Network Working Group
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The PPP AppleTalk Control Protocol (ATCP)

Status of this Memo

This RFC specifies an IAB standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "IAB Official Protocol Standards" for the standardization state and status of this protocol. Distribution of this memo is unlimited.

Abstract

The Point-to-Point Protocol (PPP) [1] provides a standard method of encapsulating Network Layer protocol information over point-to-point links. PPP also defines an extensible Link Control Protocol, and proposes a family of Network Control Protocols (NCPs) for establishing and configuring different network-layer protocols.

This document defines the NCP for establishing and configuring the AppleTalk Protocol [3] over PPP.

This memo is a joint effort of the AppleTalk-IP Working Group and the Point-to-Point Protocol Working Group of the Internet Engineering Task Force (IETF). Comments on this memo should be submitted to the ietf-ppp@ucdavis.edu mailing list.

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1. Introduction

PPP has three main components:

1. A method for encapsulating datagrams over serial links.

2. A Link Control Protocol (LCP) for establishing, configuring, and testing the data-link connection.

3. A family of Network Control Protocols (NCPs) for establishing and configuring different network-layer protocols.

In order to establish communications over a point-to-point link, each end of the PPP link must first send LCP packets to configure and test the data link. After the link has been established and optional facilities have been negotiated as needed by the LCP, PPP must send NCP packets to choose and configure one or more network-layer protocols. Once each of the chosen network-layer protocols has been configured, datagrams from each network-layer protocol can be sent over the link.

The link will remain configured for communications until explicit LCP or NCP packets close the link down, or until some external event occurs (an inactivity timer expires or network administrator intervention).

2. A PPP Network Control Protocol (NCP) for AppleTalk

The AppleTalk Control Protocol (ATCP) is responsible for configuring, enabling, and disabling the AppleTalk protocol modules on both ends of the point-to-point link. ATCP uses the same packet exchange machanism as the Link Control Protocol (LCP). ATCP packets may not be exchanged until PPP has reached the Network-Layer Protocol phase. ATCP packets received before this phase is reached should be silently discarded.

The AppleTalk Control Protocol is exactly the same as the Link Control Protocol [1] with the following exceptions:

Frame Modifications

The packet may utilize any modifications to the basic frame format which have been negotiated during the Link Establishment phase.

Data Link Layer Protocol Field

Exactly one ATCP packet is encapsulated in the Information field of a PPP Data Link Layer frame where the Protocol field indicates type hex 8029 (AppleTalk Control Protocol).

Code field

Only Codes 1 through 7 (Configure-Request, Configure-Ack, Configure-Nak, Configure-Reject, Terminate-Request, Terminate-Ack and Code-Reject) are used. Other Codes should be treated as unrecognized and should result in Code-Rejects.

Timeouts

ATCP packets may not be exchanged until PPP has reached the Network-Layer Protocol phase. An implementation should be prepared to wait for Authentication and Link Quality Determination to finish before timing out waiting for a Configure-Ack or other response. It is suggested that an implementation give up only after user intervention or a configurable amount of time.

Configuration Option Types

ATCP has a distinct set of Configuration Options, which are defined below.

2.1. Sending AppleTalk Datagrams

Before any AppleTalk packets may be communicated, PPP must reach the Network-Layer Protocol phase, and the AppleTalk Control Protocol must reach the Opened state.

Unless otherwise negotiated (via option 4), exactly one AppleTalk packet is encapsulated in the Information field of a PPP Data Link Layer frame where the Protocol field indicates type hex 0029 (AppleTalk).

Note that the negotiation of compression may imply the use of different encapsulation and hence different protocol fields. These different protocol fields imply packet types which are sub-protocols of the base AppleTalk NCP.

An encapsulated AppleTalk packet begins with an extended DDP (Datagram Delivery Protocol) header -- also known as a Long DDP header. The maximum length of a DDP datagram is 599 octets.

Since there is no standard method for fragmenting and reassembling

AppleTalk datagrams, it is required that PPP links supporting AppleTalk allow at least 599 octets in the information field of a data link layer frame.

2.2. Half-Routers

One model for routers in [3] is two remote AppleTalk routers linked as "half-routers" without a Node ID or Network number assigned to either side of the link. When acting as half-routers, the only effect on transported packets is that the hop count is incremented when it is received over the link. Routing updates received over a half-router link should also increment the hop count of routing table updates.

As part of normal operation, AppleTalk will send RTMP Routing updates every 10 seconds.

3. ATCP Configuration Options

ATCP Configuration Options allow negotiation of desirable AppleTalk parameters. ATCP uses the same Configuration Option format defined for LCP [1], with a separate set of Options.

The most up-to-date values of the ATCP Option Type field are specified in the most recent "Assigned Numbers" RFC [2]. Current values are assigned as follows:

1 AppleTalk-Address

2 Routing-Protocol

3 Suppress-Broadcasts

4 AT-Compression-Protocol

5 RESERVED

6 Server-information

7 Zone-information

8 Default-Router-Address

3.1. AppleTalk-Address

Description

This Configuration Option provides a way to negotiate the AppleTalk network and node number to be used on the local end of the link. It allows the sender of the Configure-Request to state which AppleTalk-address is desired, or to request that the peer provide the information. The peer can provide this information by NAKing the option, and returning a valid AppleTalk-address.

If negotiation about the remote AppleTalk-address is required, and the peer did not provide the option in its Configure-Request, the option SHOULD be appended to a Configure-Nak. The value of the AppleTalk-address given must be acceptable as the remote AppleTalk-address, or indicate a request that the peer provide the information.

By default, no AppleTalk address is assigned. A network or node number specified as zero in a Configure-Request shall be interpreted as requesting the remote end to specify a value via a Configure-Nak. A network or node number specified as zero in a Configure-Ack shall be interpreted as agreement that no value exists.

An implementation which requires that no AppleTalk addresses be assigned (such as a intermediate system to intermediate system "half-routing") MUST Configure-Reject all AppleTalk-Address Configuration Options.

An implementation which requires that AppleTalk addresses be assigned to it (such as a end system) MUST fail configuration if the remote side Configure-Rejects all AppleTalk-Address requests, or fails to provide a valid value.

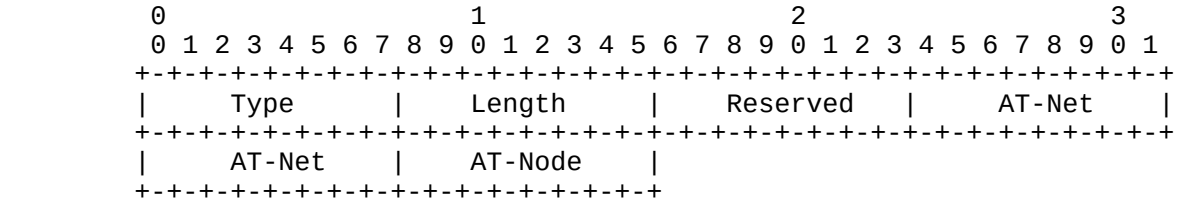
If this option is negotiated, the two sides MUST negotiate a common AppleTalk network number and two unique Appletalk node numbers. The network number MAY be zero but the Appletalk node numbers MUST be non-zero. Values selected for network and node numbers must adhere to the ranges defined in [3].

The AppleTalk protocol, phase 2, defines the concept of "extended" and "non-extended" networks. Extended networks can support a large number (hundreds) of nodes, and requires multiple network numbers and multiple zone names to be managed effectively. Non-extended networks can only support a small number of devices, and require only a single network number and zone name to be managed effectively.

If a PPP link transporting AppleTalk is assigned an AppleTalk address, it must have the "non-extended" characteristics as defined in [3].

The format of the network and node data is defined to be the same as the "AppleTalk address" in [3], chapter 3, "AppleTalk AARP packet formats on Ethernet and token ring".

A summary of the AppleTalk-Address Configuration Option format is shown below. The fields are transmitted from left to right.



Type

1

Length

6

Reserved

This octet is reserved and MUST be set to zero on transmission and ignored on reception.

AT-Net

The two octet AT-Net is the desired local AppleTalk network number of the sender of the Configure-Request. This two octet quantity represents a 16 bit unsigned number sent "network byte order" (most significant octet first).

AT-Node

The one octet AT-Node is the desired local AppleTalk node ID of the sender of the Configure-Request.

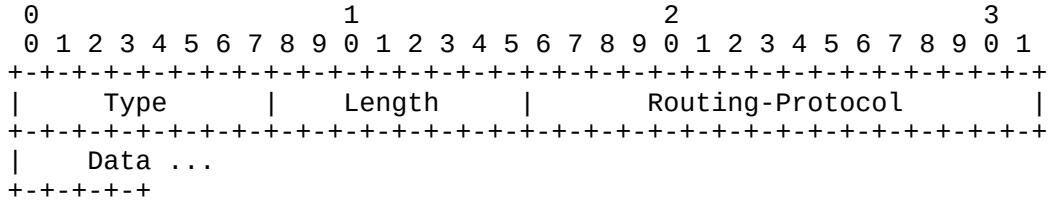
3.2. Routing-Protocol

Description

This Configuration Option provides a way to negotiate the use of a specific routing protocol. In particular, "half-routers" may want to exchange routing information using a protocol optimized for the PPP connection. By default, AppleTalk RTMP (Routing Table Maintenance Protocol) routing information is sent over the PPP connection.

By default, AppleTalk RTMP routing information is sent over the PPP connection.

A summary of the Routing-Protocol Configuration Option format is shown below. The fields are transmitted from left to right.



Type

2

Length

>= 4

Routing-Protocol

The Routing-Protocol field is two octets and indicates the type of Routing-Protocol desired. This two octet quantity represents a 16 bit number sent "network byte order" (most significant octet first).

Negotiation of some routing protocols implies that you will receive packet types which transport these protocols.

For example, negotiating AppleTalk AURP to exchange routing information implies both sides will accept EDDP type packets, since this is the transport type used by AURP.

Initial values are assigned as follows:

Value	Protocol
0	No routing information exchange
1	AppleTalk RTMP is used to exchange routing information
2	AppleTalk AURP is used to exchange routing information
3	AppleTalk ABGP is used to exchange routing information

Data

The Data field is zero or more octets and contains additional data as determined by the routing protocol indicated in the Routing-Protocol field.

None of the Routing-Protocol options defined here require additional data.

3.3. Suppress-Broadcasts

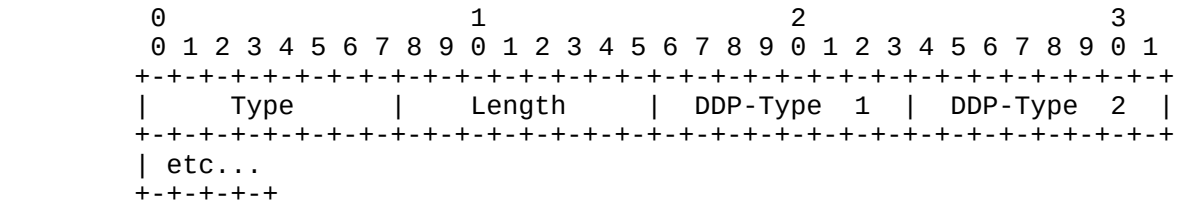
Description

This Configuration Option provides a way to negotiate the suppression of AppleTalk broadcast datagrams which might otherwise use up limitted PPP bandwidth. This Configuration Option is used to inform the remote end that no AppleTalk broadcast datagrams of a given DDP type should be sent.

This option is useful when negotiated by a single end system. It allows the local end system to request that broadcast packets generated on a remote network not be propagated across the PPP link. In the case of a single end system connected to a large network, this can be used to suppress regular NBP lookups generated by other end systems on the remote network. This will mean that protocols such as NBP can no longer be used to find network entities on the local system, but since the option configuration is asymmetric, it does not inhibit the local system’s ability to find network entities on the remote network.

By default, no AppleTalk broadcast datagrams are suppressed. Note that this option may conflict with other options (such as Routing Protocol). If so, the Suppress-Broadcasts option takes precedence.

A summary of the Suppress-Broadcasts Configuration Option format is shown below. The fields are transmitted from left to right.



Type

3

Length

>= 2

DDP-Types

A vector of one or more single octet DDP type values, each of which are to be suppressed if sent to the broadcast address.

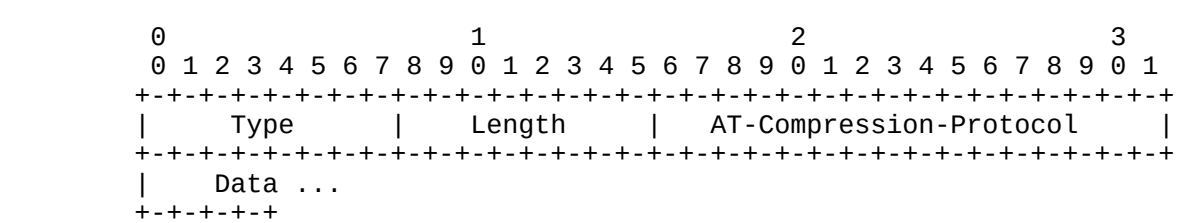
If no data is present (the length = 2), all broadcast packets are to be suppressed, regardless of DDP type.

3.4. AT-Compression-Protocol

Description

This Configuration Option provides a way to negotiate the use of a specific compression protocol. By default, compression is not enabled.

A summary of the AT-Compression-Protocol Configuration Option format is shown below. The fields are transmitted from left to right.



Type

4

Length

>= 4

AT-Compression-Protocol

The AT-Compression-Protocol field is two octets and indicates the compression protocol desired. Values for this field are always the same as the PPP Data Link Layer Protocol field values for that same compression protocol.

The most up-to-date values of the AT-Compression-Protocol field are specified in the most recent "Assigned Numbers" RFC [2]. Current values are assigned as follows:

Value (in hex)	Protocol
	none defined

Data

The Data field is zero or more octets and contains additional data as determined by the particular compression protocol.

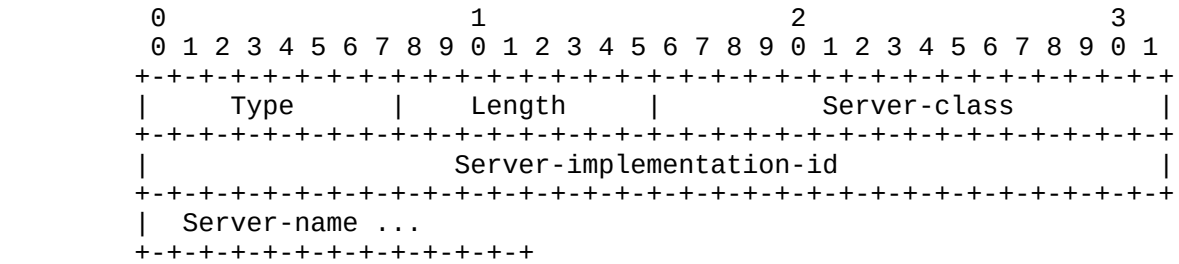
3.5. Server-information

Description

This Configuration Option provides a way to obtain information about the communications server providing the remote side of the PPP connection.

The nature of this option is advisory only. It is provided as a means of improving an end system’s ability to provide a simple user interface.

A summary of the Server-Information Option format is shown below. The fields are transmitted from left to right.



Type

6

Length

>= 8

Server-class

The Server-class field is two octets and indicates the class of the communication server providing the remote end of the PPP connection.

Initial values are assigned as follows:

Value	Class
1	AppleTalk PPP Dial-in server. The server-implementation-id is a four byte version id, with the first byte defined as the major version number (1-255) and the second byte defined as the minor version number (1-255). The third and fourth bytes are undefined and should be zero.
2	Generic AppleTalk PPP implementation. The server-implementation-id is undefined and vendor specific.
3	Both dial-in server and router

Server-implementation-id

The Server-implementation-id field is four octets and indicates the version of the communication server providing the remote end of the PPP connection.

Server-name

This optional field contains the "AppleTalk ASCII" name of the server. The character codes used in "AppleTalk ASCII" are defined in [3], appendix D, "Character codes". The length of the name is bounded by the option length.

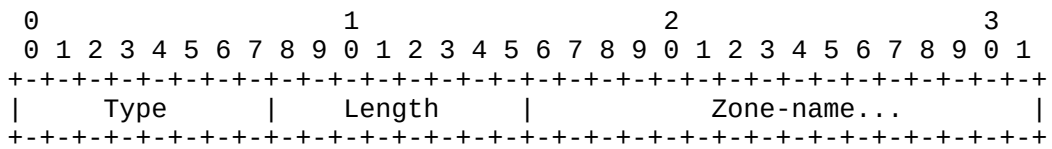
3.6. Zone-Information

Description

This Configuration Option provides a way to obtain information about the AppleTalk zone used for the PPP connection.

The nature of this option is advisory only. It is provided as a means of improving the end system's ability to provide a simple user interface.

A summary of the Zone-Information Option format is shown below. The fields are transmitted from left to right.



Type

7

Length

>= 3

Zone-name

This field contains the "AppleTalk ASCII" zone name in which the server resides. The character codes used in "AppleTalk ASCII" are defined in [3], appendix D, "Character codes". The length of the name is bounded by the option length.

3.7. Default-Router-Address

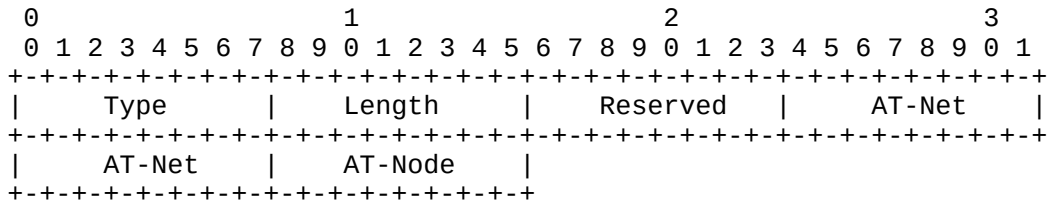
Description

This Configuration Option provides a way to obtain information about a "default" Appletalk router which may be used to obtain network information such as zone names. It is provided as a means of obtaining the address of a router in the case both sides of the link are end systems.

Any AppleTalk RTMP packets received should supercede information negotiated in this option.

By default, no default router is present.

A summary of the Default-Router-Address Option format is shown below. The fields are transmitted from left to right.



Type

8

Length

6

Reserved

This octet is reserved and MUST be set to zero on transmission and ignored on reception.

AT-Net

The two octet AT-Net is the AppleTalk network number of the default router. This two octet quantity represents a 16 bit unsigned number sent in "network byte order" (most significant octet first).

AT-Node

The one octet AT-Node is the AppleTalk node ID of the default router.

A. ATCP Recommended Options

The ATCP is designed to support three different modes of operation. Each mode places constraints on the configuration options used and the values negotiated.

The options for server information, zone information and default router address are "informational" options provided by one end of the connection and are not intended to be negotiated. These options are provided to support a higher level of service to dial-in end systems.

The options which SHOULD be negotiated in each case are outlined below. Any option not listed may be rejected.

End System to Intermediate System - "dial-in"

This mode of operation is intended to support end system dial-in.

1	AppleTalk-Address (required)
2	Routing-Protocol (required, no routing protocol)
3	Suppress-Broadcasts (optional)
4	AT-Compression-Protocol (optional)
6	Server-information (optional, request from end system)

Intermediate system to Intermediate system - with network number

This mode of operation is intended to support WAN-to-WAN, i.e., router to router, connections where the link is configured with a network number.

1	AppleTalk-Address (required, nets must be zero or equal)
2	Routing-Protocol (optional)
3	Suppress-Broadcasts (optional)

Intermediate system to Intermediate system - without network number

This mode of operation is intended to support WAN-to-WAN, i.e., router to router, connections where the link is not configured with a network number. Routers in this mode are referred to as "half-routers" in [3].

1	AppleTalk-Address (optional, nets & nodes MUST be zero)
2	Routing-Protocol (optional)
3	Suppress-Broadcasts (optional, suppress all broadcasts)

References

[1] Simpson, W., "The Point-to-Point Protocol (PPP)", RFC 1331, Daydreamer, May 1992.

[2] Reynolds, J., and J. Postel, "Assigned Numbers", STD 2, RFC 1340, USC/Information Sciences Institute, July 1992.

[3] Sidhu G., Andrews, R., and A. Oppenheimer, "Inside AppleTalk, Second Edition", Addison-Wesley Publishing Company, Inc., May 1990.

Acknowledgments

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Security Considerations

Security issues are not discussed in this memo.

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