

AppleTalk Management Information Base

Status of this Memo

This memo defines objects for managing AppleTalk objects for use with the SNMP protocol. This memo is a product of the AppleTalk-IP Working Group of the Internet Engineering Task Force (IETF). 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.

Table of Contents

1. Abstract	1
2. The Network Management Framework.....	2
3. Objects	2
3.1 Format of Definitions	3
4. Overview	3
4.1 Structure of MIB	3
4.2 The LocalTalk Link Access Protocol Group	3
4.3 The AppleTalk Address Resolution Protocol Group	4
4.4 The AppleTalk Port Group	4
4.5 The Datagram Delivery Protocol Group	4
4.6 The Routing Table Maintenance Protocol Group	4
4.7 The Kinetics Internet Protocol Group	4
4.8 The Zone Information Protocol Group	4
4.9 The Name Binding Protocol Group	4
4.10 The AppleTalk Echo Protocol Group	5
4.11 Textual Conventions	5
5. Definitions	5
6. Acknowledgements	27
7. References	28
8. Security Considerations.....	29
9. Author's Address.....	29

1. Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in TCP/IP-based internets. In particular, it defines objects for managing AppleTalk networks.

2. The Network Management Framework

The Internet-standard Network Management Framework consists of three components. They are:

RFC 1155 which defines the SMI, the mechanisms used for describing and naming objects for the purpose of management. RFC 1212 defines a more concise description mechanism, which is wholly consistent with the SMI.

RFC 1156 which defines MIB-I, the core set of managed objects for the Internet suite of protocols. RFC 1213, defines MIB-II, an evolution of MIB-I based on implementation experience and new operational requirements.

RFC 1157 which defines the SNMP, the protocol used for network access to managed objects.

The Framework permits new objects to be defined for the purpose of experimentation and evaluation.

3. Objects

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the subset of Abstract Syntax Notation One (ASN.1) [7] defined in the SMI. In particular, each object has a name, a syntax, and an encoding. The name is an object identifier, an administratively assigned name, which specifies an object type. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, we often use a textual string, termed the OBJECT DESCRIPTOR, to also refer to the object type.

The syntax of an object type defines the abstract data structure corresponding to that object type. The ASN.1 language is used for this purpose. However, the SMI [3] purposely restricts the ASN.1 constructs which may be used. These restrictions are explicitly made for simplicity.

The encoding of an object type is simply how that object type is represented using the object type's syntax. Implicitly tied to the notion of an object type's syntax and encoding is how the object type is represented when being transmitted on the network.

The SMI specifies the use of the basic encoding rules of ASN.1 [8], subject to the additional requirements imposed by the SNMP.

3.1. Format of Definitions

Section 5 contains the specification of all object types contained in this MIB module. The object types are defined using the conventions defined in the SMI, as amended by the extensions specified in [9,10].

4. Overview

AppleTalk is a protocol suite which features an open peer-to-peer architecture that runs over a variety of transmission media. AppleTalk is defined in [10]. This protocol suite interoperates with the IP protocol suite through various encapsulation methods. As large AppleTalk networks are built that coexist with large IP networks, a method to manage the AppleTalk networks with SNMP becomes necessary. This MIB defines managed objects to be used for managing AppleTalk networks.

4.1. Structure of MIB

The objects are arranged into the following groups:

- LLAP
- AARP
- ATPort
- DDP
- RTMP
- KIP
- ZIP
- NBP
- ATEcho

These groups are the basic unit of conformance. If the semantics of a group is applicable to an implementation, then it must implement all objects in that group. For example, a managed agent must implement the KIP group if and only if it implements the KIP protocol.

These groups are defined to provide a means of assigning object identifiers, and to provide a method for managed agents to know which objects they must implement.

4.2. The LocalTalk Link Access Protocol Group

The LocalTalk Link Access Protocol (LLAP) is a medium-speed data-link protocol designed for low cost and plug-and-play operation. The LLAP group is designed to manage all interfaces on a managed device that use this protocol.

4.3. The AppleTalk Address Resolution Protocol Group

The AppleTalk Address Resolution Protocol (AARP) is used to map between AppleTalk node addresses, used by the Datagram Delivery Protocol, and the addresses of the underlying data link layer. The AARP table allows for management of the Address Mapping Table on the managed device.

4.4. The AppleTalk Port Group

An AppleTalk Port is a logical connection to a network over which AppleTalk packets can be transmitted. This group allows the management of the configuration of these AppleTalk ports.

4.5. The Datagram Delivery Protocol Group

The Datagram Delivery Protocol (DDP) is the network-layer protocol that is responsible for the socket-to-socket delivery of datagrams over the AppleTalk Internet. This group manages the DDP layer on the managed device.

4.6. The Routing Table Maintenance Protocol Group

The Routing Table Maintenance Protocol (RTMP) is used by AppleTalk routers to create and maintain the routing tables that dictate the process of forwarding datagrams on the AppleTalk internet. The RTMP group manages the RTMP protocol as well as the routing tables generated by this protocol.

4.7. The Kinetics Internet Protocol Group

The Kinetics Internet Protocol (KIP) is a protocol for encapsulating and routing AppleTalk datagrams over an IP internet. This name is historical. The KIP group manages the KIP routing protocol as well as the routing tables generated by this protocol.

4.8. The Zone Information Protocol Group

The Zone Information Protocol (ZIP) is used to maintain a mapping between networks and zone names to facilitate the name lookup process performed by the Name Binding Protocol. The ZIP group manages this protocol and the mapping it produces.

4.9. The Name Binding Protocol Group

The Name Binding Protocol (NBP) is a transport-level protocol that is used to convert human readable service names into the numeric AppleTalk network addresses needed for communicating across the

AppleTalk network. The NBP group manages this protocol and the NBP services that exist on the managed device.

4.10. The AppleTalk Echo Protocol Group

The AppleTalk Echo Protocol is a transport-level protocol used to test and verify the status of the AppleTalk internet. The AtEcho group manages this protocol.

4.11. Textual Conventions

A new data type is introduced as a textual convention in this MIB document. This textual convention enhances the readability of the specification and can ease comparison with other specifications if appropriate. It should be noted that the introduction of this textual convention has no effect on either the syntax or the semantics of any managed objects. The use of this is merely an artifact of the explanatory method used. Objects defined in terms of this method are always encoded by means of the rules that define the primitive type. Hence, no changes to the SMI or the SNMP are necessary to accommodate this textual convention which is adopted merely for the convenience of readers and writers in pursuit of the elusive goal of clear, concise, and unambiguous MIB documents.

The new data type is:

```
DdpAddress ::=          -- 2 octets of net number,
                        -- 1 octet of node number
                        OCTET STRING (SIZE (3))
```

5. Definitions

```
RFC1243-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    Counter, IpAddress
        FROM RFC1155-SMI
    DisplayString, mib-2
        FROM RFC1213-MIB
    OBJECT-TYPE
        FROM RFC-1212;
```

```
-- This MIB module uses the extended OBJECT-TYPE macro as
-- defined in [9]
```

```
-- AppleTalk MIB
```

```

appletalk    OBJECT IDENTIFIER ::= { mib-2 13 }

DdpAddress ::= -- 2 octets of net number
               -- 1 octet of node number
               OCTET STRING (SIZE (3))
-- This data type is used for encoding a DDP protocol
-- address.  The format of this address is a serial
-- encoding of the two octets of network number in
-- network byte order, followed by the 1 octet node
-- number.

llap         OBJECT IDENTIFIER ::= { appletalk 1 }
aarp         OBJECT IDENTIFIER ::= { appletalk 2 }
atport       OBJECT IDENTIFIER ::= { appletalk 3 }
ddp          OBJECT IDENTIFIER ::= { appletalk 4 }
rtmp         OBJECT IDENTIFIER ::= { appletalk 5 }
kip          OBJECT IDENTIFIER ::= { appletalk 6 }
zip          OBJECT IDENTIFIER ::= { appletalk 7 }
nbp          OBJECT IDENTIFIER ::= { appletalk 8 }
atecho       OBJECT IDENTIFIER ::= { appletalk 9 }

-- The LLAP Group

llapTable OBJECT-TYPE
    SYNTAX SEQUENCE OF LlapEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "The list of LLAP entries."
    ::= { llap 1 }
llapEntry OBJECT-TYPE
    SYNTAX LlapEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "An LLAP entry containing objects for the
        LocalTalk Link Access Protocol for a particular
        LocalTalk interface."
    INDEX { llapIfIndex }
    ::= { llapTable 1 }

LlapEntry ::= SEQUENCE {
    llapIfIndex          INTEGER,
    llapInPkts           Counter,
    llapOutPkts          Counter,
    llapInNoHandlers     Counter,

```

```

        llapInLengthErrors      Counter,
        llapInBads              Counter,
        llapCollisions          Counter,
        llapDefers              Counter,
        llapNoDataErrors        Counter,
        llapRandomCTSErrors     Counter,
        llapFCSErrors           Counter
    }
    llapIfIndex OBJECT-TYPE
        SYNTAX INTEGER
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "The LLAP interface to which this entry pertains.
             The interface identified by a particular value of
             this index is the same interface as identified
             by the same value of ifIndex."
        ::= { llapEntry 1 }

    llapInPkts OBJECT-TYPE
        SYNTAX Counter
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "The total number of good packets received on this
             LocalTalk interface."
        ::= { llapEntry 2 }

    llapOutPkts OBJECT-TYPE
        SYNTAX Counter
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "The total number of packets transmitted on this
             LocalTalk interface."
        ::= { llapEntry 3 }

    llapInNoHandlers OBJECT-TYPE
        SYNTAX Counter
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "The total number of good packets received on this
             LocalTalk interface for which there was no
             protocol handler."
        ::= { llapEntry 4 }

```

llapInLengthErrors OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The total number of packets received on this LocalTalk interface whose actual length did not match the length in the header."

::= { llapEntry 5 }

llapInErrors OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The total number of packets containing errors received on this LocalTalk interface."

::= { llapEntry 6 }

llapCollisions OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The total number of collisions assumed on this LocalTalk interface due to the lack of a lapCTS reply."

::= { llapEntry 7 }

llapDefers OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The total number of times this LocalTalk interface deferred to other packets."

::= { llapEntry 8 }

llapNoDataErrors OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The total number of times this LocalTalk interface received a lapRTS packet and expected a data packet, but did not receive any data packet."

::= { llapEntry 9 }


```
llapRandomCTSErrors OBJECT-TYPE
    SYNTAX Counter
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The total number of times this LocalTalk
        interface received a lapCTS packet that was
        not solicited by a lapRTS packet."
    ::= { llapEntry 10 }

llapFCSErrors OBJECT-TYPE
    SYNTAX Counter
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The total number of times this LocalTalk
        interface received a packet with an FCS
        (Frame Check Sequence) error."
    ::= { llapEntry 11 }

-- The AARP Group
aarpTable OBJECT-TYPE
    SYNTAX SEQUENCE OF AarpEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "The AppleTalk Address Translation Table
        contains an equivalence of AppleTalk Network
        Addresses to the link layer physical address."
    ::= { aarp 1 }

aarpEntry OBJECT-TYPE
    SYNTAX AarpEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "Each entry contains one AppleTalk Network
        Address to physical address equivalence."
    INDEX { aarpIfIndex, aarpNetAddress }
    ::= { aarpTable 1 }

AarpEntry ::= SEQUENCE {
    aarpIfIndex      INTEGER,
    aarpPhysAddress  OCTET STRING,
    aarpNetAddress   DdpAddress
}
```

aarpIfIndex OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-only
STATUS mandatory
DESCRIPTION
 "The interface on which this entry's equivalence
 is effective. The interface identified by a
 particular value of this index is the same
 interface as identified by the same value of
 ifIndex."
::= { aarpEntry 1 }

aarpPhysAddress OBJECT-TYPE
SYNTAX OCTET STRING
ACCESS read-only
STATUS mandatory
DESCRIPTION
 "The media-dependent physical address"
::= { aarpEntry 2 }

aarpNetAddress OBJECT-TYPE
SYNTAX DdpAddress
ACCESS read-only
STATUS mandatory
DESCRIPTION
 "The AppleTalk Network Address corresponding to
 the media-dependent physical address."
::= { aarpEntry 3 }

-- The ATPort Group

atportTable OBJECT-TYPE
SYNTAX SEQUENCE OF AtportEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
 "A list of AppleTalk ports for this entity."
::= { atport 1 }

atportEntry OBJECT-TYPE
SYNTAX AtportEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
 "The description of one of the AppleTalk
 ports on this entity."
INDEX { atportIndex }

```

 ::= { atportTable 1 }

AtportEntry ::= SEQUENCE {
    atportIndex          INTEGER,
    atportDescr          DisplayString,
    atportType           INTEGER,
    atportNetStart       OCTET STRING (SIZE(2)),
    atportNetEnd         OCTET STRING (SIZE(2)),
    atportNetAddress     DdpAddress,
    atportStatus         INTEGER,
    atportNetConfig      INTEGER,
    atportZoneConfig     INTEGER,
    atportZone           OCTET STRING,
    atportIfIndex        INTEGER
}

atportIndex OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "A unique value for each AppleTalk port.
        Its value is between 1 and the total number of
        AppleTalk ports. The value for each port must
        remain constant at least from the
        re-initialization of the entity's network
        management system to the next
        re-initialization."
    ::= { atportEntry 1 }

atportDescr OBJECT-TYPE
    SYNTAX DisplayString
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "A text string containing information about the
        port. This string is intended for presentation
        to a human; it must not contain anything but
        printable ASCII characters."
    ::= { atportEntry 2 }

atportType OBJECT-TYPE
    SYNTAX INTEGER {
        other(1),          -- none of the following
        localtalk(2),
        ethertalk1(3),
        ethertalk2(4),
        tokentalk(5),
    }

```

```
        iptalk(6),
        serial-ppp(7),
        serial-nonstandard(8),
        virtual(9)
    }
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The type of port, distinguished by the protocol
        immediately below DDP in the protocol stack."
    ::= { atportEntry 3 }

atportNetStart OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(2))
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The first AppleTalk network address in the range
        configured for this port. This is a two octet
        DDP network address in network byte order."
    ::= { atportEntry 4 }

atportNetEnd OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(2))
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The last AppleTalk network address in the range
        configured for this port. This is a two octet
        DDP network address in network byte order. If the
        network to which this AppleTalk port is
        connected is a Phase 1 network or a non-extended
        network, the value for atportNetEnd shall be two
        octets of zero."
    ::= { atportEntry 5 }

atportNetAddress OBJECT-TYPE
    SYNTAX DdpAddress
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The AppleTalk network address configured for this
        port."
    ::= { atportEntry 6 }

atportStatus OBJECT-TYPE
    SYNTAX INTEGER {
        operational(1),
```

```

        unconfigured(2),
        off(3),
        invalid(4)
    }
ACCESS read-write
STATUS mandatory
DESCRIPTION
    "The configuration status of this port.

    Setting this object to the value invalid(4)
    has the effect of invalidating the corresponding
    entry in the atportTable. That is, it
    effectively disassociates the mapping identified
    with said entry. It is an
    implementation-specific matter as to whether the
    agent removes an invalidated entry from the table.
    Accordingly, management stations must be
    prepared to receive from agents tabular
    information corresponding to entries not
    currently in use. Proper interpretation of such
    entries requires examination of the relevant
    atportStatus object."
    ::= { atportEntry 7 }

```

```

atportNetConfig OBJECT-TYPE
    SYNTAX INTEGER {
        configured(1),  -- explicit configuration.
        garnered(2),   -- assumed from inspection of net.
        guessed(3),     -- a "random" configuration.
        unconfigured(4)
    }
ACCESS read-only
STATUS mandatory
DESCRIPTION
    "The configuration status of this port."
    ::= { atportEntry 8 }

```

```

atportZoneConfig OBJECT-TYPE
    SYNTAX INTEGER {
        configured(1),  -- explicit configuration
        garnered(2),   -- assumed from inspection of net.
        guessed(3),     -- a "random" configuration.
        unconfigured(4)
    }
ACCESS read-only
STATUS mandatory
DESCRIPTION
    "The configuration status of the zone information

```

```
        for this port."
 ::= { atportEntry 9 }

atportZone OBJECT-TYPE
    SYNTAX OCTET STRING
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The zone name configured for this AppleTalk
        port."
 ::= { atportEntry 10 }

atportIfIndex OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The physical interface associated with this
        AppleTalk port. The interface identified by a
        particular value of this index is the same
        interface as identified by the same value of
        ifIndex."
 ::= { atportEntry 11 }

-- The DDP Group

ddpOutRequests OBJECT-TYPE
    SYNTAX Counter
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The total number of DDP datagrams which were
        supplied to DDP by local DDP clients in requests
        for transmission. Note that this counter does
        not include any datagrams counted in
        ddpForwRequests."
 ::= { ddp 1 }

ddpOutShorts OBJECT-TYPE
    SYNTAX Counter
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The total number of short DDP datagrams which
        were transmitted from this entity."
 ::= { ddp 2 }
```

ddpOutLongs OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
 "The total number of long DDP datagrams which were
 transmitted from this entity."
 ::= { ddp 3 }

ddpInReceives OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
 "The total number of input datagrams received by
 DDP, including those received in error."
 ::= { ddp 4 }

ddpForwRequests OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
 "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."
 ::= { ddp 5 }

ddpInLocalDatagrams OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
 "The total number of input DDP datagrams for
 which this entity was their final DDP
 destination."
 ::= { ddp 6 }

ddpNoProtocolHandlers OBJECT-TYPE
SYNTAX Counter
ACCESS read-only
STATUS mandatory
DESCRIPTION
 "The total number of DDP datagrams addressed to
 this entity that were addressed to an upper
 layer protocol for which no protocol handler
 existed."

::= { ddp 7 }

ddpOutNoRoutes OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The total number of DDP datagrams dropped because a route could not be found to their final destination."

::= { ddp 8 }

ddpTooShortErrors OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"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."

::= { ddp 9 }

ddpTooLongErrors OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"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 because they exceeded the maximum DDP datagram size."

::= { ddp 10 }

ddpBroadcastErrors OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"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."

::= { ddp 11 }

ddpShortDDPErrors OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The total number of input DDP datagrams dropped because this entity was not their final destination and their type was short DDP."

::= { ddp 12 }

ddpHopCountErrors OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The total number of input DDP datagrams dropped because this entity was not their final destination and their hop count would exceed 15."

::= { ddp 13 }

ddpChecksumErrors OBJECT-TYPE

SYNTAX Counter

ACCESS read-only

STATUS mandatory

DESCRIPTION

"The total number of input DDP datagrams dropped because of a checksum error."

::= { ddp 14 }

-- The RTMP Group

rtmpTable OBJECT-TYPE

SYNTAX SEQUENCE OF RtmpEntry

ACCESS not-accessible

STATUS mandatory

DESCRIPTION

"A list of Routing Table Maintenance Protocol entries for this entity."

::= { rtmp 1 }

rtmpEntry OBJECT-TYPE

SYNTAX RtmpEntry

ACCESS not-accessible

STATUS mandatory

DESCRIPTION

"The route entry to a particular network range."

INDEX { rtmpRangeStart }

```

 ::= { rtmpTable 1 }

RtmpEntry ::= SEQUENCE {
    rtmpRangeStart  OCTET STRING (SIZE(2)),
    rtmpRangeEnd    OCTET STRING (SIZE(2)),
    rtmpNextHop     OCTET STRING,
    rtmpType        INTEGER,
    rtmpPort        INTEGER,
    rtmpHops        INTEGER,
    rtmpState       INTEGER
}

rtmpRangeStart OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(2))
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The first DDP network address in the network
        range to which this routing entry pertains.
        This is a two octet DDP network address in
        network byte order."
    ::= { rtmpEntry 1 }

rtmpRangeEnd OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(2))
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The last DDP network address in the network range
        to which this routing entry pertains. This is a
        two octet DDP network address in network byte
        order. If the network to which this routing
        entry pertains is a Phase 1 network or a
        non-extended network, the value for rtmpRangeEnd
        shall be two octets of zero."
    ::= { rtmpEntry 2 }

rtmpNextHop OBJECT-TYPE
    SYNTAX OCTET STRING
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The next hop in the route to this entry's
        destination network. If the type of this route
        is Appletalk, this address takes the same form
        as DdpAddress."
    ::= { rtmpEntry 3 }

```

```
rtmpType OBJECT-TYPE
    SYNTAX INTEGER {
        other(1),
        appletalk(2),
        serial-ppp(3),
        serial-nonstandard(4)
    }
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The type of network over which this route
        points."
    ::= { rtmpEntry 4 }

rtmpPort OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The index of the AppleTalk port over which
        this route points."
    ::= { rtmpEntry 5 }

rtmpHops OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The number of hops required to reach the
        destination network to which this routing
        entry pertains."
    ::= { rtmpEntry 6 }

rtmpState OBJECT-TYPE
    SYNTAX INTEGER {
        good(1),
        suspect(2),
        goingBad(3),
        bad(4) -- may be removed from table
    }
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The status of the information contained in this
        route entry.

        Setting this object to the value bad(4) has the
        effect of invalidating the corresponding entry"
```

in the rtmpTable. That is, it effectively disassociates the mapping identified with said entry. It is an implementation-specific matter as to whether the agent removes an invalidated entry from the table. Accordingly, management stations must be prepared to receive from agents tabular information corresponding to entries not currently in use. Proper interpretation of such entries requires examination of the relevant rtmpState object."

```
::= { rtmpEntry 7 }
```

```
-- The KIP Group
```

```
kipTable OBJECT-TYPE
```

```
    SYNTAX SEQUENCE OF KipEntry
```

```
    ACCESS not-accessible
```

```
    STATUS mandatory
```

```
    DESCRIPTION
```

```
        "The table of routing information for KIP networks."
```

```
 ::= { kip 1 }
```

```
kipEntry OBJECT-TYPE
```

```
    SYNTAX KipEntry
```

```
    ACCESS not-accessible
```

```
    STATUS mandatory
```

```
    DESCRIPTION
```

```
        "An entry in the routing table for KIP networks."
```

```
    INDEX { kipNetStart }
```

```
 ::= { kipTable 1 }
```

```
KipEntry ::= SEQUENCE {
```

```
    kipNetStart      OCTET STRING (SIZE(2)),
```

```
    kipNetEnd        OCTET STRING (SIZE(2)),
```

```
    kipNextHop       IPAddress,
```

```
    kipHopCount      INTEGER,
```

```
    kipBCastAddr     IPAddress,
```

```
    kipCore           INTEGER,
```

```
    kipType           INTEGER,
```

```
    kipState          INTEGER,
```

```
    kipShare          INTEGER
```

```
}
```

```
kipNetStart OBJECT-TYPE
```

```
    SYNTAX OCTET STRING (SIZE(2))
```

```
    ACCESS read-write
```

STATUS mandatory
DESCRIPTION
 "The first AppleTalk network address in the range for this routing entry. This address is a two octet DDP network address in network byte order."
 ::= { kipEntry 1 }

kipNetEnd OBJECT-TYPE
SYNTAX OCTET STRING (SIZE(2))
ACCESS read-write
STATUS mandatory
DESCRIPTION
 "The last AppleTalk network address in the range for this routing entry. This address is a two octet DDP network address in network byte order. If the network to which this AppleTalk port is connected is a Phase 1 network or a non-extended network, the value for kipNetEnd shall be two octets of zero."
 ::= { kipEntry 2 }

kipNextHop OBJECT-TYPE
SYNTAX IpAddress
ACCESS read-write
STATUS mandatory
DESCRIPTION
 "The IP address of the next hop in the route to this entry's destination network."
 ::= { kipEntry 3 }

kipHopCount OBJECT-TYPE
SYNTAX INTEGER
ACCESS read-write
STATUS mandatory
DESCRIPTION
 "The number of hops required to reach the destination network to which this entry pertains."
 ::= { kipEntry 4 }

kipBCastAddr OBJECT-TYPE
SYNTAX IpAddress
ACCESS read-write
STATUS mandatory
DESCRIPTION
 "The form of the IP address used to broadcast on this network."
 ::= { kipEntry 5 }

```

kipCore OBJECT-TYPE
    SYNTAX INTEGER {
        core(1),
        notcore(2)
    }
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The status of this network as a Kip Core
        network."
    ::= { kipEntry 6 }

kipType OBJECT-TYPE
    SYNTAX INTEGER {
        kipRouter(1),
        net(2),
        host(3),
        other(4)
    }
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The type of the entity that this route points
        to."
    ::= { kipEntry 7 }

kipState OBJECT-TYPE
    SYNTAX INTEGER {
        configured(1),
        learned(2),
        invalid(3)
    }
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The state of this network entry.

        Setting this object to the value invalid(3) has
        the effect of invalidating the corresponding
        entry in the kipTable.  That is, it effectively
        disassociates the mapping identified with said
        entry.  It is an implementation-specific matter
        as to whether the agent removes an invalidated
        entry from the table.
        Accordingly, management stations must be
        prepared to receive from agents tabular
        information corresponding to entries not
        currently in use.  Proper interpretation of such

```

```

        entries requires examination of the relevant
        kipState object."
 ::= { kipEntry 8 }

kipShare OBJECT-TYPE
    SYNTAX INTEGER {
        shared(1),
        private(2)
    }
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "If the information in this entry is propagated
        to other routers as part of a routing protocol,
        the value of this variable is equal to
        shared(1). Otherwise its value is private(2)."
```

```
 ::= { kipEntry 9 }
```

```
-- The ZIP Group

zipTable OBJECT-TYPE
    SYNTAX SEQUENCE OF ZipEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "The table of zone information for reachable
        AppleTalk networks."
```

```
 ::= { zip 1 }
```

```
zipEntry OBJECT-TYPE
    SYNTAX ZipEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "An entry of zone information for a particular
        zone and network combination."
```

```
INDEX { zipZoneNetStart, zipZoneIndex }
 ::= { zipTable 1 }
```

```
ZipEntry ::= SEQUENCE {
    zipZoneName      OCTET STRING,
    zipZoneIndex     INTEGER,
    zipZoneNetStart  OCTET STRING (SIZE(2)),
    zipZoneNetEnd    OCTET STRING (SIZE(2)),
    zipZoneState     INTEGER
}
```

```
zipZoneName OBJECT-TYPE
    SYNTAX OCTET STRING
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The ASCII zone name of this entry."
    ::= { zipEntry 1 }

zipZoneIndex OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "An integer that is unique to the zipZoneName
        that is present in this entry.  For any given
        zone name, every zipEntry that has an equal zone
        name will have the same zipZoneIndex."
    ::= { zipEntry 2 }

zipZoneNetStart OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(2))
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The network that starts the range for this
        entry.  This address is a two octet DDP network
        address in network byte order."
    ::= { zipEntry 3 }

zipZoneNetEnd OBJECT-TYPE
    SYNTAX OCTET STRING (SIZE(2))
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The network that ends the range for this
        entry.  This address is a two octet DDP network
        address in network byte order.  If the network
        to which this zip entry pertains is a Phase 1
        network or a non-extended network, the value for
        zipZoneNetEnd shall be two bytes of zero."
    ::= { zipEntry 4 }

zipZoneState OBJECT-TYPE
    SYNTAX INTEGER {
        valid(1),
        invalid(2)
    }
    ACCESS read-write
```


STATUS mandatory

DESCRIPTION

"The state of this zip entry.

Setting this object to the value invalid(2) has the effect of invalidating the corresponding entry in the zipTable. That is, it effectively disassociates the mapping identified with said entry. It is an implementation-specific matter as to whether the agent removes an invalidated entry from the table.

Accordingly, management stations must be prepared to receive from agents tabular information corresponding to entries not currently in use. Proper interpretation of such entries requires examination of the relevant zipZoneState object."

::= { zipEntry 5 }

-- The NBP Group

nbpTable OBJECT-TYPE

SYNTAX SEQUENCE OF NbpEntry

ACCESS not-accessible

STATUS mandatory

DESCRIPTION

"The table of NBP services registered on this entity."

::= { nbp 1 }

nbpEntry OBJECT-TYPE

SYNTAX NbpEntry

ACCESS not-accessible

STATUS mandatory

DESCRIPTION

"The description of an NBP service registered on this entity."

INDEX { nbpIndex }

::= { nbpTable 1 }

NbpEntry ::= SEQUENCE {

nbpIndex INTEGER,

nbpObject OCTET STRING,

nbpType OCTET STRING,

nbpZone OCTET STRING,

nbpState INTEGER

}

```
nbpIndex OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The index of this NBP entry.  This value ranges
        from 1 to the number of NBP entries currently
        registered on this entity."
    ::= { nbpEntry 1 }

nbpObject OBJECT-TYPE
    SYNTAX OCTET STRING
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The name of the service described by this
        entity."
    ::= { nbpEntry 2 }

nbpType OBJECT-TYPE
    SYNTAX OCTET STRING
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The type of the service described by this
        entity."
    ::= { nbpEntry 3 }

nbpZone OBJECT-TYPE
    SYNTAX OCTET STRING
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The zone the service described by this entity is
        registered in."
    ::= { nbpEntry 4 }

nbpState OBJECT-TYPE
    SYNTAX INTEGER {
        valid(1),
        invalid(2)
    }
    ACCESS read-write
    STATUS mandatory
    DESCRIPTION
        "The state of this NBP entry.

        Setting this object to the value invalid(2) has
```

the effect of invalidating the corresponding entry in the nbpTable. That is, it effectively disassociates the mapping identified with said entry. It is an implementation-specific matter as to whether the agent removes an invalidated entry from the table. Accordingly, management stations must be prepared to receive from agents tabular information corresponding to entries not currently in use. Proper interpretation of such entries requires examination of the relevant nbpState object."

```
::= { nbpEntry 5 }
```

-- The ATEcho Group

```
atechoRequests OBJECT-TYPE
    SYNTAX Counter
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The number of AppleTalk echo requests received."
    ::= { atecho 1 }
```

```
atechoReplies OBJECT-TYPE
    SYNTAX Counter
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The number of AppleTalk echo replies sent."
    ::= { atecho 2 }
```

END

6. Acknowledgements

This document was produced by the IETF AppleTalk-IP Working Group:

Terry Braun, Novell
Gregory Bruell, Shiva
Philip Budne, Shiva
Rob Chandhok, CMU
Cyrus Chow, NASA
Bruce Crabill, UMD
Peter DiCamillo, Brown
Robert Elz, U. of Melbourne
Tom Evans, Webster
Karen Frisa, CMU

Russ Hobby, UC Davis
Tom Holodnik, CMU
Peter Honeyman, U. of Michigan
Michael Horowitz, Shiva
Van Jacobson, Lawrence Berkeley Labs
Doug Kerr, Novell
Holly Knight, Apple
Philip Koch, Dartmouth
Louise Laier, Apple
Nik Langrind, Shiva
Joshua Littlefield, Cayman
Kanchei Loa, Motorola
John Mason, Apple
Leo McLaughlin, TWG
Milo Medin, NASA
Greg Minshall, Novell
Bob Morgan, Stanford
Ed Moy, Berkeley
Matthew Nocifore, Drexel
Zbigniew Opalka, BBN
Alan Oppenheimer, Apple
Brad Parker, Cayman
Greg Satz, Cisco
John Seligson, Apple
Frank Slaughter, Shiva
Zaw-Sing Su, SRZ
John Veizades, Apple
Peter Vinsel, Apple
Jonathan Wenocur, Shiva
Steven Willis, Wellfleet

In addition, the contribution of the following individuals is also acknowledged:

Karen Frisa, Carnegie Mellon University
Greg Minshall, Novell, Inc.
Marshall T. Rose, PSI

7. References

- [1] Cerf, V., "IAB Recommendations for the Development of Internet Network Management Standards", RFC 1052, NRI, April 1988.
- [2] Cerf, V., "Report of the Second Ad Hoc Network Management Review Group", RFC 1109, NRI, August 1989.
- [3] Rose M., and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based internets", RFC 1155,

Performance Systems International, Hughes LAN Systems, May 1990.

- [4] McCloghrie K., and M. Rose, "Management Information Base for Network Management of TCP/IP-based internets", RFC 1156, Hughes LAN Systems, Performance Systems International, May 1990.
- [5] Case, J., Fedor, M., Schoffstall, M., and J. Davin, "Simple Network Management Protocol", RFC 1157, SNMP Research, Performance Systems International, Performance Systems International, MIT Laboratory for Computer Science, May 1990.
- [6] McCloghrie K., and M. Rose, Editors, "Management Information Base for Network Management of TCP/IP-based internets", RFC 1213, Performance Systems International, March 1991.
- [7] Information processing systems - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1), International Organization for Standardization, International Standard 8824, December 1987.
- [8] Information processing systems - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Notation One (ASN.1), International Organization for Standardization, International Standard 8825, December 1987.
- [9] Rose, M., and K. McCloghrie, Editors, "Concise MIB Definitions", RFC 1212, Performance Systems International, Hughes LAN Systems, March 1991.
- [10] Sidhu, G., Andrews, R., and A. Oppenheimer, "Inside AppleTalk", Second Edition, Addison Wesley, 1990.

8. Security Considerations

Security issues are not discussed in this memo.

9. Author's Address

Steven Waldbusser
Carnegie Mellon University
4910 Forbes Ave.
Pittsburgh, PA 15213

EMail: waldbusser@andrew.cmu.edu