Vanguard Managed Solutions

Vanguard Applications Ware
IP and LAN Feature Protocols

Appletalk

Notice

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Part No. T0100-08, Rev G
Publication Code: DS
First Printing: November 1998

Manual is current for Release 6.2 of Vanguard Applications Ware.

To comment on this manual, please send e-mail to LGEN031@vanguardms.com

AppleTalk Phase 2 Protocol Over Ethernet

Overview

About the AppleTalk Option

This manual discusses the implementation of the AppleTalk Phase 2 Protocol for Ethernet on the Vanguard routers. AppleTalk Phase 2 Protocol for Ethernet is supported only on the Vanguard routers that have Ethernet ports.

Bridging AppleTalk Over WANs

You can bridge AppleTalk traffic by means of the Bridged Protocols parameter on the Bridge Record in the operational software on Vanguard routers that support AppleTalk Phase 2 Over Ethernet. You can bridge AppleTalk traffic using the Protocol Type parameter in the Protocol Filter Table in the Configure Bridge menu. For more information refer to the *Vanguard Applications Ware Bridging Manual* (Part Number T0100-02). However, you may encounter problems if you bridge across a WAN.

Certain protocols within the AppleTalk suite are extremely delay sensitive, and they may not work properly when bridged over a WAN. When AppleTalk Zones disappear from the Macintosh Chooser exemplify this problem. Therefore, we recommend that you route AppleTalk over WANs.

You should not experience any problems performing transparent bridging of AppleTalk over LANs.

In This Manual

Introduction

What Is AppleTalk?

AppleTalk is a routable protocol that comprises several protocols developed by Apple Computer for intercomputer communication.

AppleTalk Copyright Information

Copyright information is as follows:

AppleTalk Copyright (c) 1995 by AGE Logic Inc., San Diego, CA.

LANs Supported

In Vanguard Applications Ware, AppleTalk routing is supported over Ethernet LANs only. Vanguard routers do not support the Localtalk LAN used by Apple Macintosh computers.

Vanguard Products that Support AppleTalk

Not all Vanguard routers support AppleTalk:

- Only those Vanguard routers equipped with an Ethernet port support AppleTalk Phase 2 over Ethernet. Vanguard routers that do not support an Ethernet port do not support any AppleTalk protocols.
- AppleTalk Phase 1 is not supported on any Vanguard router.

Note

Unless otherwise noted, throughout this chapter, the term “Vanguard router” denotes a Vanguard that supports an Ethernet port.

Alarms and Reports

For alarms and reports for AppleTalk Phase 2, please consult the *Vanguard Applications Ware Alarms and Reports Manual* (Part Number T0005).

Protocols Supported

These are the AppleTalk protocols supported by the Vanguard routers:

- AppleTalk Address Resolution Protocol (AARP)
- AppleTalk Echo Protocol (AEP)
- AppleTalk Transaction Protocol (ATP) used by ZIP; only a subset of ATP is needed
- Datagram Delivery Protocol (DDP), DDP Long headers only
- EtherTalk Link Access Protocol (ELAP)
- Name Binding Protocol (NBP)
- Routing Table Maintenance Protocol (RTMP)
- Zone Information Protocol (ZIP)

Figure 1 shows the AppleTalk protocols supported by the Vanguard router at the different API layers:

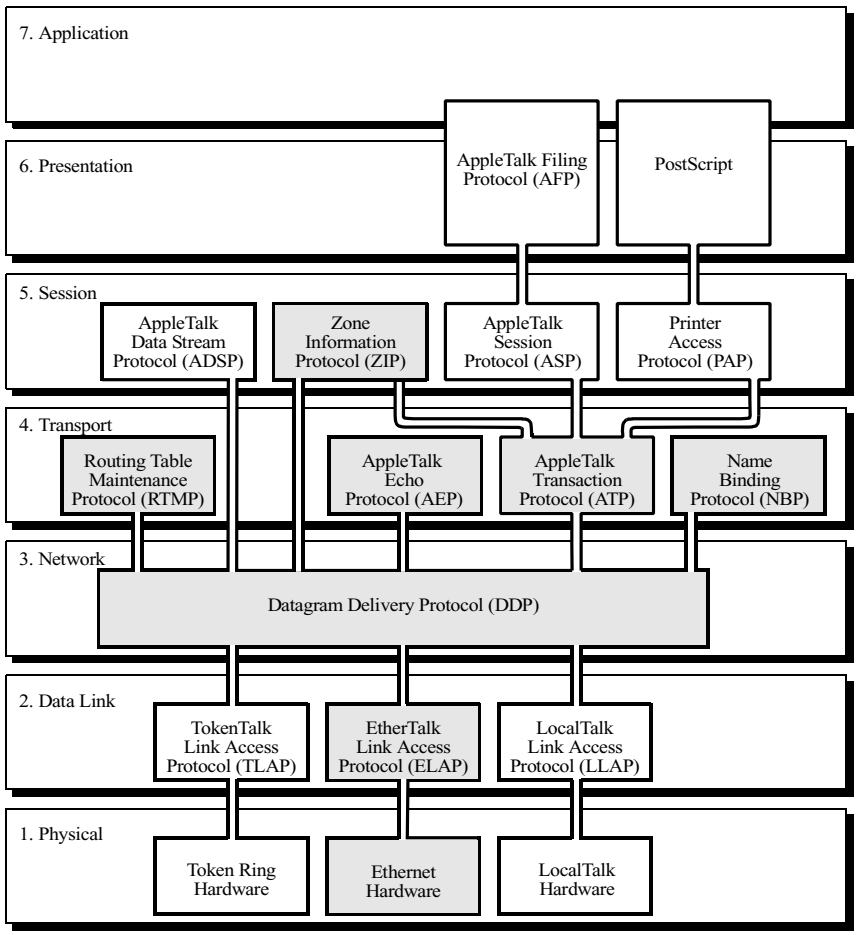

Figure 1. AppleTalk Protocols Supported (shaded areas)

Protocols Not Supported by Vanguard

All Vanguard routers do not support:

- Access and Distribution Lists
- AppleTalk Phase 1
- AppleTalk Session Protocol (ASP)
- AppleTalk Data Stream Protocol
- AppleTalk Filing Protocol
- AppleTalk Update Routing Protocol (AURP)
- LocalTalk Link Access Protocol (LLAP)
- IP Address Management Services
- MAC-IP
- Printer Access Protocol (PAP)
- TokenTalk Link Access Protocol (TLAP)

Requirements for Network End Nodes

A MacIntosh with an Ethernet card must run EtherTalk Version 2.0 or later to support extended AppleTalk.

A MacIntosh with only a Local Talk interface is not supported by Vanguard routers.

Requirements for Other Network Routers

All routers on the network must run AppleTalk Phase 2 and use AARP, as opposed to AURP.

Limitations

Since all Vanguard routers do not support AppleTalk Phase 1, they cannot translate between AppleTalk Phase 1 and AppleTalk Phase 2.

AppleTalk Routing Concepts

Introduction

This section describes AppleTalk Routing concepts and terminology.

An AppleTalk Internet Router (IR) is used to connect several AppleTalk networks together and communicate to nodes on a different network. This topology, consisting of more than one network, and one or more IRs, forms what Apple Computer calls an AppleTalk Internet, or Inter-Network.

Node and Network Numbers

In the addressing scheme used in AppleTalk, node and network numbers are used to identify the sender and destination.

Each workstation node on the network dynamically assigns itself an 8-bit node number upon startup.

Each network (that is, each LAN) can be assigned a range of 16-bit AppleTalk network numbers that identify the network connected to the node. AppleTalk WAN links are not usually assigned a network number.

Node and Network Number Address Format

When a computer sends an AppleTalk message, it addresses it to a (network number, node number) pair using the Datagram Delivery Protocol (DDP).

A third address component, a one-byte socket address, is also considered part of the AppleTalk address. When a packet reaches a computer, as identified by network number and node number, the socket number directs the packet to a particular software process.

Network Range

The extended addressing functions of AppleTalk Phase 2 include network ranges, which constitute contiguous network numbers. Each number of the network range can be associated with 254 nodes. Each network range must be unique. No number may be used twice for the same internetwork, nor can any network ranges share network numbers.

Networks can be extended or nonextended.

Extended versus Nonextended Networks

An extended network has more than one network number in its number range. Ethernet networks are often extended networks so that more than 254 nodes may be assigned on the Ethernet.

A nonextended network has only one AppleTalk network number assigned.

What are Zones and Zone Names?

AppleTalk zones are logical divisions of an internet. Network resources are grouped to help users to locate them more easily and to avoid having to contend with numerical network, node, or socket numbers.

An AppleTalk zone name is a text string that identifies a single network or group of networks connected to a router. The zone name is associated to a generalized service, such as file sharing or printing, available on an AppleTalk internetwork.

Zone names are 1 to 32 characters long. The Chooser contains the name identifying the zone.There is no maximum number of devices that can be associated with a zone.

How the Name Binding Protocol Works

The AppleTalk Name Binding Protocol (NBP) is the mechanism by which the numerical network, node, or socket numbers are automatically converted into zone names that users can easily recall when selecting network devices.

NBP Format

Each component of the NBP name:

- is case-insensitive
- may be up to 32 characters long
- may contain non-ASCII characters

The general form of an NBP name is:

<node-name>: <service type> @ <zone name>

where <node-name> is a name of the service (for example, C3_Server), <service type> is the type of the service (AFPServer), and <zone name> is the AppleTalk zone in which the service resides (Codex_C3_A).

Zones

The AppleTalk routers assist workstations in determining the list of available zone names and in matching them against the network/node/socket addresses of services on remote networks.

The routers exchange information that contains the zone name of the networks they are advertising. Workstations communicate with the routers using the Zone Information Protocol (ZIP) to determine the list of zone names available on the entire AppleTalk internetwork.

The following table describes in sequence how NBP and zones are used to display all Appleshare servers in a particular zone:

Stage	*Description*
1	The user opens the Chooser.
2	The user selects the AppleShare icon.
3	The workstation receives the list of AppleTalk Zones by sending a ZIP query to the Zones Information Socket on any router on its network. The ZIP reply contains a list of all zones known to the router (from its Zone Information Table). The Chooser displays all the zone names.
4	The workstation sends an NBP Broadcast Request Packet to the Names Information Socket of any router on its network, requesting information of all Appleshare servers in the selected zone.
5	The router then forwards one NBP Forward Request packet to all networks that contain nodes in the target zone.
6	The routers on the destination networks then multicast an NBP lookup request to the workstations on that network in the target zone.
7	The NBP lookup replies are sent directly to the requesting workstation.
8	The user sees a list of all AppleShare servers in the selected zone.

Network Zone List

Every network has one or more zones defined for it, called the network's zone list. In AppleTalk Phase 2, multiple zone names could be associated with a given network, and any zone can be spread out across many networks. Workstations are always considered to belong to a single network number and a single zone name.

The seed router(s) on that network define the zone list. All seed routers must agree on the zone list. Routers without a defined zone list obtain their zone list from a seed router. In addition, every network has a default zone name. The first zone name in the zone list for a given interface is the default zone for that interface.

Seed Router Operation

The router can be configured either as a seed or non-seed router, based on its interface configuration parameters. When seed routers come up, they verify their configuration with other routers on the network.

If the configuration is valid (that is, the network range is the same, and the zone list is the same), the router starts functioning. Otherwise, the router does not function, and marks that interface as Invalid. If a seed router's interface is found to have no zones assigned to it, the router generates an event, and the interface's status is invalid.

Non-Seed Router Operation

A non-seed router must first communicate with a seed router before it can function. If a non-seed router cannot find a seed router when it first comes up, the router shuts itself down, and it does not begin operating.

If a non-seed router is configured with either a zero network ID or a zero node ID (or both), it determines the IDs following the same procedure as a workstation.

WAN Routing

A WAN link to another AppleTalk router is considered to be a “half port.” A half port does not have an AppleTalk network number, so it does not have an AppleTalk network address. Therefore, certain functions cannot be performed on WAN ports, such as Ping.

AppleTalk Networking

Introduction

This section describes how AppleTalk communicates among nodes on the same network on the same network and among nodes on different networks.

Same Network Nodes

The DDP protocol uses the AppleTalk Address Resolution Protocol (AARP) for communication between nodes on the same network only. AARP determines the Media Access Control (MAC) address on the network that corresponds to a particular AppleTalk node number.

AARP receives packets from DDP. If it does not already know the MAC address for the destination AppleTalk node address, it broadcasts an AARP request message to all stations on the network, providing the target destination node number. If that node number is connected, it responds with an AARP response that contains its MAC address. The requesting station then caches the MAC address to AppleTalk node address mapping.

DIfferent Network Nodes

Before a workstation sends a packet to a node on a different AppleTalk network number, it sends the packet to an AppleTalk Internet Router (IR) connected to its local net.

The AppleTalk IR determines where to forward the packet toward its destination network. AppleTalk IRs periodically broadcast packets using the Router Table Maintenance Protocol (RTMP) to tell each other which AppleTalk network number they can reach. Workstations listen to the RTMP messages sent by routers, so they know to which router to send AppleTalk packets destined for non-local network numbers.

Configuring AppleTalk

Introduction

This section provides configuration information for AppleTalk.

New AppleTalk Menus

The Configure AppleTalk appears in Vanguard routers with Ethernet ports. This menu contains the following tables and records:

- Parameters Record
- Interfaces Record
- Zone Seed Table

The following sections describe these tables and records.

Configure Routers Menu

Figure 2 shows the Configure Router menu. Select Configure AppleTalk to access the parameters for AppleTalk configuration:

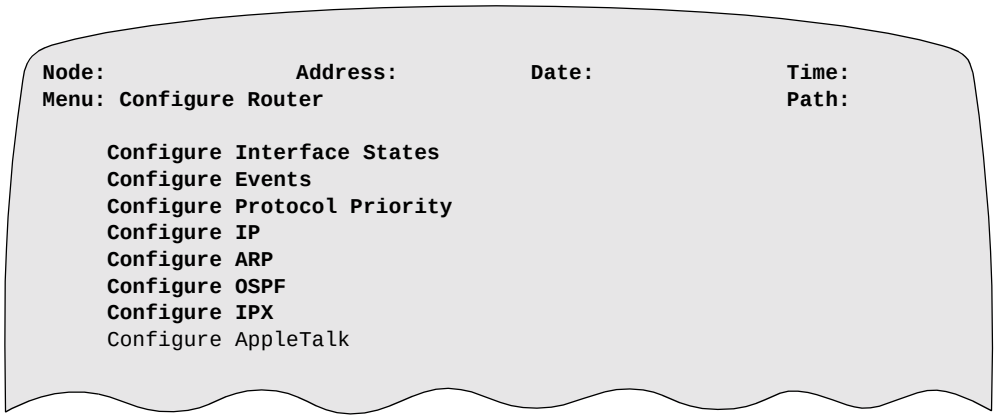

Figure 2. Configure Routers Menu

Configure AppleTalk Menu

Figure 3 shows the Configure AppleTalk menu.

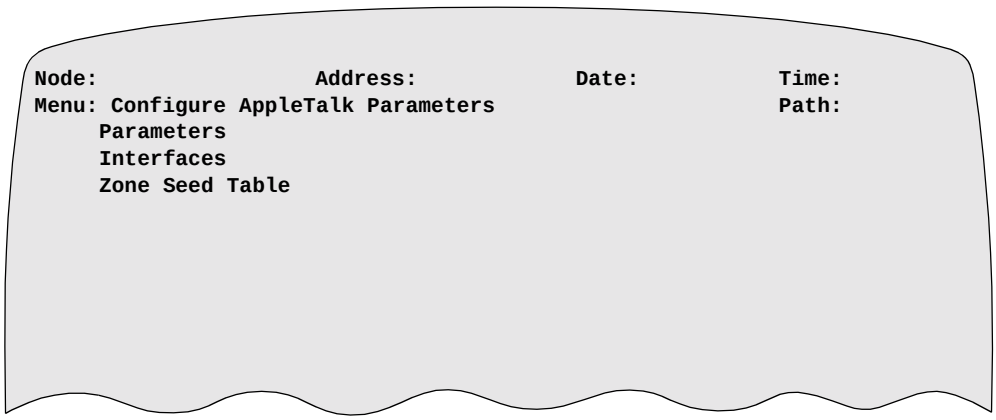

Figure 3. Configure AppleTalk Menu

Configuring Parameters Record

Introduction

This section describes configuration parameters that effect overall AppleTalk operation.

What You See in This Record

Figure 4 shows the Parameters record. If no CMEM records exist, the AppleTalk router operates as if the default values of the AppleTalk Parameters record were stored.

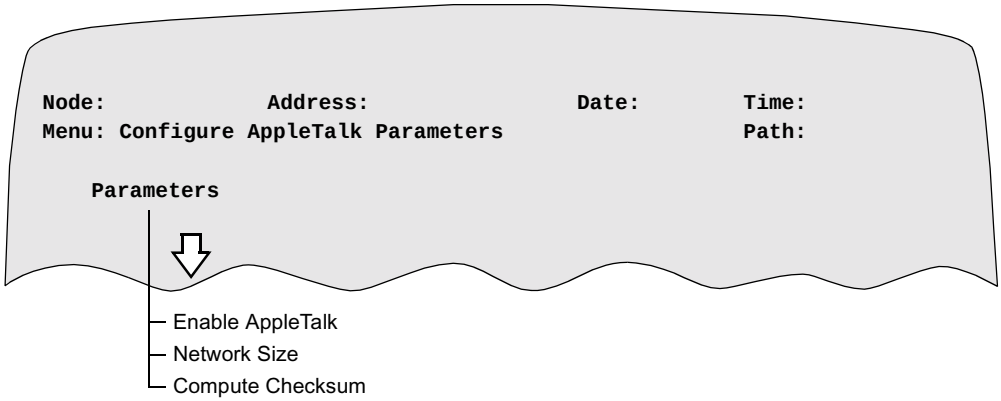

Figure 4. Parameters Record

Configuring record Parameters

Follow these steps to configure the Parameters record:

Step	*Action*	*Result/Description*
1	Select **Configure AppleTalk** from the Configure menu.	The Configure AppleTalk menu appears.
2	Select **Parameters**.	The Parameters record appears.
3	Configure the parameters and save the record by pressing the semicolon (**;**).	
4	Press **ESC** to return to the Configure AppleTalk menu when you have configured all parameters.	

Parameters

These are the parameters that make up the Parameters record:

Note

Unless otherwise indicated, perform a Node boot for changes to these parameters to take effect.

Enable AppleTalk

Range:	Enabled, Disabled
Default:	Disabled
Description:	Enables or disables operation of this product as an AppleTalk Internet router. When enabled, the Interfaces table for AppleTalk must be configured for proper operation.

Network Size

Range:	Small, Medium, Large, Huge
Default:	Small
Description:	The number of AppleTalk networks on the AppleTalk internet; controls how much memory is set aside for AppleTalk routing. • Small: Fewer than 100 networks • Medium: Fewer than 500 networks • Large: Fewer than 2000 networks • Huge: Fewer than 4000 networks Note the following: • Each network has a range of network numbers; a network with network numbers 11-15 counts as one network, not five. • If you set Network Size Parameter value too low, no zones are listed as being available within the Chooser menu. • Within statistics of the Vanguard routers that have Ethernet ports, the AppleTalk Routing Table shows all of the zones, including the network size parameter value. • Change the Network Size parameter to a larger value than is currently being used.

Compute Checksum

Range:	Enabled, Disabled
Default:	Enabled
Description:	Globally enables or disables the computation of checksums in a long Datagram Deliver Protocol (DDP) header. Checksum is never performed on data packets forwarded through the router. This is normally enabled. However, it may need to be disabled for interoperation with older AppleTalk equipment.

Configuring the Interfaces Record

Introduction

Every router interface that is to route AppleTalk must have one AppleTalk Interfaces record defined for it. This section describes how to configure the Interfaces parameters for the router's network interface.

What You See in This Record

Figure 5 shows the Interfaces record.

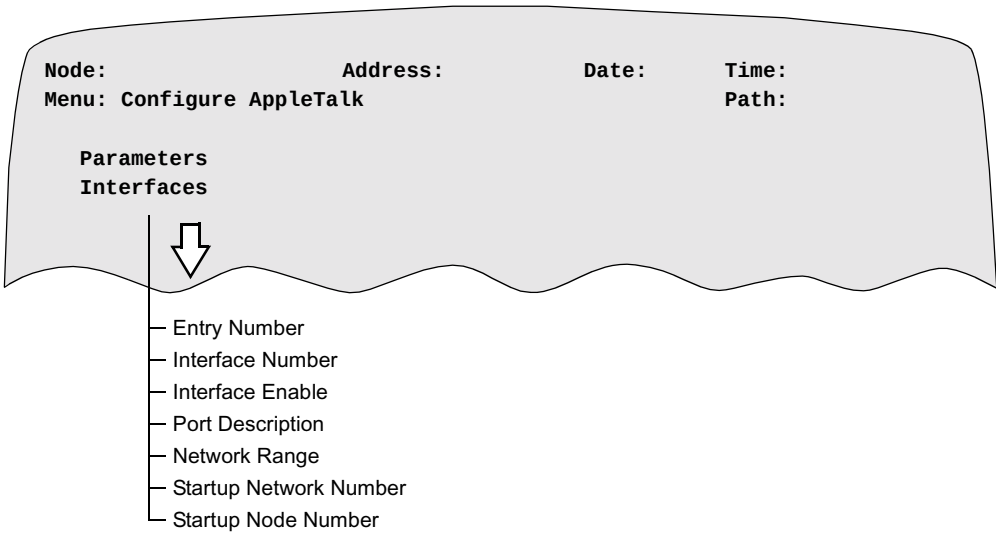

Figure 5. Interfaces Record

Configuring Interface Records

Follow these steps to configure the Interfaces record:

Step	*Action*	*Result/Description*
1	From the Configure Router menu, select **Configure AppleTalk**.	The Configure AppleTalk menu appears.
2	Select **Interfaces**.	The Interfaces record appears.
3	Configure the parameters and save the record.	
4	Press **ESC** to return to the Configure AppleTalk menu when you have configured all parameters.	The Startup Network Number is verified within the Network Range (if Network Range is given). Warnings appear if: • No default zone exists for this Interface. • The same Interface number exists in another Interface record.

Parameters

These are the parameters that make up the Interfaces record:

Entry Number

Range:	1 to 256
Default:	1
Description:	Entry number used to reference this table record.

Interface Number

Range:	1 to 36 (max interfaces)
Default:	0
Description:	The router interface number for this record. Each interface handling AppleTalk packets must have an interface record defined for it. Interface numbers 1 to 4 are reserved for LAN ports; interface numbers 5 and higher are used for WAN interfaces or “LAN connections.”

Interface Enable

Range:	Enabled, Disabled
Default:	Disabled
Description:	Enables or disables operation of AppleTalk routing on the interface.

Port Description

Range:	0 to 40
Default:	Blank
Description:	Assigns a text string to the interface. It is not used in port operation; it helps with port management.

Network Range

Range:	0, low-high (must each be between 1 and 65,279)
Default:	0
Description:	Each network has a range of network numbers, defined as low-high, where low is a number between 1 and 65,279, and high is a number between low and 65,279 (hex $FEFF). The network manager tells you the network range for this Ethernet segment. This parameter lets you have more than 254 devices on a single network segment. If you do not have more than 254 AppleTalk devices on the segment, then the starting and ending range can be the same. • If 0, the router starts up assuming the network range is unknown and discovers it from another router's RTMP messages. • If non-zero, then the router sets both the low and high network numbers for the range, acting as a seed for this interface; all the seed routers on an interface must agree on the range of network numbers. **Note** If an interface cannot support AppleTalk (if interface number ≥ 5), this parameter does not appear.

Startup Network Number

Range:	0, 1 to 65,279
Default:	0
Description:	• If 0, then the node chooses its network number for the given interface. • If non-zero, then the node attempts to use this number as its network number. If network range is 0, then this parameter must also be 0. Otherwise, this parameter must fall within the low to high network range specified above (see the Network Range parameter). **Note** If an interface cannot support AppleTalk (if the interface number is ≥ 5), this parameter does not appear.

Startup Node Number

Range:	0 to 253
Default:	0
Description:	• If 0, then the node chooses its node number for the given interface. • If non-zero, then the node attempts to use this number as its node number. However, if the node number is in use, a different node number is chosen. If network range is 0, then this parameter must also be 0. **Note** If an interface cannot support AppleTalk (if the interface number is ≥ 5), this parameter does not appear.

Configuring the Zone Seed Table

Introduction

This section describes how to configure the Zone Seed Table parameters. By configuring the Zone Seed Table, you define a table that contains all the zone lists for all the interfaces for which the router is a seed.

What You See in This Record

Figure 6 shows the Zone Seed Table.

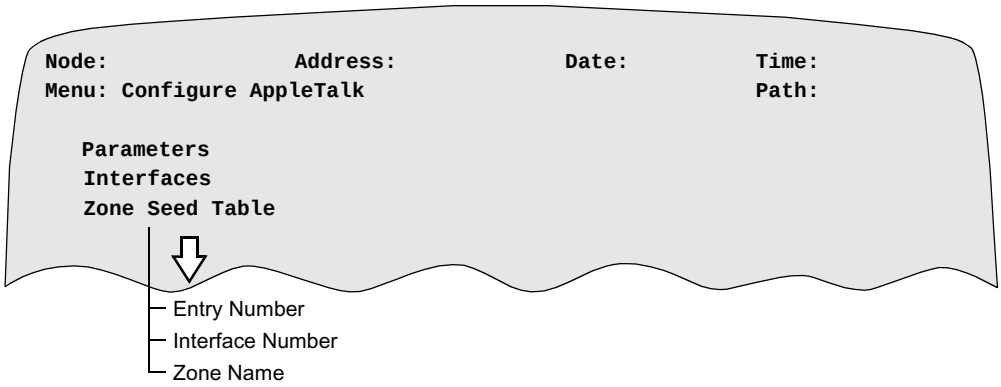

Figure 6. Zone Seed Table

Configuring the Zone Seed Table

Follow these steps to configure the Zone Seed Table:

Step	*Action*	*Result/Description*
1	Select **Configure AppleTalk** from the Configure Router menu.	The Configure AppleTalk menu appears.
2	Select **Zone Seed Table**.	The Zone Seed Table appears.
3	Configure the parameters and save the record.	
4	Press **ESC** to return to the Configure AppleTalk menu when you have configured all parameters.	These verifications are made: • No zone is assigned to a non-existent interface. That is, if an Interface Number has a zone list, then an interface configuration exists for that interface. • No zone is assigned to an interface that cannot support AppleTalk. • No zone is assigned to an interface with Zone Range of 0 (that is, to a non-seed router).

Parameters

These are the parameters that make up the Zone Seed Table record.

Entry Number

Range:	1 to 256
Default:	1
Description:	Entry number used to reference this table record.

Interface Number

Range:	1 to 4
Default:	1
Description:	The router interface number for this record.

Zone Name

Range:	1 to 32 characters
Default:	blank
Description:	If a zone name is entered, this router becomes the seed router for the network. Note these: • Configure at least one router on each network as the seed for the zone names. (A router configured to seed the network number also seeds the zone name, and vice-versa.) • Configure at least one zone name for an interface if its low and high network numbers are configured as non-zero. • The first zone name in the list for each interface is the default zone name for the interface. • To enter a non-ASCII character, enter: XX, where X is a hexadecimal digit (0-9, A-F, a-f).

Configuration Example

Introduction

This section contains a sample application configuration that you can use as a reference.

Note

This sample configuration application shows critical parameters only. You should be familiar with configuring operational software for Vanguard routers before configuring AppleTalk on a Vanguard. Refer to the preceding sections in this document for information on accessing and configuring AppleTalk parameters through the CTP. You can also refer to the *Vanguard Basic Configuration Manual* (Part Number T0113) for additional configuration information.

Description of the Configuration Example

Figure 7 shows a point-to-point setup of 6520 and a Vanguard 300 in an AppleTalk routing configuration in which AppleTalk Phase 2 is being run throughout the network. The Vanguard 6520 Node 100 and Vanguard 300 Node 200 route the AppleTalk protocol from one site to another. At Node 100, multiple zone names (Zone A and Zone B) are assigned to a single EtherTalk segment.

The Vanguard 6520 by default assigns the first configured zone name for the interface to the clients on the EtherTalk segment. Both the Vanguard 6520 and Vanguard 300 serve as seed routers for their EtherTalk segments. Node 100 places an autocall to Node 200. The Chooser window indicates what User Z sees upon selecting the AppleShare icon.

Note

AppleTalk can be configured only on a point-to-point LAN Connection. Group LAN Connections do not support AppleTalk.

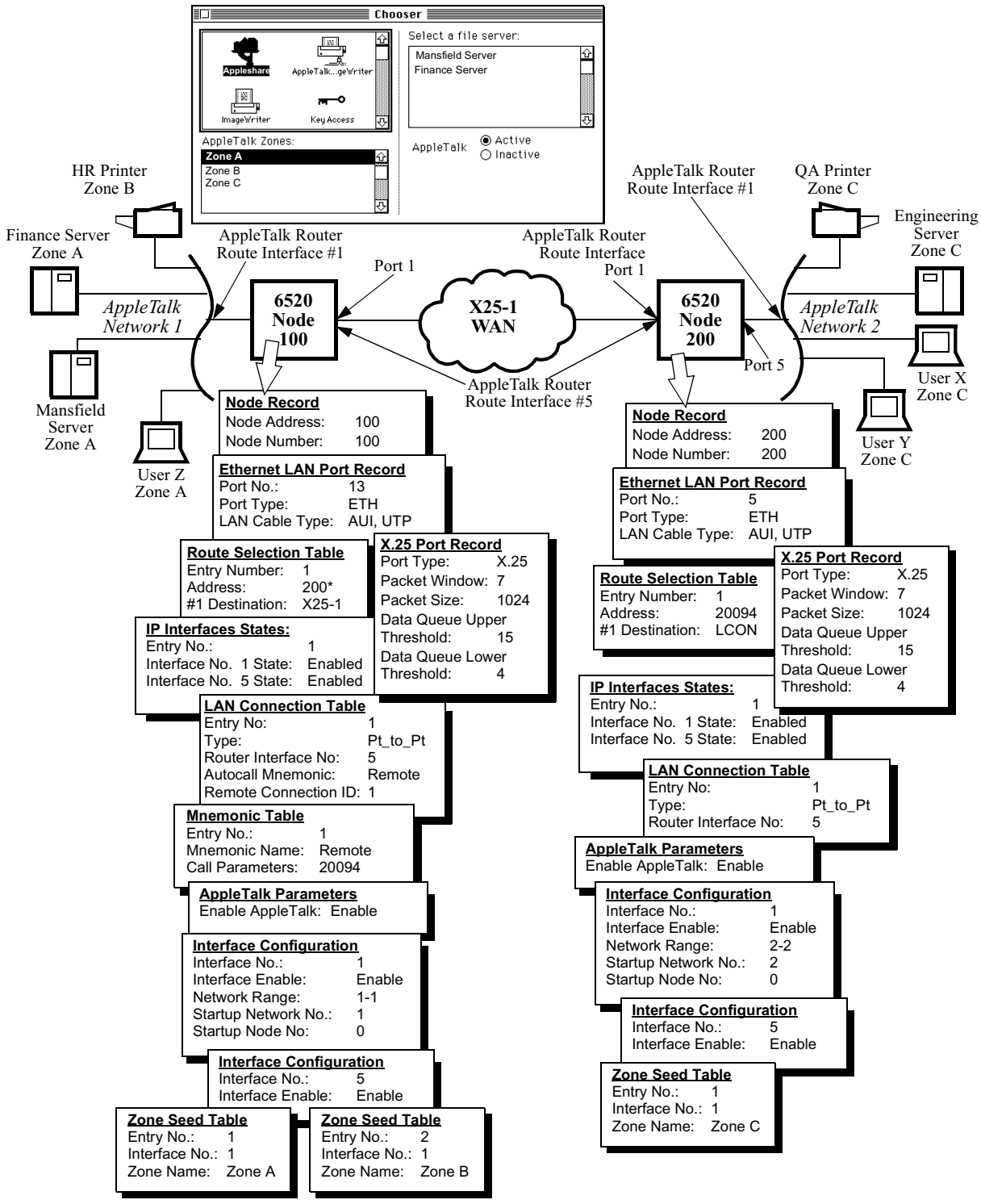

Figure 7. Point to Point AppleTalk Configuration Parameters

Configuring Node 100 for AppleTalk

Follow these configuration steps for the Vanguard 6520 nodes as shown in Figure 7.

For details on configuring the Node Record, Mnemonic Table, X.25 physical interfaces, as well as all other planned WAN router-to-router connections, see the *Vanguard Basic Configuration Manual* (Part Number T0113).

Step	Action
1	Configure the Node Record.
2	Configure the WAN port as X.25.
3	Configure LAN port 13 as an Ethernet port type.
4	Configure Network Services ->Route Selection Table for calls going out of node 100.
5	Configure LAN Connections->Configure LAN Connection Table.
6	Configure Network Services -> Mnemonic Table in the Vanguard 6520 node that is placing the LCON calls.
7	Configure the parameters in AppleTalk->Parameters to enable AppleTalk.
8	Configure interfaces 1 (LAN interface) and 5 (WAN interface) as enabled in the Configure Router->Configure AppleTalk->Interfaces Record.
9	Configure the parameters in Configure Router->Configure AppleTalk-> Zone Seed Table to create a seed router for the network.
10	Perform a Node (warm) boot to implement the configuration.

Configuring Node 200 for AppleTalk

Follow these configuration steps for the Vanguard 300 nodes as shown in Figure 7.

Step	Action
1	Configure the Node Record.
2	Configure the WAN port as X.25.
3	Configure LAN port 5 as Ethernet port type.
4	Configure Network Services ->Route Selection Table for LCON call coming into the node.
5	Configure Router->Configure IP Interface States of all router interfaces being used (1,5) to enabled.
6	Configure LAN Connections->Configure LAN Connection Table.
7	Configure the parameters in AppleTalk->Parameters to enable AppleTalk.
8	Configure interfaces 1 (LAN interface) and 5 (WAN interface) as enabled in the Configure Router->Configure AppleTalk->Interfaces Record.

Step	*Action (continued)*
9	Configure the parameters in Configure Router->Configure AppleTalk-> Zone Seed Table to create a seed router for the network.
10	Perform a Node (warm) boot to implement the configuration.

Verifying Configurations

User Z on AppleTalk Network 1 clicks on the Appleshare icon under Chooser. User Z would by default be assigned to Zone A, since Vanguard 6520 Node 100's first zone configured on interface 1 is Zone A.

User Z sees Zones A, B, and C on the Zone list. If user Z chooses Zone A, all resources that are assigned to Zone A appear, which would be the Mansfield Server and Finance Server.

If user Z chooses Zone C, the Engineering Server, and any shared directories on User X's and User Y's machines appear. Printers do not appear under the Chooser under Appleshare; they appear only under the printer chooser icons. At this point, User Z can log in to any of the shared resources.

Changing A Default Zone

One AppleTalk router interface can be configured to support multiple zones assigned to a single Ethertalk segment. The router defines the zones. By default, when an AppleTalk device comes up on a LAN, the Vanguard router assigns it to the first zone name entry that it has configured on that AppleTalk interface.

Step	*Action*	*Result*
1	If the router is configured for multiple zones on the same Ethertalk segment, select **Control Panels** from the Apple menu on a MacIntosh that is on the multiple Ethertalk zones segment.	The Control Panels menu appears.
2	Double-click the **Network** icon.	The Ethertalk icon appears under AppleTalk connection type.
3	Double-click the **EtherTalk** icon.	A dialog box appears with the current zone highlighted and list of available zones assigned to that Ethertalk segment. The message **Please Select this computer's AppleTalk zone** appears.
4	You can then change which default zone you belong to. Select the desired zone by highlighting it, then click **OK.**	The default zone is changed.

Statistics

Introduction

The following sections describe the AppleTalk statistics, which include:

- AppleTalk Interfaces
- AppleTalk Routing Table
- AppleTalk ARP Table
- AppleTalk Events
- Clear AppleTalk Events
- AppleTalk Memory Statistics

Accessing Statistics

Follow these steps to view AppleTalk statistics:

Step	*Action*	*Result*
1	Select **Status/Statistics** from the CTP Main menu.	The Status/Statistics menu appears.
2	Select **Router Stats** from the Status/Statistics menu.	The Router Stats menu appears as shown in Figure 8.
3	Select **AppleTalk Stats** from the Router Stats menu.	The AppleTalk Stats menu appears as shown in Figure 9.
4	Select the type of AppleTalk statistics you wish to view from the AppleTalk Stats menu	The statistics screen for that entry is displayed.

Router Stats Menu

Figure 8 shows the Router Stats menu. You can access AppleTalk Statistics from this menu:

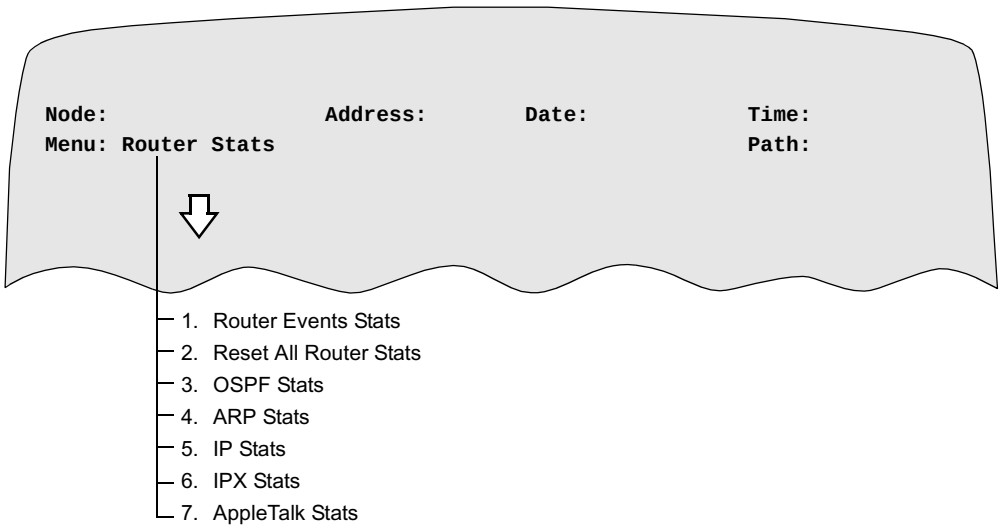

Figure 8. Router Stats Menu

AppleTalk Stats Screen

Figure 9 shows the AppleTalk Stats. You can select the type of statistics that you want to view:

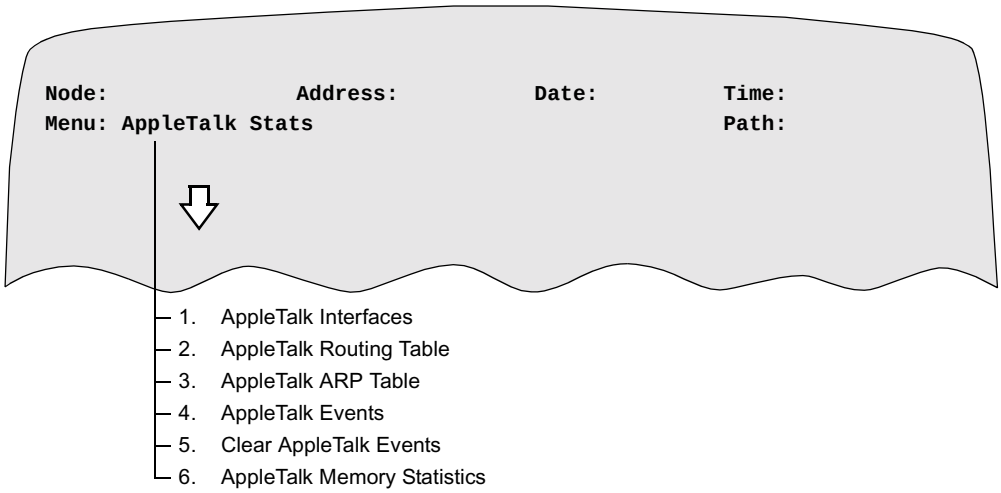

Figure 9. AppleTalk Stats Screen

Using AppleTalk Interfaces Statistics

Introduction

The AppleTalk Interfaces Statistics lists all enabled AppleTalk interfaces.

Example of AppleTalk Interface Statistics Screen

Figure 10 shows the AppleTalk Interfaces Statistics screen.

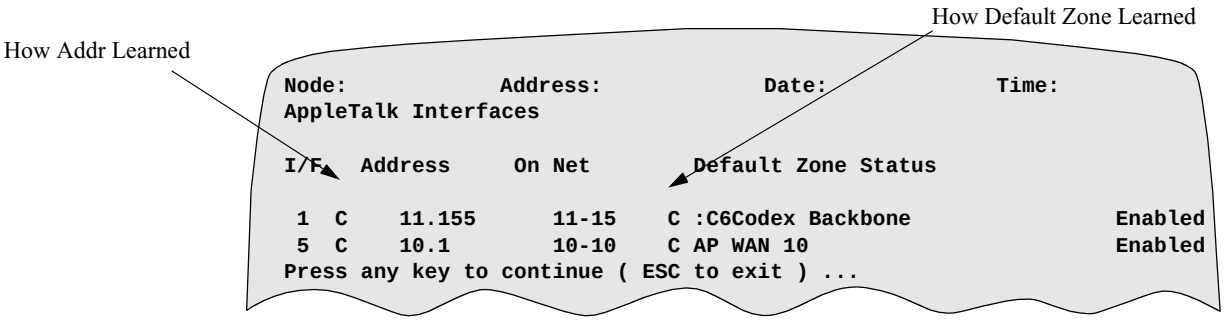

Figure 10. AppleTalk Interfaces Screen

Screen Terms

This table describes the terms used in the AppleTalk Interface Statistics screen:

Screen term	*Explanation*
I/F	The router interface number
How Address Learned	How the information was learned; possible values are: • Configured (C) • Learned (L) • Guessed (G)
How Default Zone Learned	How the information was learned; possible values are: • Configured (C) • Learned (L) • Guessed (G)
Address	Lists the address of the router on the Network in the format: net-number.node-number.
Default zone	The default zone for all services on the interface's network

Screen term	Explanation (continued)
Status	Interface status is: • Enabled • Disabled • Invalid (due to mismatch of a seed router) • Failed (cannot communicate this interface) The Status does not indicate the status of the router interface State Menu, which enables/disables a router interface for all protocols.

Using the AppleTalk Routing Table

Introduction

The AppleTalk Routing Table lists the Routing Table and Zone Information Table information.

Note

Information in your screen may differ from the example shown.

Example of AppleTalk Routing Table Screen

Figure 11 shows an example of the AppleTalk Routing Table screen:

```
Node:            Address:            Date:          Time:
AppleTalk Routing Table

AppleTalk   Routing
Total Routes: 5
Dest Net    Cost        I/F    State    Next Hop  Zones
...,
11-15       0           1      Dir      10.0      :C6Codex_Backbone,
                                                  :C6Warren_Zone
10-10       0           1      Dir      50.0      AP WAN 10
10-10       0           1      Dir      50.0      AP WAN 10
21-25       1           1      Good     510.2     C3_Zone_B, C3_Platform
31-35       2           1      Susp     510.2

Press any key to continue ( ESC to exit ) ...
```

Figure 11. AppleTalk Routing Table Screen

Screen terms

This table describes the terms used in the AppleTalk Routing Table screen:

Screen term	Explanation
Total Routes	Shows the number of configured routes.
AppleTalk Dest Net	The network range to which this router can send packets.
Routing Cost	The number of routers the data packet crosses to reach its destination.
Address Table State	• Good (non-Direct Routes only). Routes are marked Good whenever an RTMP data packet says that a particular route is valid. RTMP packets are transmitted every 10 seconds. • Susp (non-Direct Routes only). Good Routes are marked Suspect every 20 seconds. Given these first two rules, "valid" routes oscillate between the good and suspect states. • Bad (non-Direct Routes only). Routes are marked Bad if no data comes from that network for 20 seconds. **Note** Routes are removed from the table if no data comes from that network for 60 seconds.
Next Hop	The AppleTalk network number and node number of another AppleTalk router that is on a directly attached network. The Vanguard router forwards packets for the destination network to this next hop router.
I/F	The interface number of the next hop router; for direct routes, the Next Hop is 0.0.
Zones	Zones implemented on the Destination Net.

Using the AppleTalk ARP Table Screen

Introduction

When an AppleTalk network comes up initially, it sends an ARP broadcast packet to obtain the hardware MAC layer address of a particular device on a particular zone and network to which it wants to send. The AppleTalk ARP Table screen shows how an AppleTalk device's network and node number maps to its MAC address.

Example of AppleTalk ARP Table Screen

Figure 12 shows an example of the AppleTalk ARP Table screen:

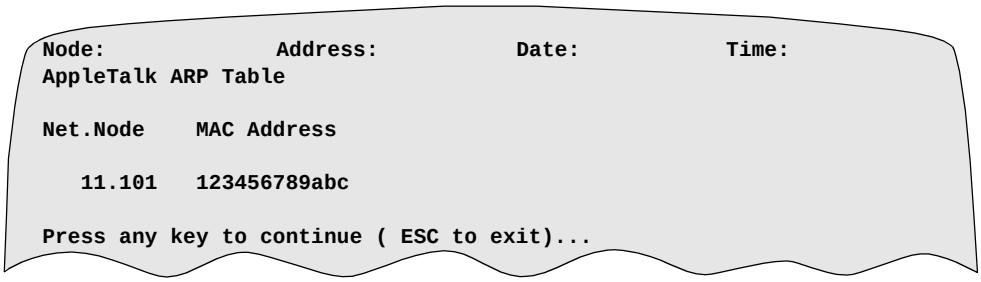

Figure 12. AppleTalk ARP Table Screen

Screen Terms

This table describes the terms used in the AppleTalk ARP Table screen:

Screen term	*Explanation*
Net.Node	The network and node numbers of the device to which packets are to be sent.
MAC Address	The physical MAC layer hardware address of the device to which packets are to be sent.

Using the AppleTalk Event Counters Screen

Introduction

The AppleTalk Event Counters screen summarizes all data packet flows.

Example of AppleTalk Event Counters Screen Page 1

Figure 13 shows Page 1 of the AppleTalk Event Counters screen:

```
Node:            Address:            Date:            Time:
AppleTalk Event Counters

   Count     Description                                  Code
--------  ----------------------------------------     ------------
########  Total DDP pkts Originating in this node       ddpOutRequests
########  Total Short DDP pkts sent by this node        ddpOutShorts
########  Total Long DDP pkts send by this node         ddpOutLongs
########  Total DDP pkts recieved                       ddpInReceives
########  Total DDP pkts this node tried to forward     ddpForwRequests
########  Total DDP pkts destined for this node         ddpInLocalDatagrams

Press any key to continue ( ESC to exit ) ...
```

Figure 13. AppleTalk Event Counters Screen—Page 1

Page 1 Screen Terms

This table describes the terms used in Page 1 of the AppleTalk Event Counters screen:

Screen term	*Explanation*
ddpOutRequests	The total number of DDP datagrams supplied to DDP by local DDP clients in requests for transmission.
ddpOutShorts	The total number of short DDP datagrams transmitted from this entity. **Note** This should always be 0 for Ethertalk and Tokentalk.
ddpOutLongs	The total number of long DDP datagrams transmitted from this entity.
ddpInReceives	The total number of input datagrams received by DDP, including those received in error.
ddpInLocalDatagrams	The total number of input DDP datagrams for which this entity was their final DDP destination.

Screen term	*Explanation (continued)*
ddpForwRequests	The number of input datagrams for which this entity was not their final DDP destination, as a result of which an attempt was made to find a route to forward them to that final destination.

Example of AppleTalk Event Counters Screen Page 2

Figure 14 shows Page 2 of the AppleTalk Event Counters screen:

```
Node:            Address:            Date:             Time:
AppleTalk Event Counters

  Count       Description                                  Code
--------  ---------------------------------------     ------------
####### No Port Hdlr existed for received pkt         ddpNoProtocolHandlers
####### Pkts dropped because no route found           ddpOutNoRoutes
####### Pkts dropped because too short                ddpTooShortErrors
####### Pkts dropped because too long                 ddpTooLongErrors
####### Broadcast Pkts not destined for this node     ddpBroadcastErrors
####### Short DDP Hdr, but this node not final dest   ddpShortDDPErrors
####### pkts dropped because hop cnt would exceed 15  ddpHopCountErrors
####### pkts dropped due to checksum error            ddpChecksumErrors
####### Total number of echo requests                 atechoRequests
####### Total number of echo replies                  atechoReplies

Press any key to continue ( ESC to exit ) ...
```

Figure 14. AppleTalk Event Counters Screen—Page 2

Page 2 Screen Terms

This table describes the terms used in Page 2 of the AppleTalk Event Counters screen:

Screen term	Explanation
ddpNoProtocolHandlers	The total number of DDP datagrams addressed to this entity that were addressed to an upper layer protocol for which no protocol handler existed.
ddpOutNoRoutes	The total number of DDP datagrams dropped because a route could not be found to their final destination.
ddpTooShortErrors	The total number of input DDP datagrams dropped because: • The received data length was less than the data length specified in the DDP header. or • The received data length was less than the length of the expected DDP header.
ddpTooLongErrors	The total number of input DDP datagrams dropped because: • The received data length was greater than the data length specified in the DDP header. or • They exceeded the maximum DDP datagram size.
ddpBroadcastErrors	The total number of input DDP datagrams dropped because this entity was not their final destination, and they were addressed to the link level broadcast.
ddpShortDDPErrors	The total number of input DDP datagrams dropped because this entity was not their final destination, and their type was short DDP.
ddpHopCountErrors	The total number of input DDP datagrams dropped because this entity was not their final destination and their hop count would exceed 15.
ddpChecksumErrors	The total number of input DDP datagrams dropped because of a checksum error.
atechoRequests	The number of AppleTalk echo requests received.
atechoReplies	The number of AppleTalk echo replies sent.

Using the Clear AppleTalk Events Statistics

Screen term	Explanation
ddpNoProtocolHandlers	The total number of DDP datagrams addressed to this entity that were addressed to an upper layer protocol for which no protocol handler existed.
ddpOutNoRoutes	The total number of DDP datagrams dropped because a route could not be found to their final destination.
ddpTooShortErrors	The total number of input DDP datagrams dropped because: • The received data length was less than the data length specified in the DDP header. or • The received data length was less than the length of the expected DDP header.
ddpTooLongErrors	The total number of input DDP datagrams dropped because: • The received data length was greater than the data length specified in the DDP header. or • They exceeded the maximum DDP datagram size.
ddpBroadcastErrors	The total number of input DDP datagrams dropped because this entity was not their final destination, and they were addressed to the link level broadcast.
ddpShortDDPErrors	The total number of input DDP datagrams dropped because this entity was not their final destination, and their type was short DDP.
ddpHopCountErrors	The total number of input DDP datagrams dropped because this entity was not their final destination and their hop count would exceed 15.
ddpChecksumErrors	The total number of input DDP datagrams dropped because of a checksum error.
atechoRequests	The number of AppleTalk echo requests received.
atechoReplies	The number of AppleTalk echo replies sent.

Introduction

The Clear AppleTalk Events statistics screen is an informational screen that confirms that all AppleTalk statistics have been cleared.

Example of Clear AppleTalk Events Screen

Figure 15 shows an example of the Clear AppleTalk Events screen:

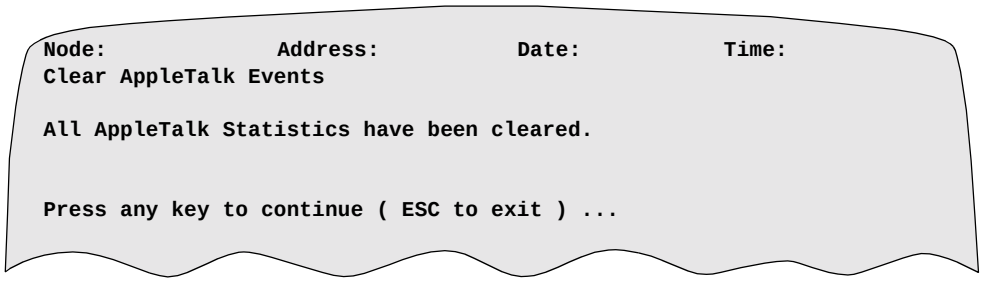

Figure 15. Clear AppleTalk Events Screen

Using AppleTalk Memory Statistics

Introduction

The AppleTalk Memory Statistics screen can be used to troubleshoot memory in use while running AppleTalk. It describes how much memory is set aside for AppleTalk routing.

Example of AppleTalk Memory Screen

Figure 16 shows an example of the AppleTalk Memory Statistics screen:

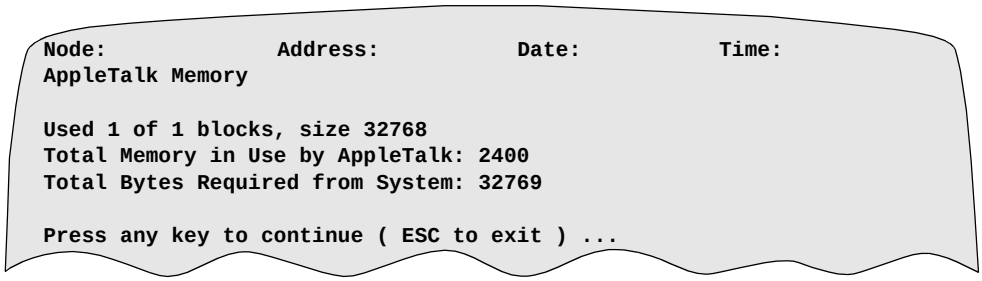

Figure 16. AppleTalk Memory Screen

Screen Terms

This table describes the terms used in the AppleTalk Memory Statistics screen:

Screen term	*Explanation*
Used 1 of 1 Blocks	The number of internal memory blocks used.
Total Memory in Use by AppleTalk	The amount of memory used by AppleTalk, determined by the value configured in the Network Size parameter.
Total Bytes Required from System	The amount of system memory AppleTalk requires.

Diagnostics

Introduction

AppleTalk Ping uses the AppleTalk Echo Protocol.

Limitations

A node that only contains WANs (on LANs) cannot be Ping-ed, and it cannot initiate a Ping because a node that contains only WANs cannot be addressed.

Changes to the Diagnostics Menu

AppleTalk Ping may be found in the Diagnostics menu (Figure 17):

```
Node:              Address:          Date:              Time:
Menu: Diagnostics                                       Path:

    Local Loopback
    V.54 Loopback 2
    V.54 Loopback 3
    Fatal Error Reports
    Logged Alarms
    Startup Diagnostics
    DSU Internal Loopback
    DSU Internal and External Loopbacks
    Start Delay Measurement
    Stop Delay Measurement
    Display Delay Summary
    IP Ping
    AppleTalk Ping
    Telnet
```

Figure 17. Diagnostics Menu Changes

AppleTalk Ping Menu

Figure 18 shows an example of the AppleTalk Ping menu:

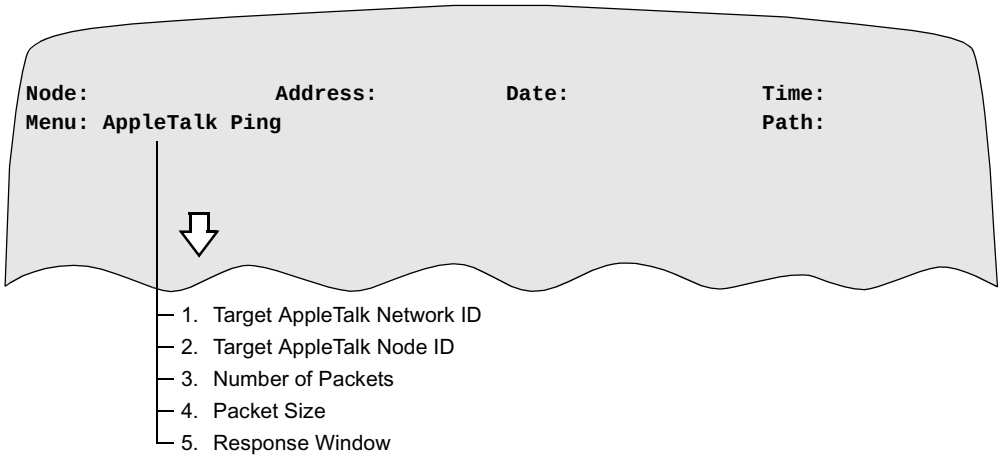

Figure 18. AppleTalk Ping Menu

AppleTalk Ping Parameters

These parameters make up the AppleTalk Ping menu:

Target AppleTalk Network ID

Range:	1 to 65,279
Default:	None (Enter valid info, ESC, or ^T.)
Description:	The AppleTalk Network ID of the node to be Pinged.

Target AppleTalk Node ID

Range:	1 to 253
Default:	None (Enter valid info, ESC, or ^T.)
Description:	The AppleTalk Node ID of the node to be Pinged.

Number of Packets

Range:	1 to 65,535
Default:	1
Description:	Number of Ping packets is an integer number from 1 to 65,535.

Packet Size

Range:	8 to 586
Default:	4
Description:	Size of Ping packets is an integer number.

Response Window

Range:	1 to 60
Default:	1
Description:	Specifies the time (in seconds) that AppleTalk waits for a Ping response before deciding that the Ping failed. It can be used to improve Ping statistics for networks with high delay characteristics.

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