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Setting Up MacIP

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Introduction

The Macintosh Internet Protocol (MacIP) tunnels IP datagrams inside AppleTalk for a Macintosh client communicating over an AppleTalk network to a MacIP server. The MacIP server pulls the IP packet out of the AppleTalk datagram and forwards it as Native IP. Cisco IOS® routers and access servers can act as MacIP servers. This document shows you how to set up MacIP on the server and Macintosh Transfer Control Protocol (MacTCP) on the Macintosh client.

The two ways that a Macintosh can speak TCP/IP are with Native IP and MacIP.

Native IP is ideal for Macintoshes (Macs) on Ethernet or Token Ring. The Macs speak IP directly on to the LAN.

MacIP is ideal for Macs using LocalTalk or AppleTalk Remote Access (ARA) at the Data Link Layer (Open System Interconnection (OSI) Layer 2). These data links only support AppleTalk. By tunneling IP inside of AppleTalk packets, IP connectivity can be gained through the MacIP server.

Using MacIP for devices on Ethernet or Token Ring should be avoided. All IP packets would require extra hops, which may insert additional points of failure. Also, IP performance is significantly reduced due to MacIP's 600−byte packet size and non−sliding window transport layer. Use Native IP on Ethernet or Token Ring whenever possible. For dial−up IP connections, PPP or Serial Line Internet Protocol (SLIP) offer better performance than ARA with MacIP.

The MacIP server acts as a proxy for all the IP addresses it is currently serving to its clients. When it receives a packet for one of its clients, it bundles it up in an AppleTalk packet and sends it to the client.

Before You Begin

Conventions

For more information on document conventions, see the Cisco Technical Tips Conventions.

Prerequisites

There are no specific prerequisites for this document.

Components Used

The information in this document is based on the software and hardware versions below.

- Cisco IOS® Software Releases 9.21(5), 9.1(12), 10.x, and later

Setting Up MacIP Under Cisco IOS

Since the MacIP server gives the MacTCP client its full IP configuration, configure your Cisco IOS router with the following commands:

- **ip name−server x.x.x.x**
- **ip domain−name xyz.com**

This information is served to the client, simplifying the client's configuration.

The MacIP server has two configuration requirements:

- Defining the server.
- Assigning its resources (or addresses).

Defining the Server

The MacIP server needs to have an IP component and an AppleTalk component. The IP resources assigned must come from the same interface as the IP component. Below are the configuration rules for the IP and AppleTalk components.

IP Configuration Rules

- Only primary subnets can be used for MacIP. Secondary subnets do not work.
- Determine how many IP addresses are served to the clients. Pick an IP interface with the available address space. Loopback interfaces can be used if you want to dedicate an entire subnet to MacIP.
- The MacIP clients look to the rest of the IP network as if they are part of the subnet used for the IP component, although the Macintosh may be many hops away.
- Use the IP address of the interface selected for the definition of the server.

For example, consider that there is no available address space on any of the physical ports on the router. A loopback (virtual) interface must be created for the MacIP clients.

```
int loopback 0
ip address 192.68.200.1 255.255.255.0
```

Now, MacIP clients can be given IP addresses on the subnet of the loopback interface. This must be a unique subnet in your IP network.

AppleTalk Configuration Rules

- Define a zone where the MacIP server is visible to the Macs. The Macs use this zone to locate the MacIP server.
- Only default zones (the first zone in the list) can be used, never additional zones.
- An AppleTalk Remote Access Protocol (ARAP) network, or proxy network, cannot be used.
- Macintosh clients cannot choose from multiple MacIP servers in a single zone. Only one MacIP server should exist per zone.

Define the MacIP Server

Once the IP and AppleTalk components are configured, add the MacIP server definition into the configuration. In the example below, the default zone on the interface loopback 0 is Marketing and is used for the AppleTalk component of the MacIP server.

```
appletalk macip server 192.68.200.1 zone Marketing
```

Advanced users can use utilities such as the Cisco IOS nbptest or the Mac−based Inter Poll to confirm that the MacIP server responds to Name Binding Protocol (NBP) lookups (above example) as 192.68.200.1:IPGATEWAY@Marketing.

If more than one IPGATEWAY exists in zone Marketing, it may cause unexpected results.

Assigning Resources to the MacIP Server

MacIP servers can be configured with two kinds of resources: dynamic addresses and static addresses.

Dynamic Addresses

Dynamic addresses are more commonly used than static addresses. They allow you to assign pools of IP addresses. For instance, you could assign a pool of eight addresses for eight dial−in lines. Clients wouldn't know which of the eight addresses they would get, and they probably wouldn't need to know. This conserves IP addresses and makes the configuration easier for the customer.

In the example below, the range of addresses 192.68.200.2 through 192.68.200.9 are assigned to the MacIP server defined above in the zone Marketing.

```
appletalk macip dynamic 192.68.200.2 192.68.200.9 zone Marketing
```

The MacTCP client calls this a server address since the server selects it.

Static Addresses

Use static resources if the clients must always know their IP addresses. For example, if they are to be mapped in a Domain Name Service (DNS) server. With static addresses, you normally need many more IP addresses, since you'll need one for each possible client. Static addresses are usually not required.

In the example below, the range of IP addresses is 192.68.200.10 through 192.68.200.11 and they are available to the MacIP clients from the MacIP server in zone Marketing. The ranges defined should be

continuous, and they must not overlap with each other or with IP host addresses.

```
appletalk macip static 192.68.200.10 192.68.200.11 zone Marketing
```

For static addresses, the MacIP client needs to be configured for zone Marketing. Also, a manual address and a valid static address must be configured in the MacIP server. See the Configuring the Mac section for more information.

Verifying the MacIP Server

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only) , which allows you to view an analysis of **show** command output.

There are three useful commands for checking the MacIP server:

- **show apple macip−server** − Shows the state of the server (for instance, is it up and running).
- **show apple macip−client** − Shows the status of the current clients.
- **show apple macip−traffic** − Shows a traffic summary since the last reload.

Confirm that the MacIP server is operational:

```
Router#show apple macip-server
MACIP SERVER 1, IP 192.68.200.1, ZONE 'CE lab' STATE is server_up
      Resource #1 DYNAMIC 192.68.200.2-192.68.200.9, 0/8 IP in use
      Resource #2 STATIC 192.68.200.10-192.68.200.11, 0/2 IP in use
```

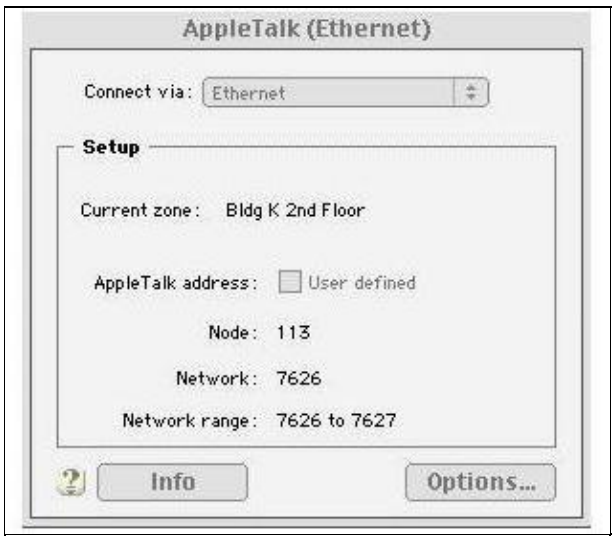
Configuring the MAC

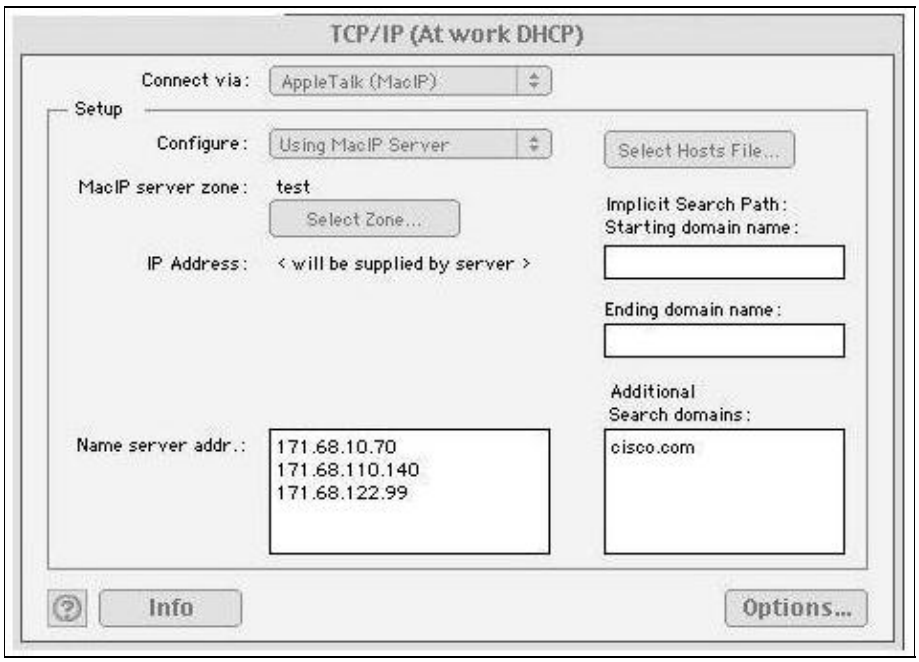
In each Macintosh client's network control panel, choose the pull down menu item that represents the network that the AppleTalk packets should use. For an ARA connection, select either Ethernet, Modem/Printer Port, or Remote Only (if there is a serial printer on the printer port). This is an AppleTalk connectivity requirement, not a MacIP requirement, but there must be AppleTalk connectivity to the MacIP server.

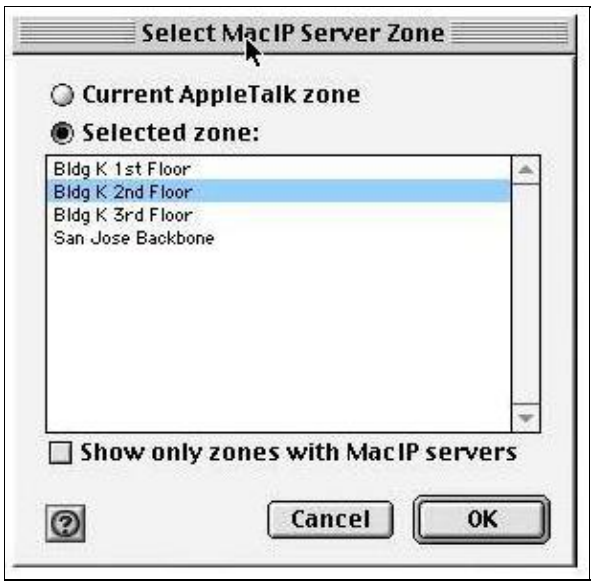
Newer versions of MacOS do not support ARA. The only choice will be AppleTalk(MacIP) from the TCP/IP control panel. This will use the Ethernet connector on the Macintosh. To set up the client to use MacIP services, use the steps below.

1. Connect to the AppleTalk network (with ARA or other options). Zones should be in the chooser.
2. Open the TCP/IP control panel by selecting **Appletalk(MacIP)** from the Connect via pull down menu and then selecting **Using MacIP server** from the Configure pull down menu.
3. Select **Select Zone**.

   When the Select MacIP Server Zone window appears, select the **Show Only Zones with MacIP Servers** checkbox and select the zone where the MacIP server resides.

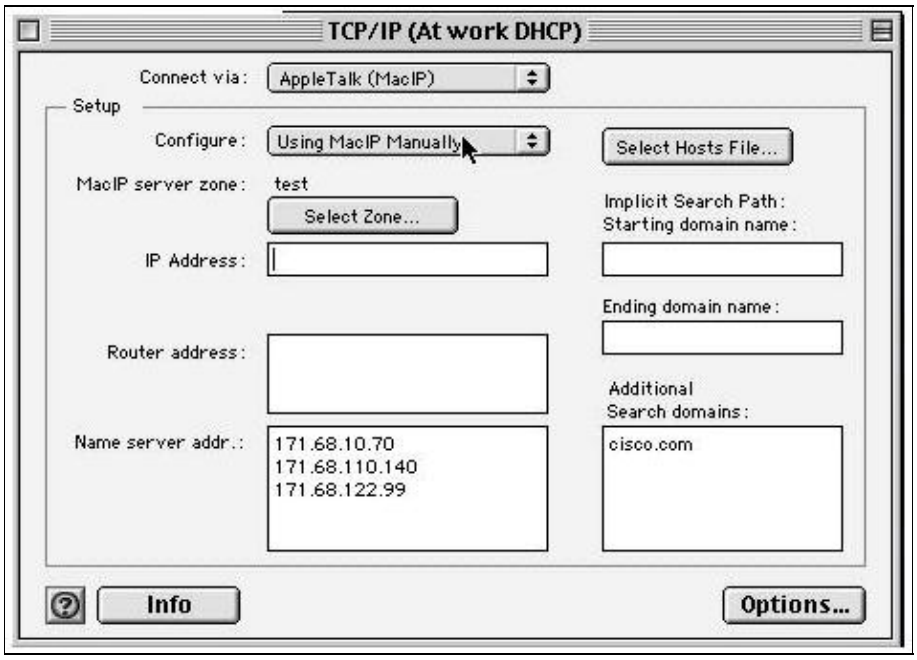

AppleTalk (Ethernet)
Connect via: Ethernet
Setup
Current zone: Bldg K 2nd Floor
AppleTalk address: User defined
Node: 113
Network: 7626
Network range: 7626 to 7627
Info
Options...


TCP/IP (At work DHCP)
Connect via: AppleTalk (MacIP)
Setup
Configure: Using MacIP Server
Select Hosts File...
MacIP server zone: test
Select Zone...
Implicit Search Path:
Starting domain name:
IP Address: < will be supplied by server >
Ending domain name:
Additional
Search domains:
Name server addr.:
171.68.10.70
171.68.110.140
171.68.122.99
cisco.com
Info
Options...

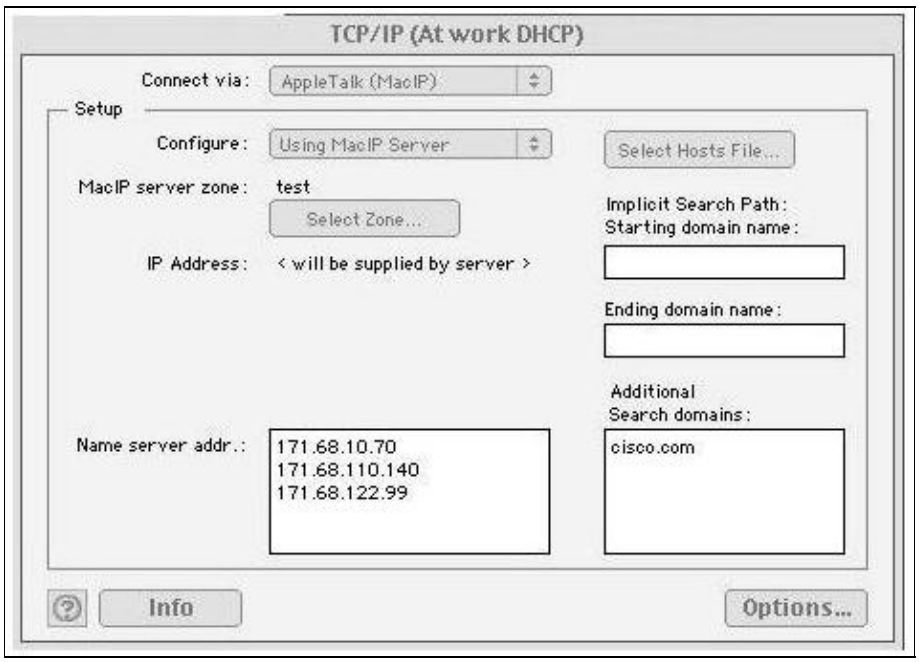

Select MacIP Server Zone
Current AppleTalk zone
Selected zone:
Bldg K 1st Floor
Bldg K 2nd Floor
Bldg K 3rd Floor
San Jose Backbone
Show only zones with MacIP servers
Cancel
OK

4. For dynamic resources (MacIP dynamic), select **Using MacIP Server** in the Configure pull down menu.

   For static resources (MacIP static), select **Using MacIP Manually** in the Configure pull down menu, then type in the IP address (no spaces or returns). Also, configure the correct subnet mask and the correct gateway address.



   When the MacIP dialog box is configured, the window should appear as follows:



5. Close TCP/IP and restart the Mac if you are instructed to do so.

   MacTCP is now configured and it will not be necessary to connect again in the future.
6. Launch a Macintosh program that uses IP and see if it works.

If you have problems, use MacTCP Ping for testing. This comes with MacTCP V2.

Note: There is some confusion caused by the names that MacIP and MacTCP use. The chart below helps to clarify these terms. Only "server" and "manual" are options for MacIP−based IP.

Address Type	MacTCP Icon	MacTCP Detail	Cisco IOS Configuration
Server−assigned address	Remote only, LocalTalk, or EtherTalk (select zone)	Server	Dynamic resources
Server−based static address	Remote only, LocalTalk, or EtherTalk (select zone)	Manual	Static resources
Native dynamic address (not using MacIP)	Ethernet, PPP, or SLIP (no zone)	Dynamic	Not applicable
Native static address (not using MacIP)	Ethernet, PPP, or SLIP (no zone)	Manual	Not applicable

Related Information

- **Technology Support**
- **Product Support**
- **Technical Support − Cisco Systems**

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