Apple Products: Multihoming and Multinode Support

This article contains information about the implementation of multihoming and multinode support in Apple products. This is an advanced technical article provided for informational purposes only. Apple will not provide assistance with interpreting or understanding this information.

Questions answered in this article:

What is meant by the terms multihoming and multinode support?

Which Apple products include multihoming or multinode support?

How does the network connectivity for the DOS and Mac OS environments on the enhanced PCI-based Power Macintosh computers differ from previous Macintosh computers using DOS or PC Compatibility Cards?

If I have a PC Compatibility card installed in an enhanced Power Macintosh**, can I install an additional network adapter card for use in the DOS environment?

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Question: What is meant by the terms multihoming and multinode support?

Answer: Multihoming is the term applied to the capability to communicate using more than one network interface (card), at the same time, using the same protocol. In such a situation, the different network cards can each be connected to different zones and have different addresses, but each must be using the same protocol, such as TCP/IP, AppleTalk, and so on.

Multinode support (often referred to as Single link multi-homing), however, is the capability to communicate using multiple network protocol addresses through a single network interface (with different datalink addresses) using a single protocol.

	Network Interface Cards	Hardware Addresses	Protocol Addresses	Protocols
Multihoming	Multiple	Different	Different	Same
Multinode	Single	Different	Different	Same

Question: Which Apple products include multihoming or multinode support?

Answer:

Multihoming Support

Open Transport 1.1 introduced AppleTalk multihoming support to developers at the API level. This change allowed developers to re-write existing applications to take advantage of this feature.

With the release of Open Transport 1.1, AppleShare 4.2.1 incorporated AppleTalk multihoming support. With AppleShare 4.2.1, you can install multiple network interface cards into the server allowing users to connect to volumes and servers with the same name in different zones, allowing multiple network interfaces to be active simultaneously.

By supporting multiple network connections, multihoming support provides additional "pipelines" to the server, which increases the amount of network traffic that can reach the server. This enables servers to support more clients, to offer greater total performance, and to increase the reliability of mission critical applications.

Please note that multihoming does not bridge or route those network segments into a LAN. The network segments will not see each other by being connected to this one computer, but clients on the unique network segments will all see the AppleShare server.

AppleShare IP 5 and 6 also take advantage of multihoming. Note that multihoming support is still limited to AppleTalk.

The Apple Internet Router v3.0 modifies the Classic AppleTalk stack to allow multihoming. A re-write of the router is required to use the built-in AppleTalk multihoming capabilities of version 1.1 of the Open Transport/AppleTalk stack.

The ARA Client supports AppleTalk multihoming for a single limited case: two ports only--one LAN and one serial, in both Classic and Open Transport network configurations.

Multinode Support

- Open Transport 1.3 introduced single link multihoming (Multinode support), a mechanism by which Open Transport can support multiple IP

addresses on the same hardware interface. Synonyms for this feature include IP Aliasing, Secondary IP address support, IP Masquerading, "Multihoming", and IP Multinode support. This is useful for sites like Internet Service Providers (ISPs), that want to give each of their clients a distinct IP address, without requiring separate computers for each address. Web server software packages or server plug-ins that utilize this feature can offer virtual domain support that supports all web browsers.

- The ARA Personal Server uses AppleTalk multinode capability in both the Classic and Open Transport/AppleTalk protocol stacks and is compatible with both network systems.
- The ARA Multiport Server uses AppleTalk multinode capability in both the Classic and Open Transport/AppleTalk protocol stacks and is compatible with both network systems.
- The Apple IP Gateway modifies MacTCP to allow TCP/IP multinode capability using Classic networking. A re-write of the IP Gateway is required to use the TCP/IP built-in multihoming capabilities that are planned for future Open Transport releases. Open Transport 1.1 does not include TCP/IP multinode support.
- Starting with the Enhanced PCI-based Power Macintosh computers**, and later with the PowerMacintosh G3 computers, built-in Ethernet hardware allowed PC Compatible cards and the Mac OS environment to share the built-in Ethernet interface, therefore allowing simultaneous network connections in both environments. Each environment uses a separate physical layer address. Depending upon the capabilities of each protocol stack being used in a given environment, multinode support may or may not be available. For example, you can connect the DOS and Macintosh environments to the same network using the same protocol (such as TCP/IP).

This configuration could also be loosely defined as multihoming because even though the Mac OS and DOS environments use the same network controller protocols, they appear as separate hardware addresses on the network. Essentially, one physical network interface appears as two.

To further describe the full capabilities of these advanced Apple systems, the implementation of a protocol stack in the Mac OS or DOS environment may itself include multinode support. For example, the TCP/IP protocol stack installed in the DOS environment may support assigning multiple IP addresses to a physical interface using the primary hardware address. In this type of configuration, a Macintosh computer with the enhanced Ethernet controller, Open Transport 1.1 or later and a PC Compatibility Card can accept connection to three or more IP addresses.

Note: By default, Open Transport/TCP can only be configured to use one port at a time. IPNetLink, a utility from Sustainable Softworks, http://www.sustworks.com/~psichel, removes this limitation.

Tenon's MachTEN, http://www.tenon.com, and Vicom's SoftRouter and SurfDoubler products, http://www.vicomtech.com, also allow a Macintosh to use two or more ports concurrently with TCP/IP.

Question: How does the network connectivity for the DOS and Mac OS environments on the enhanced PCI-based Power Macintosh computers differ from previous Macintosh computers using DOS or PC Compatibility Cards?

Answer: In other Macintosh computers that use DOS or PC Compatibility Cards, you do not have multinode or multihoming support. Instead, you only have one effective instance of an TCP/IP protocol stack. You can be connected using either the Mac OS or DOS environment, but you cannot be connected using both environments simultaneously.

Question: If I have a PC Compatibility card installed in an enhanced Power Macintosh** or a Power Macintosh G3, can I install an additional network adapter card for use in the DOS environment?

Answer: No. The installed PC Compatibility Cards are hard-coded to use the built-in Ethernet interfaces. However, you can add an additional network card to provide additional network services, such as AppleTalk for the Mac OS. The Mac OS and DOS environments would then use the built-in Ethernet for TCP/IP, and the Mac OS could use the Ethernet card for AppleTalk.

Even though you are providing another network interface for the computer to use, you do not get any network performance advantage by doing this. However, this is a viable solution if the DOS and Mac OS environments need to be physically located on different networks.

**Note: Following are the Enhanced Power Macintosh computers:

- Power Macintosh 7200/90 (Europe ONLY)
- Power Macintosh 7200/120
- Power Macintosh 7300 series
- Power Macintosh 7600 series
- Power Macintosh 8500/132
- Power Macintosh 8500/150
- Power Macintosh 8500/180
- Power Macintosh 8600 series
- Power Macintosh 9500/150
- Power Macintosh 9500/180MP
- Power Macintosh 9500/200
- Power Macintosh 9600 series

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