About the AppleTalk Manager-2 New routines for AppleTalk

AppleTalk is a communications network system including personal computer workstations, computers acting as file servers and print servers, printers, and a variety of types of communications hardware and software. the **AppleTalk Manager** provides an interface to this communications network system for applications running on Macintosh computers.

About the AppleTalk Manager-2 describes:

- new routines for the .MPP, .ATP, and .XPP device drivers
- a new wildcard character for use with the Name-Binding Protocol
- a new operating-system queue, called the AppleTalk Transition Queue
- a new set of OS utilities, collectively called **The LAP Manager**
- the application interface routines provided by a new AppleTalk protocol, the **AppleTalk DSP (ADSP)**
- **The .ENET driver** and the routines your application can use to control this driver

The **AppleTalk Manager** describes the routines that your application can use to send and receive information within an AppleTalk network system. Because the AppleTalk network system includes both hardware and software-and because the software includes not only the **AppleTalk Manager** but also file servers, print servers, internet routers, drivers for circuit cards, and so forth-the information here constitutes only a small part of the body of literature documenting AppleTalk.

For a detailed description of AppleTalk protocols, see *Inside AppleTalk,* second edition. For a complete description of **The LAP Manager**, EtherTalk, and alternate AppleTalk connections, see the *Macintosh AppleTalk Connections Programmer's Guide*. To learn how to install and operate an AppleTalk internet, see the *AppleTalk Internet Router Administrator's Guide* and the *AppleTalk Phase 2 Introduction and Upgrade Guide.* For an introduction to the hardware and software of an entire AppleTalk network, see *Understanding Computer Networks* and the *AppleTalk Network System Overview.* For information on designing circuit cards and device drivers for Macintosh computers, see *Designing Cards and Drivers for the Macintosh Family,* second edition.

The changes to that have most recently been made to AppleTalk other than **AppleTalk DSP (ADSP)** and, **The LAP Manager** are collectively referred to as **AppleTalk Phase 2.** (When necessary for purposes of differentiation, the previous version of AppleTalk is referred to as AppleTalk Phase 1.) The Phase 2 versions of the AppleTalk drivers are included as part of system software version 7.0 and can be installed on any Macintosh computer other than the Macintosh128K, Macintosh 512K, Macintosh 512K enhanced, and Macintosh XL computers. If you want to provide AppleTalk Phase 2 drivers with your product, you must obtain a license from Apple Software Licensing.

The **AppleTalk Manager** includes a number of protocols that are implemented in various device drivers. The **AppleTalk Manager** also includes **The LAP Manager** (which interfaces the AppleTalk link access protocols to the higher-level AppleTalk protocols) and hardware device

drivers for specific data links. Software that supports AppleTalk data links is contained in files of type 'adev', referred to as *AppleTalk connection files*. This section lists the new features of AppleTalk, describes the organization of the **AppleTalk Manager**, and briefly discusses what each component of the **AppleTalk Manager** does.

Changes to The AppleTalk Manager

The AppleTalk features that are new or improved include:

- a new .MPP driver function that returns information about **The .MPP Driver** (see **Getting Information About the .MPP Driver** in **The .MPP Driver)**

- a new Name-Binding Protocol (NBP) wildcard character that can substitute for one or more characters in AppleTalk names (see **A New NBP Wildcard Character** in **PGetAppleTalkInfo)**

- **The LAP Manager**, a set of operating-system utilities that provide a standard interface between the AppleTalk protocols and the **data links** used by AppleTalk, such as LocalTalk, EtherTalk, and TokenTalk (see **The LAP Manager)**

- the **AppleTalk Transition Queue**, an operating-system queue that can notify your application each time an AppleTalk driver is opened or closed or each time certain other transitions occur

- an implementation of parts of the IEEE 802.2 protocol, which allows you to attach and detach your own protocol handlers for EtherTalk data packets (see **LAP Manager 802.2 Protocol)**

- new .ATP driver functions that allow you to set a value for the .ATP release timer and to cancel all pending asynchronous calls to the **ATPGetRequest** function for a specific socket (for detailed information, see **The .ATP Driver)**

- new .XPP driver functions that provide information from ZIP about zones (see **The .XPP Driver)**

- improvements to the AppleTalk protocols that allow a single network, other than LocalTalk, to contain more than one zone (see **How to Get Zone Information)**

- the **AppleTalk Data Stream Protocol (ADSP)**, which provides full-duplex data stream communications for use by applications (see the section, **AppleTalk Data Stream Protocol (ADSP))**

- **The .ENET Driver**, an Ethernet driver for the EtherTalk NB card that is manufactured by Apple Computer, Inc. (for detailed information, see **The .ENET Driver)**

AppleTalk Protocols

The **AppleTalk Manager** includes the following protocols:

- LocalTalk Link Access Protocol (LLAP)

- EtherTalk Link Access Protocol (ELAP)
- TokenTalk Link Access Protocol (TLAP)
- Datagram Delivery Protocol (DDP)
- Routing Table Maintenance Protocol (RTMP)
- appleTalk Transaction Protocol (ATP)
- Name-Binding Protocol (NBP)
- appleTalk Echo Protocol (AEP)
- Zone Information Protocol (ZIP)
- AppleTalk Session Protocol (ASP)
- **AppleTalk Data Stream Protocol (ADSP)**
- AppleTalk Filing Protocol (AFP)

The LocalTalk Link Access Protocol, EtherTalk Link Access Protocol, TokenTalk Link Access Protocol, and other link access protocols provide interfaces between the **AppleTalk Manager** and the different types of data link hardware used by AppleTalk.

> **Note:** The LocalTalk Link Access Protocol (LLAP) was originally called the AppleTalk Link Access Protocol (ALAP). With the addition of the EtherTalk Link Access Protocol (ELAP) and other link access protocols, this protocol was renamed to indicate the specific data link it supports.

> **Note:** The various AppleTalk protocols are sets of rules, not computer programs, and so can be implemented in many different ways on many different systems. All of the AppleTalk protocol functions that you can address or control from a Macintosh application are implemented as Macintosh device drivers or managers. Many other features of these protocols are implemented in software located only on internet routers that are not used to run general applications. Some parts of protocols are implemented by server software such as file servers and print servers. Therefore, when **About The AppleTalk Manager** refers to a protocol as **‘‘**doing**’’** or **‘‘**controlling**’’** something, you should understand the statement to mean that some program that implements the protocol actually carries out the operation.

As shown, a **link access protocol** controls the access of the node to the network hardware and makes it possible for many nodes to share the same communications hardware. Each link access protocol assigns a node ID to the node and decodes the node addresses of messages it receives. A link access protocol provides node-to-node delivery of data packets. Examples of link access protocols include the LocalTalk Link Access Protocol, the EtherTalk Link Access Protocol, and the TokenTalk Link Access Protocol.

Whereas earlier implementations of AppleTalk were restricted to one 16-bit network number per network (that is, one network number for all nodes connected with no intervening routers) and 254 nodes per network number,

AppleTalk Phase 2 allows more than one network number for each network (other than LocalTalk, which is still limited to one network number per network). A network of a type that allows more than one network number is known as an **extended network.** Each node in an extended network must now be specified by both its 16-bit network number and its 8-bit node ID. In principle, each network (other than LocalTalk) can now have over 16 million nodes. In any specific implementation, the hardware or software might limit the network to fewer nodes.

The **Datagram Delivery Protocol (DDP)** provides socket-to-socket delivery of data packets within an AppleTalk internet. The address of a DDP packet includes the socket number, node ID, and network number.

The **Routing Table Maintenance Protocol (RTMP)** is used by routers on an AppleTalk internet to determine how to forward a data packet to the network number to which it is addressed. The RTMP implementation on a router maintains a table, called a **routing table,** that specifies the shortest path to each possible destination network number. The AppleTalk protocol software in a workstation (that is, a node other than a router) contains only a small part of RTMP, called the **RTMP stub,** that DDP uses to determine the network number (or range of network numbers) of the network cable to which the node is connected and to determine the network number and node ID of one router on that network cable. There is no application interface to the RTMP stub.

The **AppleTalk Transaction Protocol (ATP)** provides reliable delivery of data by retransmitting any data packets that are lost. ATP also ensures that data packets are delivered in the correct sequence. ATP is a **transaction-based protocol,** meaning that one socket client transmits a request for some action and the other socket client carries out the action and transmits a response. Although-as you can see from the AppleTalk Protocols figure-the **AppleTalk Manager** provides high-level protocols that are clients of ATP, many applications use ATP directly to transmit data over an AppleTalk internet.

The **Name-Binding Protocol (NBP)** maintains a table that contains the internet address and name of each entity in the node that is visible to other entities on the internet (that is, each entity that has registered a name with NBP). The **internet address** includes the socket number, node ID, and network number. The **name** consists of three fields: the object, type, and zone. The **object** and **type** are assigned by the entity itself and can be anything the user or application assigns. A **zone** is a logical grouping of a subset of the nodes on the internet. The zone field of the name is the zone in which the node resides.

NBP also allows its clients to obtain the internet address of any network-visible entity in the internet by providing its name. NBP maps this name to an internet address, thus providing the link between the user-supplied name for an entity and the internet address that is used by DDP to send and receive data packets.

The **AppleTalk Echo Protocol (AEP)** listens for special packets sent by other nodes and, when it receives such a packet, echoes it back to the sender. AEP is used by some clients of DDP to determine whether another node (known to have AEP) can be accessed over the inter-net, and to determine how long it takes a packet to reach another node. There is no application interface to AEP.

The **Zone Information Protocol (ZIP)** maintains a table in each router, called the *zone information table,* that lists the relationships between zone names and networks. In AppleTalk Phase 2, a single network number can be associated with more than one zone name, or a single zone name can be associated with more than one network. You can use .XPP driver routines to obtain information from ZIP.

The **AppleTalk Session Protocol (ASP)** sets up and maintains sessions between a workstation and a server. A **session** consists of a logical (as opposed to physical) connection between two entities on the internet. ASP is a nonsymmetrical protocol; that is, only one of the two entities involved in the session (the workstation) can send commands. The other entity (the server) is restricted to responding to the commands. ASP is used by the AppleTalk Filing Protocol, for example, to allow a user to manipulate files on a file server. As long as the session is open, the workstation can request directory information, change filenames, and so forth. The file server must respond to the workstation's commands and cannot initiate any actions on its own.

AppleTalk DSP (ADSP) appears to its clients to maintain an open pipeline between two entities on the internet. Either entity can write a stream of bytes to the pipeline or read data bytes from the pipeline. **ADSP** is a **symmetrical protocol;** that is, the two clients at either end of the connection are equal and can perform exactly the same operations. **ADSP** is especially useful for exchanging information between two equal entities, as in a telephone communications network, or as required by a terminal emulation program for sending or receiving a continuous stream of data. Because **ADSP**, like all other high-level AppleTalk protocols, is a client of DDP, the data is actually sent as data packets. This allows **ADSP** to correct transmission errors in a way that would not be possible for a true data stream connection. Thus, **ADSP** retains many of the advantages of a transaction-based protocol while providing to its clients a full-duplex data stream.

The **AppleTalk Filing Protocol (AFP)** provides an interface between an application and a file server. AFP is a client of ASP and is used to access AppleShare file servers on Macintosh computer workstations. When the user opens a session with an AppleShare file server over an internet, the session appears to any application running on the workstation that uses **File Manager** routines as if the files on the file server were located on a disk drive connected to the workstation (see **AFP Implementation**.)

AppleTalk Device Drivers, AppleTalk Connection Files & LAP Mgr

A protocol is only a set of rules, not a computer program. The various AppleTalk protocols are implemented as Macintosh device drivers, including:

- **The .MPP Driver**, which implements LLAP, DDP, the RTMP stub, NBP, and AEP
- **The .ATP Driver**, which implements ATP
- **The .XPP driver**, which implements ASP and the workstation portions of ZIP and AFP
- **The .DSP Driver**, which implements **ADSP**
- **The .ENET Driver**, which implements an interface to the Ethernet

data link

A Macintosh computer on an AppleTalk network can also include one or more AppleTalk connection files. An **AppleTalk connection file** has file type 'adev' and contains a link access protocol implementation for a data link (ELAP for EtherTalk, for example). **The LAP Manager** makes it possible for the user to select among AppleTalk connection files by using the Network control panel to specify which network is to be used for the node's AppleTalk connection.

The AppleTalk connection file and **The LAP Manager** work together with the Network control panel (Network 'cdev') file. When the user selects a connection from the Network control panel, **The LAP Manager** routes AppleTalk communications through the selected link access protocol and hence through the selected hardware.

Each of the AppleTalk device drivers, **The LAP Manager**, and AppleTalk connection files implements one or more AppleTalk protocols.