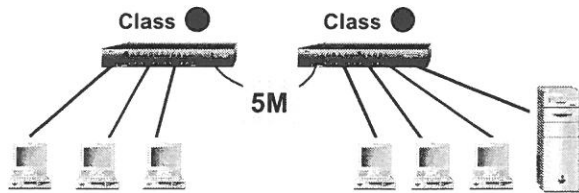
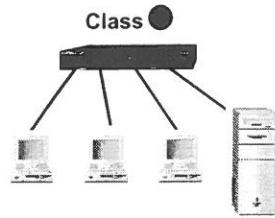
- 1 - Some ISP equipment have problems determining which standard the calling modem uses, and sometimes selects the wrong one.
- 2 - The higher speeds sometimes cause problems (data loss, crosstalk) with telephone cables and / or equipment, especially in older parts of cities or older buildings where old cables are still being used. This causes unreliable connections.

When problems with protocol selection or low quality connections are experienced, it is better to use a slower connection speed. The iMac's internal modem can only be configured using a "modem script". The standard iMac Internal Modem Script will automatically try to connect at the highest speed using the V.90 protocol, but will switch to a lower speed or K56Flex if negotiated to do so with the modem at the other side.

If you are experiencing difficulties such as failed connections, dropped connections etc., try switching to V.34 speed (33.6kb/s) by selecting the iMac v34 Only Modem Script in the Modems Control Panel. The V.34 script can be obtained at the Apple Software Updates Web Site.

Fast Ethernet Hub Rules

- UTP or Fiber Optic cables
 - Use only Cat. 5 UTP cables
- Class I repeaters
 - No connection to other repeaters
- Class II repeaters
 - Connection with one other Class II repeater



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Notes

Fast Ethernet is becoming more common, and is quickly becoming the preferred network for connecting Servers to the network. The official term for the Fast Ethernet frame definition and access / contention method is IEEE 802.3u, as defined by the IEEE (Institute of Electrical and Electronics Engineers).

When IEEE 802.3 is used with UTP cables, this is called 100Base-TX. When IEEE 802.3u is used with fiber optic cables, it is called 100Base-FX.

The speed of Fast Ethernet is much higher than "standard" Ethernet, and uses much higher carrier and modulation frequencies. Consequently, the cables which have been traditionally used for standard Ethernet can NOT be used for Fast Ethernet.

For use with 100Base-TX the cables to be used must be of at least Cat. 5 (Category 5) quality. Use of lower quality cables may work if the lengths are short enough, but problems (data loss, collisions, low speed) must be expected.

When using fiber optic cables (100Base-FX) the same standard cables can be used as was previously used for 10mb/s Ethernet (10Base-FL), but the maximum allowed length is less. For 100Base-FX the maximum length is 412 meters in Half Duplex mode, and 2000 meters in Full Duplex mode.

The rules for interconnecting Hubs (repeaters) with Fast Ethernet are also different than for standard Ethernet. Because of the higher speeds, less hubs can be interconnected using the "Uplink" method. By this we mean that a port of one hub is connected to a port of the next hub, forming a "chain". If two normal ports are used, a "crossed" cable must be used. Most hubs however, have an "Uplink Port" whereby a standard cable can be used. There are two types of Fast Ethernet hubs: Class I hubs and Class II hubs.

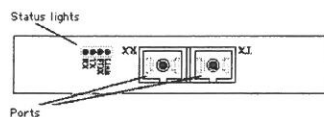
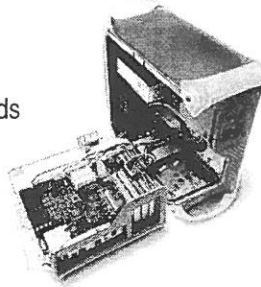
Class I hubs are slower and it is not allowed to connect any other hubs to this hub. Only connections to servers and clients are allowed.

Class II hubs are a little faster than Class I hubs, and it is allowed to connect one and only one other Class II hub with a cable not exceeding 5 meters.

Both Class I and Class II hubs can be "stacked" depending on the make and model of the hub.

Gigabit Ethernet

- Apple's Gigabit Ethernet Card
 - 1000Base-SX, IEEE 802.3z standards
 - For G3 server systems appropriately configured
 - Supports 62.5 and 50 micron Multi-Mode Fiber (MMF)
 - Supports 850 nm SC connectors
 - Requires drivers (Apple Gigabit Enet I and II)



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Notes

When using a new G3 as a server, the limitation on the amount of data that can be transferred to and from the users is sometimes limited by the speed of the network itself. A 100mb/s Ethernet network can transport only about 9 MB of data. The capacity of the server can be extended by installing more Ethernet adapters, this is not always a good solution, depending on how many PCI slots are available and which network protocols are used.

A good solution to increase the server's network capacity is to install an Apple Gigabit PCI Ethernet Card. This card has a capacity of 1000mb/s, resulting in a theoretical maximum of about 90 Megabytes of data per second. If the card can be used in Full Duplex mode, this capacity could be doubled.

Apple's Gigabit Card complies with the IEEE 802.3z and 1000Base-SX standards and can be used with industry standard Gigabit cables and switches. The card has one "SC" glass fiber connection. The SC connector is a dual connector with one fiber for transmit data and another for receive data. Using this connector, standard 62.5 micron Multi-Mode Fiber (MMF) cables can be used with a maximum length of 260 meters. When longer cables are required, it is possible to use 50 micron cables, which have a maximum length of 550 meters.

To install the card, simply plug it into any PCI-bus slot and restart the server. Next, connect the server to the glass fiber network. Then install the Apple Gigabit Enet I and Apple Gigabit Enet II drivers by dragging them from the CD onto the closed system folder. Restart the server again and select the card in the AppleTalk control panel.

When the Server is equipped with a Gigabit Ethernet Card, the network probably can carry more traffic than the server can handle. To achieve optimum results, the server should have enough memory, and multiple hard disk storage in the form of RAID arrays. When hard disk storage is in RAID arrays, the data is spread across a number of disks, allowing data to be read from one disk while the others are seeking (positioning the heads for the next read operation). The more disks the better the performance. Also, more than one SCSI Array controller should be considered to improve disk performance even further.

Currently, Gigabit Ethernet can only be used to connect to an Ethernet Switch. Be sure to select a switch that has enough performance and enough 100Base-TX or 10Base-T ports to distribute the data from the Gigabit card to the network.

System Profiler version 2.1.2

- The new version:
 - Supports new G3 hardware
 - Collects more information
 - Shows Network Adapter configuration
- Network Adapter configuration (Automatic)
 - 10 or 100Mb/s speed selection
 - Full or Half duplex selection
 - Link Test status (Up or Down)



Network overview

Ethernet	Link: up	Speed: 10 Mbps	Duplex: half
Open Transport	Installed: Yes	Active: Yes	Version: 2.0.2
▶ AppleTalk	Installed: Yes	Active: Yes	Version: 60
▶ TCP/IP	Installed: Yes	Active: No	Version: 2.0.2

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Notes

Most new Macintoshes (iMac, G3) are equipped with a built-in Autosensing Fast Ethernet adapter. In Macintoshes with PCI slots, one or more additional Fast Ethernet adapters can be installed. When a Macintosh is connected to the network, the adapter will select the most appropriate mode of operation, which can be 10mb/s or 100mb/s, and Full Duplex or Half Duplex in either speed.

The current version of Open Transport and Ethernet drivers do not allow us to select the mode of operation, or even to see which mode has been automatically selected. The new version of the System Profiler allows us to see which mode the card has been set to. If the Macintosh is not achieving the network performance we expect, one reason could be that it is working at 10Mb/s instead of at 100Mb/s, or that it is in Half Duplex mode instead of in Full Duplex mode.

When a dual-speed 10/100 Ethernet device (such as a Macintosh) is connected to the network it sends and receives "Link pulses". If it senses 100Mb/s Link pulses, the adapter will switch to 100Mb/s. Otherwise it will switch to 10Mb/s. This process is called "Autonegotiating". So, if a Macintosh with a dual-speed Fast Ethernet adapter is connected to the network, it should always automatically work at the highest speed, even when connected to a dual-speed hub, or another computer with a dual-speed adapter.

The Link pulses of modern equipment also allow sensing for Full/Half Duplex. The normal mode of operation is Half duplex. Full Duplex is only allowed when the Macintosh is connected to an Ethernet Switch, or directly to another Macintosh.

Macintoshes equipped with a PCI-bus adapter have LED's on the adapter which indicate the speed, link state and traffic. Macintosh with built-in Ethernet, such as the iMac, have no indication LED's. This can make troubleshooting difficult. With the new version of the System Profiler, the Link state can be seen. If the Link is "Up" it means that the Macintosh is receiving Link pulses and the physical connection is most likely good. If the Link state is "Down" then the cable may be disconnected, broken or damaged, or the equipment at the other side of the cable (usually a hub) may be down or defective.