

[draft-thaler-idmr-multicast-routemib-00.txt](#)

Experimental

Multiprotocol Multicast Routing MIB

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1. Abstract

This memo defines an experimental portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects used for managing IP Multicast Routing for IPv4 and IPv6, independent of the specific multicast routing protocol in use.

2. Introduction

This MIB describes objects used for managing IPv4 and IPv6 Multicast Routing[2], independent of the specific multicast routing protocol [3,4,5,6,7] in use. This MIB extends the MIB proposed in [8]. Managed objects specific to particular multicast routing protocols are specified elsewhere. Similarly, this MIB does not support management of multicast routing for other address families.

Such management may be supported by other MIBs.

3. The SNMP Management Framework

[draft-thaler-idmr-multicast-routemib-1](#)

1
June 2000

The SNMP Management Framework presently consists of five major components:

- o An overall architecture, described in [RFC 2571](#) [9].
- o Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIV1 and described in [RFC 1155](#) [10], [RFC 1212](#) [11] and [RFC 1215](#) [12]. The second version, called SMIV2, is described in [RFC 2578](#) [13], [RFC 2579](#) [14] and [RFC 2580](#) [15].
- o Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in [RFC 1157](#) [16]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in [RFC 1901](#) [17] and [RFC 1906](#) [18]. The third version of the message protocol is called SNMPv3 and described in [RFC 1906](#) [18], [RFC 2572](#) [19] and [RFC 2574](#) [20].
- o Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in [RFC 1157](#) [16]. A second set of protocol operations and associated PDU formats is described in [RFC 1905](#) [21].
- o A set of fundamental applications described in [RFC 2573](#) [22] and the view-based access control mechanism described in [RFC 2575](#) [23].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the mechanisms defined in the SMI.

This memo specifies a MIB module that is compliant to the SMIV2. A MIB conforming to the SMIV1 can be produced through the appropriate translations. The resulting translated MIB must be semantically equivalent, except where objects or events are omitted because no translation is possible (use of Counter64). Some machine readable information in SMIV2 will be converted into textual descriptions in SMIV1 during the translation process. However, this loss of machine readable information is not considered to change the semantics of

the MIB.

4. Overview

This MIB module contains one scalar and five tables. The tables are:

Thaler, Adams, Siadak Experimental/Expires Dec 2000

[draft-thaler-idmr-multicast-routemib-1](#)

2

June 2000

- (1) the Multicast Route Table containing multicast routing information for datagrams sent by particular sources to the multicast groups known to a router.
- (2) the Multicast Routing Next Hop Table containing information on the next-hops for the routing multicast datagrams. Each entry is one of a list of next-hops on outgoing interfaces for particular qsources sending to a particular multicast group address.
- (3) the Multicast Routing Interface Table containing multicast routing information specific to interfaces.
- (4) the Multicast Scope Boundary Table containing the boundaries configured for multicast scopes [24].
- (5) the Multicast Scope Name Table containing human-readable names of multicast scope.

5. Definitions

INETMROUTE-STD-MIB DEFINITIONS ::= BEGIN

IMPORTS

```
MODULE-IDENTITY, OBJECT-TYPE, mib-2,
Integer32, Counter32, Counter64, Gauge32,
TimeTicks                                FROM SNMPv2-SMI
RowStatus, TEXTUAL-CONVENTION,
TruthValue                              FROM SNMPv2-TC
MODULE-COMPLIANCE, OBJECT-GROUP         FROM SNMPv2-CONF
SnmpAdminString                         FROM SNMP-FRAMEWORK-MIB
InterfaceIndexOrZero,
InterfaceIndex                           FROM IF-MIB
IANAipRouteProtocol,
IANAipMRouteProtocol                     FROM IANA-RTPROTO-MIB
```

InetAddress, InetAddressType FROM INET-ADDRESS-MIB;

inetMRouteStdMIB MODULE-IDENTITY

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3

[draft-thaler-idmr-multicast-routemib-1](#)

June 2000

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DESCRIPTION

"The MIB module for management of IP Multicast routing,
but independent of the specific multicast routing
protocol in use._

REVISION "200003090000Z" -- March 9, 2000

DESCRIPTION

"Initial version, published as RFC xxxx (to be filled
in
by RFC-Editor)."

::= { mib-2 XX }

-- NOTE TO RFC EDITOR: When this document is published as

-- an RFC, replace XX with IANA-assigned number,

-- and delete this comment.

-- Textual Conventions

```

LanguageTag ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "100a"
    STATUS      current
    DESCRIPTION
        "An RFC 1766-style language tag, with all alphabetic
        characters converted to lowercase. This restriction is
        intended to make the lexical ordering imposed by SNMP
        useful when applied to language tags. Note that it is
        theoretically possible for a valid language tag to
        exceed the allowed length of this syntax, and thus be
        impossible to represent with this syntax. Sampling of
        language tags in current use on the Internet suggests
        that this limit does not pose a serious problem in
        practice."
    SYNTAX      OCTET STRING (SIZE (1..100))

```

```
-- Top-level structure of the MIB
```

```
inetMRouteMIBObjects OBJECT IDENTIFIER ::= { inetMRouteStdMIB 1 }
```

```
inetMRoute      OBJECT IDENTIFIER ::= { inetMRouteMIBObjects 1 }
```

```
-- the IP Multicast Routing MIB-Group
```

Thaler, Adams, Siadak Experimental/Expires Dec 2000

4

[draft-thaler-idmr-multicast-routemib-1](#)

June 2000

```
--
-- a collection of objects providing information about
-- IP Multicast Groups
```

```
inetMRouteEnabled OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The enabled status of IP Multicast routing on this
router."
    ::= { inetMRoute 1 }
```

```
inetMRouteEntryCount OBJECT-TYPE
    SYNTAX      Gauge32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of rows in the inetMRouteTable. This can
be
        used to monitor the multicast routing table size."
    ::= { inetMRoute 7 }
```

```

inetMRouteTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF InetMRouteEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The (conceptual) table containing multicast routing
        information for IP datagrams sent by particular sources
        to the IP multicast groups known to this router."
    ::= { inetMRoute 2 }

inetMRouteEntry OBJECT-TYPE
    SYNTAX      InetMRouteEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry (conceptual row) containing the multicast
        routing information for IP datagrams from a particular
        source and addressed to a particular IP multicast group
        address. Discontinuities in counters in this entry can
        be detected by observing the value of
        inetMRouteUpTime."
    INDEX       { inetMRouteGroupType,
                  inetMRouteGroup,
                  inetMRouteGroupMaskLen,
                  inetMRouteSourceType,
                  inetMRouteSource,
                  inetMRouteSourceMaskLen }
    ::= { inetMRouteTable 1 }

InetMRouteEntry ::= SEQUENCE {

```

Thaler, Adams, Siadak Experimental/Expires Dec 2000

[draft-thaler-idmr-multicast-routemib-1](#)

5

June 2000

inetMRouteGroupType	InetAddressType,
inetMRouteGroup	InetAddress,
inetMRouteGroupMaskLen	INTEGER,
inetMRouteSourceType	InetAddressType,
inetMRouteSource	InetAddress,
inetMRouteSourceMaskLen	INTEGER,
inetMRouteUpstreamNeighborType	InetAddressType,
inetMRouteUpstreamNeighbor	InetAddress,
inetMRouteInIfIndex	InterfaceIndexOrZero,
inetMRouteUpTime	TimeTicks,
inetMRouteExpiryTime	TimeTicks,
inetMRoutePkts	Counter32,
inetMRouteDifferentInIfPackets	Counter32,
inetMRouteOctets	Counter32,
inetMRouteProtocol	IANAipMRouteProtocol,

```

inetMRouteRtProto          IANAipRouteProtocol,
inetMRouteRtAddressType    InetAddressType,
inetMRouteRtAddress        InetAddress,
inetMRouteRtMaskLen        INTEGER,
inetMRouteRtType           INTEGER,
inetMRouteHC0ctets         Counter64
}

inetMRouteGroupType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A value indicating the address family of the address
        contained in inetMRouteGroup.  Legal values correspond
        to the subset of address families for which multicast
        forwarding is supported."
    ::= { inetMRouteEntry 1 }

inetMRouteGroup OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The IP multicast group address which when combined
with
        the corresponding value specified in
        inetMRouteGroupMaskLen identifies the groups for which
        this entry contains multicast routing information."
    ::= { inetMRouteEntry 2 }

inetMRouteGroupMaskLen OBJECT-TYPE
    SYNTAX      INTEGER (0..128)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The length in bits of the mask which when combined
with
        the corresponding value of inetMRouteGroup identifies
        the groups for which this entry contains multicast
        routing information."
    ::= { inetMRouteEntry 3 }

inetMRouteSourceType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  not-accessible

```

```

STATUS      current
DESCRIPTION
    "A value indicating the address family of the address
    contained in inetMRouteSource. The value MUST be the
same
    as the value of inetMRouteGroupType."
 ::= { inetMRouteEntry 4 }

inetMRouteSource OBJECT-TYPE
SYNTAX      InetAddress
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The network address which when combined with the
    corresponding value of inetMRouteSourceMaskLen
    identifies the sources for which this entry contains
    multicast routing information."
 ::= { inetMRouteEntry 5 }

inetMRouteSourceMaskLen OBJECT-TYPE
SYNTAX      INTEGER (0..128)
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The length in bits of the mask which when combined
with
    the corresponding value of inetMRouteSource identifies
    the sources for which this entry contains multicast
    routing information."
 ::= { inetMRouteEntry 6 }

inetMRouteUpstreamNeighborType OBJECT-TYPE
SYNTAX      InetAddressType
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "A value indicating the address family of the address
    contained in inetMRouteUpstreamNeighbor. The value MUST
    be the same as the value of inetMRouteGroupType."
 ::= { inetMRouteEntry 7 }

inetMRouteUpstreamNeighbor OBJECT-TYPE
SYNTAX      InetAddress
MAX-ACCESS  read-only
STATUS      current

```


"The address of the upstream neighbor (e.g., RPF neighbor) from which IP datagrams from these sources to this multicast address are received. If the upstream neighbor is unknown, then inetMRouteUpstreamNeighbor will be 0.0.0.0 in the case of an IPv4 entry, and 0:0:0:0:0:0:0:0 in the case of an IPv6 entry. (e.g., in CBT)."

::= { inetMRouteEntry 8 }

inetMRouteInIfIndex OBJECT-TYPE

SYNTAX InterfaceIndexOrZero

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of ifIndex for the interface on which IP datagrams sent by these sources to this multicast address are received. A value of 0 indicates that datagrams are not subject to an incoming interface check, but may be accepted on multiple interfaces

(e.g.,

in CBT)."

::= { inetMRouteEntry 9 }

inetMRouteUpTime OBJECT-TYPE

SYNTAX TimeTicks

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The time since the multicast routing information represented by this entry was learned by the router."

::= { inetMRouteEntry 10 }

inetMRouteExpiryTime OBJECT-TYPE

SYNTAX TimeTicks

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The minimum amount of time remaining before this entry will be aged out. The value 0 indicates that the entry is not subject to aging."

::= { inetMRouteEntry 11 }

inetMRoutePkts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of packets which this router has received from these sources and addressed to this multicast

group

address."

::= { inetMRouteEntry 12 }

inetMRouteDifferentInIfPackets OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of packets which this router has received from these sources and addressed to this multicast

group

address, which were dropped because they were not received on the interface indicated by inetMRouteInIfIndex. Packets which are not subject to an incoming interface check (e.g., using CBT) are not counted."

::= { inetMRouteEntry 13 }

inetMRouteOctets OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of octets contained in IP datagrams which were received from these sources and addressed to this multicast group address, and which were forwarded by this router."

::= { inetMRouteEntry 14 }

inetMRouteProtocol OBJECT-TYPE

SYNTAX IANAipMRouteProtocol

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The multicast routing protocol via which this
multicast forwarding entry was learned."

::= { inetMRouteEntry 15 }

inetMRouteRtProto OBJECT-TYPE

SYNTAX IANAipRouteProtocol

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The routing mechanism via which the route used to find the upstream or parent interface for this multicast forwarding entry was learned. Inclusion of values for

routing protocols is not intended to imply that those protocols need be supported."
::= { inetMRouteEntry 16 }

inetMRouteRtAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-only

STATUS current

Thaler, Adams, Siadak Experimental/Expires Dec 2000

9

[draft-thaler-idmr-multicast-routemib-1](#)

June 2000

DESCRIPTION

"A value indicating the address family of the address contained in inetMRouteRtAddress. The value MUST be the same as the value of inetMRouteGroupType."

::= { inetMRouteEntry 17 }

inetMRouteRtAddress OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The address portion of the route used to find the upstream or parent interface for this multicast forwarding entry."

::= { inetMRouteEntry 18 }

inetMRouteRtMaskLen OBJECT-TYPE

SYNTAX INTEGER (0..128)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The length in bits of the mask associated with the route used to find the upstream or parent interface for this multicast forwarding entry."

::= { inetMRouteEntry 19 }

inetMRouteRtType OBJECT-TYPE

SYNTAX INTEGER {

unicast (1), -- Unicast route used in multicast RIB

multicast (2) -- Multicast route

}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The reason the given route was placed in the (logical) multicast Routing Information Base (RIB). A value of unicast means that the route would normally be placed

only in the unicast RIB, but was placed in the
multicast RIB (instead or in addition) due to local
configuration,
such as when running PIM over RIP. A value of
multicast means that the route was explicitly added to the
multicast RIB by the routing protocol, such as DVMRP or
Multiprotocol BGP."
::= { inetMRouteEntry 20 }

inetMRouteHCOctets OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

Thaler, Adams, Siadak Experimental/Expires Dec 2000

10

[draft-thaler-idmr-multicast-routemib-1](#)

June 2000

DESCRIPTION

"The number of octets contained in IP datagrams which
were received from these sources and addressed to this
multicast group address, and which were forwarded by
this router. This object is a 64-bit version of
inetMRouteOctets."

::= { inetMRouteEntry 21 }

--

-- The IP Multicast Routing Next Hop Table

--

inetMRouteNextHopTable OBJECT-TYPE

SYNTAX SEQUENCE OF InetMRouteNextHopEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The (conceptual) table containing information on the
next-hops on outgoing interfaces for routing IP
multicast datagrams. Each entry is one of a list of
next-hops on outgoing interfaces for particular sources
sending to a particular multicast group address."

::= { inetMRoute 3 }

inetMRouteNextHopEntry OBJECT-TYPE

SYNTAX InetMRouteNextHopEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry (conceptual row) in the list of next-hops on
outgoing interfaces to which IP multicast datagrams

from particular sources to a IP multicast group address are routed. Discontinuities in counters in this entry can be detected by observing the value of inetMRouteUpTime."

```

INDEX      { inetMRouteNextHopGroupType,
              inetMRouteNextHopGroup,
              inetMRouteNextHopSourceType,
              inetMRouteNextHopSource,
              inetMRouteNextHopSourceMaskLen,
              inetMRouteNextHopIfIndex,
              inetMRouteNextHopAddressType,
              inetMRouteNextHopAddress }
 ::= { inetMRouteNextHopTable 1 }

```

```

InetMRouteNextHopEntry ::= SEQUENCE {
    inetMRouteNextHopGroupType      InetAddressType,
    inetMRouteNextHopGroup          InetAddress,
    inetMRouteNextHopSourceType      InetAddressType,
    inetMRouteNextHopSource          InetAddress,
    inetMRouteNextHopSourceMaskLen  INTEGER,
    inetMRouteNextHopIfIndex         InterfaceIndex,

```

Thaler, Adams, Siadak Experimental/Expires Dec 2000 11
[draft-thaler-idmr-multicast-routemib-1](#) June 2000

```

    inetMRouteNextHopAddressType      InetAddressType,
    inetMRouteNextHopAddress          InetAddress,
    inetMRouteNextHopPruned           TruthValue,
    inetMRouteNextHopUpTime           TimeTicks,
    inetMRouteNextHopExpiryTime       TimeTicks,
    inetMRouteNextHopClosestMemberHops Integer32,
    inetMRouteNextHopProtocol         IANAipMRouteProtocol,
    inetMRouteNextHopPkts             Counter32
}

```

```

inetMRouteNextHopGroupType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A value indicating the address family of the address
        contained in inetMRouteNextHopGroup. Legal values
        correspond to the subset of address families for which
        multicast forwarding is supported."
    ::= { inetMRouteNextHopEntry 1 }

```

```

inetMRouteNextHopGroup OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS  not-accessible

```

STATUS current
 DESCRIPTION
 "The IP multicast group for which this entry specifies
 a next-hop on an outgoing interface."
 ::= { inetMRouteNextHopEntry 2 }

inetMRouteNextHopSourceType OBJECT-TYPE
 SYNTAX InetAddressType
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "A value indicating the address family of the address
 contained in inetMRouteNextHopSourceType. The value
 MUST be the same as the value of
 inetMRouteNextHopGroupType."
 ::= { inetMRouteNextHopEntry 3 }

inetMRouteNextHopSource OBJECT-TYPE
 SYNTAX InetAddress
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "The network address which when combined with the
 corresponding value of the mask specified in
 inetMRouteNextHopSourceMaskLen identifies the sources
 for which this entry specifies a next-hop on an
 outgoing

Thaler, Adams, Siadak Experimental/Expires Dec 2000 12
[draft-thaler-idmr-multicast-routemib-1](#) June 2000

interface."
 ::= { inetMRouteNextHopEntry 4 }

inetMRouteNextHopSourceMaskLen OBJECT-TYPE
 SYNTAX INTEGER (0..128)
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "The length in bits of the mask which when combined
 with the corresponding value specified in
 inetMRouteNextHopSource identifies the sources for
 which this entry specifies a next-hop on an outgoing
 interface."
 ::= { inetMRouteNextHopEntry 5 }

inetMRouteNextHopIfIndex OBJECT-TYPE

SYNTAX InterfaceIndex

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The ifIndex value of the interface for the outgoing interface for this next-hop."

::= { inetMRouteNextHopEntry 6 }

inetMRouteNextHopAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A value indicating the address family of the address contained in inetMRouteNextHopAddressType. The value MUST be the same as the value of inetMRouteNextHopGroupType."

::= { inetMRouteNextHopEntry 7 }

inetMRouteNextHopAddress OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The address of the next-hop specific to this entry. For most interfaces, this is identical to inetMRouteNextHopGroup. NBMA interfaces, however, may have multiple next-hop addresses out a single outgoing interface."

::= { inetMRouteNextHopEntry 8 }

inetMRouteNextHopPruned OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

Thaler, Adams, Siadak Experimental/Expires Dec 2000

13

[draft-thaler-idmr-multicast-routemib-1](#)

June 2000

DESCRIPTION

"An indication of whether the outgoing interface and next-hop represented by this entry is currently being used to forward IP datagrams. The value 'false' indicates it is currently being used; the value 'true' indicates it is not."

::= { inetMRouteNextHopEntry 9 }

inetMRouteNextHopUpTime OBJECT-TYPE

SYNTAX TimeTicks

```

MAX-ACCESS read-only
STATUS      current
DESCRIPTION
    "The time since the multicast routing information
    represented by this entry was learned by the router."
::= { inetMRouteNextHopEntry 10 }

inetMRouteNextHopExpiryTime OBJECT-TYPE
    SYNTAX      TimeTicks
    MAX-ACCESS read-only
    STATUS      current
    DESCRIPTION
        "The minimum amount of time remaining before this entry
        will be aged out.  If inetMRouteNextHopPruned is
        pruned(1), the remaining time until the prune expires
        and the state reverts to forwarding(2).  Otherwise, the
        remaining time until this entry is removed from the
        table.  The time remaining may be copied from
        inetMRouteExpiryTime if the protocol in use for this
        entry does not specify next-hop timers.  The value 0
        indicates that the entry is not subject to aging."
    ::= { inetMRouteNextHopEntry 11 }

inetMRouteNextHopClosestMemberHops OBJECT-TYPE
    SYNTAX      Integer32
    MAX-ACCESS read-only
    STATUS      current
    DESCRIPTION
        "The minimum number of hops between this router and any
        member of this IP multicast group reached via this
        next-hop on this outgoing interface.  Any IP multicast
        datagrams for the group which have a TTL (IPv4) or Hop
        Count (IPv6) less than this number of hops will not be
        forwarded to this next-hop."
    ::= { inetMRouteNextHopEntry 12 }

inetMRouteNextHopProtocol OBJECT-TYPE
    SYNTAX      IANAipMRouteProtocol
    MAX-ACCESS read-only
    STATUS      current
    DESCRIPTION
        "The routing mechanism via which this next-hop was
        learned."

Thaler, Adams, Siadak  Experimental/Expires Dec 2000
draft-thaler-idmr-multicast-routemib-1

```

```

::= { inetMRouteNextHopEntry 13 }

```

```

inetMRouteNextHopPkts OBJECT-TYPE

```



```

SYNTAX      Counter32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The number of packets which have been forwarded using
    this route."
::= { inetMRouteNextHopEntry 14 }

--
-- The Multicast Routing Interface Table
--

inetMRouteInterfaceTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF InetMRouteInterfaceEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The (conceptual) table containing multicast routing
        information specific to interfaces."
    ::= { inetMRoute 4 }

inetMRouteInterfaceEntry OBJECT-TYPE
    SYNTAX      InetMRouteInterfaceEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry (conceptual row) containing the multicast
        routing information for a particular interface."
    INDEX       { inetMRouteInterfaceIfIndex }
    ::= { inetMRouteInterfaceTable 1 }

InetMRouteInterfaceEntry ::= SEQUENCE {
    inetMRouteInterfaceIfIndex      InterfaceIndex,
    inetMRouteInterfaceTtl          Integer32,
    inetMRouteInterfaceProtocol     IANAipMRouteProtocol,
    inetMRouteInterfaceRateLimit    Integer32,
    inetMRouteInterfaceInMcastOctets Counter32,
    inetMRouteInterfaceOutMcastOctets Counter32,
    inetMRouteInterfaceHCInMcastOctets Counter64,
    inetMRouteInterfaceHCOutMcastOctets Counter64
}

inetMRouteInterfaceIfIndex OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The ifIndex value of the interface for which this
entry
        contains information."

```

::= { inetMRouteInterfaceEntry 1 }

inetMRouteInterfaceTtl OBJECT-TYPE

SYNTAX Integer32 (0..255)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The datagram TTL threshold for the interface. Any IP multicast datagrams with a TTL (IPv4) or Hop Count (IPv6) less than this threshold will not be forwarded out the interface. The default value of 0 means all multicast packets are forwarded out the interface."

::= { inetMRouteInterfaceEntry 2 }

inetMRouteInterfaceProtocol OBJECT-TYPE

SYNTAX IANAipMRouteProtocol

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The routing protocol running on this interface."

::= { inetMRouteInterfaceEntry 3 }

inetMRouteInterfaceRateLimit OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The rate-limit, in kilobits per second, of forwarded multicast traffic on the interface. A rate-limit of 0 indicates that no rate limiting is done."

DEFVAL { 0 }

::= { inetMRouteInterfaceEntry 4 }

inetMRouteInterfaceInMcastOctets OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of octets of multicast packets that have arrived on the interface, including framing characters. This object is similar to ifInOctets in the Interfaces MIB, except that only multicast packets are counted."

::= { inetMRouteInterfaceEntry 5 }

inetMRouteInterfaceOutMcastOctets OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current
 DESCRIPTION
 "The number of octets of multicast packets that have
 been sent on the interface."
 ::= { inetMRouteInterfaceEntry 6 }

Thaler, Adams, Siadak Experimental/Expires Dec 2000
 [draft-thaler-idmr-multicast-routemib-1](#)

16
 June 2000

inetMRouteInterfaceHCInMcastOctets OBJECT-TYPE
 SYNTAX Counter64
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The number of octets of multicast packets that have
 arrived on the interface, including framing characters.
 This object is a 64-bit version of
 inetMRouteInterfaceInMcastOctets. It is similar to
 ifHCInOctets in the Interfaces MIB, except that only
 multicast packets are counted."
 ::= { inetMRouteInterfaceEntry 7 }

inetMRouteInterfaceHCOutMcastOctets OBJECT-TYPE
 SYNTAX Counter64
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The number of octets of multicast packets that have
 been sent on the interface. This object is a 64-bit
 version of inetMRouteInterfaceOutMcastOctets."
 ::= { inetMRouteInterfaceEntry 8 }

--
 -- The IP Multicast Scope Boundary Table
 --

inetMRouteBoundaryTable OBJECT
 -TYPE

 SYNTAX SEQUENCE OF InetMRouteBoundaryEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "The (conceptual) table listing the router's scoped
 multicast address boundaries."
 ::= { inetMRoute 5 }

inetMRouteBoundaryEntry OBJECT-TYPE
 SYNTAX InetMRouteBoundaryEntry
 MAX-ACCESS not-accessible

```

STATUS      current
DESCRIPTION
    "An entry (conceptual row) in the
    inetMRouteBoundaryTable representing a scoped
boundary."
INDEX      { inetMRouteBoundaryIfIndex,
             inetMRouteBoundaryAddressType,
             inetMRouteBoundaryAddress,
             inetMRouteBoundaryAddressMaskLen }
::= { inetMRouteBoundaryTable 1 }

```

```

InetMRouteBoundaryEntry ::= SEQUENCE {
    inetMRouteBoundaryIfIndex      InterfaceIndex,
    inetMRouteBoundaryAddressType  InetAddressType,
}

```

Thaler, Adams, Siadak Experimental/Expires Dec 2000 17
[draft-thaler-idmr-multicast-routemib-1](#) June 2000

```

    inetMRouteBoundaryAddress      InetAddress,
    inetMRouteBoundaryAddressMaskLen  INTEGER,
inetMRouteBoundaryStatus          RowStatus
}

```

```

inetMRouteBoundaryIfIndex OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The IfIndex value for the interface to which this
        boundary applies.  Packets with a destination address
in
        the associated address/mask range will not be forwarded
        out this interface."
    ::= { inetMRouteBoundaryEntry 1 }

```

```

inetMRouteBoundaryAddressType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A value indicating the address family of the address
        contained in inetMRouteBoundaryAddress. Legal values
        correspond to the subset of address families for which
        multicast forwarding is supported."
    ::= { inetMRouteBoundaryEntry 2 }

```

```

inetMRouteBoundaryAddress OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS  not-accessible
    STATUS      current

```

DESCRIPTION

boundary "The group address which when combined with the corresponding value of inetMRouteBoundaryAddressMaskLen identifies the group range for which the scoped exists. Scoped IPv4 addresses must come from the range 239.x.x.x as specified in [RFC 2365](#). Scoped IPv6 addresses must come from range ff.nn.nn.nn.nn.nn.nn, where nn encodes the scope type and group identifier as specified in [RFC 2373](#)."

::= { inetMRouteBoundaryEntry 3 }

inetMRouteBoundaryAddressMaskLen OBJECT-TYPE

SYNTAX INTEGER (0..128)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

with "The length in bits of the mask which when combined the corresponding value of inetMRouteBoundaryAddress

Thaler, Adams, Siadak Experimental/Expires Dec 2000

[draft-thaler-idmr-multicast-routemib-1](#)

18

June 2000

boundary identifies the group range for which the scoped exists."

::= { inetMRouteBoundaryEntry 4 }

inetMRouteBoundaryStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of this row, by which new entries may be created, or old entries deleted from this table."

::= { inetMRouteBoundaryEntry 5 }

--
-- The IP Multicast Scope Name Table
--

inetMRouteScopeNameTable OBJECT-TYPE

SYNTAX SEQUENCE OF InetMRouteScopeNameEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The (conceptual) table listing the multicast scope names."

::= { inetMRoute 6 }

inetMRouteScopeNameEntry OBJECT-TYPE
SYNTAX InetMRouteScopeNameEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"An entry (conceptual row) in the
inetMRouteScopeNameTable representing a multicast scope
name."
INDEX { inetMRouteScopeNameAddressType,
inetMRouteScopeNameAddress,
inetMRouteScopeNameAddressMaskLen,
IMPLIED inetMRouteScopeNameLanguage }
::= { inetMRouteScopeNameTable 1 }

InetMRouteScopeNameEntry ::= SEQUENCE {
inetMRouteScopeNameAddressType InetAddressType,
inetMRouteScopeNameAddress InetAddress,
inetMRouteScopeNameAddressMaskLen INTEGER,
inetMRouteScopeNameLanguage LanguageTag,
inetMRouteScopeNameString SnmpAdminString,
inetMRouteScopeNameDefault TruthValue,
inetMRouteScopeNameStatus RowStatus
}

inetMRouteScopeNameAddressType OBJECT-TYPE
SYNTAX InetAddressType

Thaler, Adams, Siadak Experimental/Expires Dec 2000 19
[draft-thaler-idmr-multicast-routemib-1](#) June 2000

MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A value indicating the address family of the address
contained in inetMRouteScopeNameAddressType. Legal
values correspond to the subset of address families for
which multicast forwarding is supported."
::= { inetMRouteScopeNameEntry 1 }

inetMRouteScopeNameAddress OBJECT-TYPE
SYNTAX InetAddress
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The group address which when combined with the
corresponding value of
inetMRouteScopeNameAddressMaskLen
identifies the group range associated with the

multicast

scope. Scoped IPv4 addresses must come from the range 239.x.x.x. Scoped IPv6 addresses must come from range ff.nn.nn.nn.nn.nn.nn, where nn encodes the scope type and group identifier as specified in [RFC 2373](#)."

::= { inetMRouteScopeNameEntry 2 }

inetMRouteScopeNameAddressMaskLen OBJECT-TYPE

SYNTAX INTEGER (0..128)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The length in bits of the mask which when combined with the corresponding value of inetMRouteScopeNameAddress identifies the group range associated with the multicast scope."

::= { inetMRouteScopeNameEntry 3 }

inetMRouteScopeNameLanguage OBJECT-TYPE

SYNTAX LanguageTag

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The [RFC 1766](#)-style language tag associated with the scope name."

::= { inetMRouteScopeNameEntry 4 }

inetMRouteScopeNameString OBJECT-TYPE

SYNTAX SnmpAdminString

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The textual name associated with the multicast scope. The value of this object should be suitable for

Thaler,Adams,Siadak Experimental/Expires Dec 2000

[draft-thaler-idmr-multicast-routemib-1](#)

20

June 2000

displaying to end-users, such as when allocating a multicast address in this scope. When no name is specified, the default value of this object for IPv4 should be the string 239.x.x.x/y with x and y replaced appropriately to describe the address and mask length associated with the scope. Scoped IPv6 addresses must come from range ff.nn.nn.nn.nn.nn.nn, where nn encodes the scope type and group identifier."

::= { inetMRouteScopeNameEntry 5 }

```

inetMRouteScopeNameDefault OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "If true, indicates a preference that the name in the
        following language should be used by applications if no
        name is available in a desired language."
    DEFVAL { false }
    ::= { inetMRouteScopeNameEntry 6 }

```

```

inetMRouteScopeNameStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The status of this row, by which new entries may be
        created, or old entries deleted from this table."
    ::= { inetMRouteScopeNameEntry 7 }

```

-- conformance information

```

inetMRouteMIBConformance
    OBJECT IDENTIFIER ::= { inetMRouteStdMIB 2 }
inetMRouteMIBCompliances
    OBJECT IDENTIFIER ::= { inetMRouteMIBConformance
1 }
inetMRouteMIBGroups OBJECT IDENTIFIER ::= {
inetMRouteMIBConformance 2 }

```

-- compliance statements

```

inetMRouteMIBCompliance MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "The compliance statement for the IP Multicast MIB."
    MODULE -- this module
    MANDATORY-GROUPS { inetMRouteMIBBasicGroup,
        inetMRouteMIBRouteGroup}

    GROUP      inetMRouteMIBBoundaryGroup
    DESCRIPTION
        "This group is mandatory if the router supports

```

Thaler, Adams, Siadak Experimental/Expires Dec 2000 21
[draft-thaler-idmr-multicast-routemib-1](#) June 2000

administratively-scoped multicast address boundaries."

```

OBJECT      inetMRouteBoundaryStatus
MIN-ACCESS  read-only

```



```

DESCRIPTION
    "Write access is not required."

OBJECT      inetMRouteScopeNameStatus
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

GROUP      inetMRouteMIBHCInterfaceGroup
DESCRIPTION
    "This group is mandatory only for those network
    interfaces for which the value of the corresponding
    instance of ifSpeed is greater than 20,000,000
    bits/second."

 ::= { inetMRouteMIBCompliances 1 }

-- units of conformance
inetMRouteMIBBasicGroup OBJECT-GROUP
    OBJECTS { inetMRouteEnabled, inetMRouteEntryCount,
               inetMRouteUpstreamNeighborType,
               inetMRouteUpstreamNeighbor,
               inetMRouteInIfIndex,
               inetMRouteUpTime, inetMRouteExpiryTime,
               inetMRouteNextHopPruned,
               inetMRouteNextHopUpTime,
               inetMRouteNextHopExpiryTime,
               inetMRouteNextHopProtocol,
               inetMRouteNextHopPkts,
               inetMRouteInterfaceTtl,
               inetMRouteInterfaceProtocol,
               inetMRouteInterfaceRateLimit,
               inetMRouteInterfaceInMcastOctets,
               inetMRouteInterfaceOutMcastOctets,
               inetMRouteProtocol
            }
    STATUS current
    DESCRIPTION
        "A collection of objects to support basic management of
        IP Multicast routing."
    ::= { inetMRouteMIBGroups 1 }

inetMRouteMIBHopCountGroup OBJECT-GROUP
    OBJECTS { inetMRouteNextHopClosestMemberHops }
    STATUS current
    DESCRIPTION
        "A collection of objects to support management of the
        use of hop counts in IP Multicast routing."
    ::= { inetMRouteMIBGroups 2 }

```

```
inetMRouteMIBBoundaryGroup OBJECT-GROUP
    OBJECTS { inetMRouteBoundaryStatus, inetMRouteScopeNameString,
               inetMRouteScopeNameDefault, inetMRouteScopeNameStatus
    }
    STATUS current
    DESCRIPTION
        "A collection of objects to support management of
scoped
        multicast address boundaries."
    ::= { inetMRouteMIBGroups 3 }

inetMRouteMIBPktsOutGroup OBJECT-GROUP
    OBJECTS { inetMRouteNextHopPkts }
    STATUS current
    DESCRIPTION
        "A collection of objects to support management of
packet
        counters for each outgoing interface entry of a route."
    ::= { inetMRouteMIBGroups 4 }

inetMRouteMIBHCInterfaceGroup OBJECT-GROUP
    OBJECTS { inetMRouteInterfaceHCInMcastOctets,
               inetMRouteInterfaceHCOutMcastOctets,
               inetMRouteHCOctets }
    STATUS current
    DESCRIPTION
        "A collection of objects providing information specific
        to high speed (greater than 20,000,000 bits/second)
        network interfaces."
    ::= { inetMRouteMIBGroups 5 }

inetMRouteMIBRouteGroup OBJECT-GROUP
    OBJECTS { inetMRouteRtProto, inetMRouteRtAddressType,
               inetMRouteRtAddress,
               inetMRouteRtMaskLen , inetMRouteRtType }
    STATUS current
    DESCRIPTION
        "A collection of objects providing information on the
        relationship between multicast routing information,
        and the IP Forwarding Table."
    ::= { inetMRouteMIBGroups 6 }

inetMRouteMIBPktsGroup OBJECT-GROUP
    OBJECTS { inetMRoutePkts, inetMRouteDifferentInIfPackets,
               inetMRouteOctets }
    STATUS current
    DESCRIPTION
```

"A collection of objects to support management of
packet
counters for each forwarding entry."
::= { inetMRouteMIBGroups 7 }

Thaler, Adams, Siadak Experimental/Expires Dec 2000

23

[draft-thaler-idmr-multicast-routemib-1](#)

June 2000

END

6. IANA Considerations

The ipMRouteRtProto, ipMRouteNextHopProtocol, ipMRouteInterfaceProtocol, and ipMRouteProtocol use textual conventions imported from the IANA-RTPROTO-MIB. The purpose of defining these textual conventions in a separate MIB module is to allow additional values to be defined without having to issue a new version of this document. The Internet Assigned Numbers Authority (IANA) is responsible for the assignment of all Internet numbers, including various SNMP- related numbers; it will administer the values associated with these textual conventions. The rules for additions or changes to the IANA-RTPROTO-MIB are outlined in the DESCRIPTION clause associated with its MODULE-IDENTITY statement. The current versions of the IANA-RTPROTO-MIB can be accessed from the IANA home page at: "http://www.iana.org/".

7. Security Considerations

This MIB contains readable objects whose values provide information related to multicast routing, including information on what machines are sending to which groups. There are also a number of objects that have a MAX-ACCESS clause of read-write and/or read-create, such as those which allow an administrator to configure multicast boundaries.

While unauthorized access to the readable objects is relatively innocuous, unauthorized access to the write-able objects could cause a denial of service, or could cause wider distribution of packets intended only for local distribution. Hence, the support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

SNMPv1 by itself is such an insecure environment. Even if the network itself is secure (for example by using IPSec), even then, there is no control as to who on the secure network is allowed to access and SET (change/create/delete) the objects in this MIB.

It is recommended that the implementers consider the security features as provided by the SNMPv3 framework. Specifically, the

use of the User-based Security Model [RFC 2574](#) [20] and the View-based Access Control Model [RFC 2575](#) [23] is recommended.

It is then a customer/user responsibility to ensure that the SNMP entity giving access to this MIB, is properly configured to give access to those objects only to those principals (users) that have legitimate rights to access them.

8. Intellectual Property Notice

The IETF takes no position regarding the validity or scope of any

Thaler, Adams, Siadak Experimental/Expires Dec 2000

24

[draft-thaler-idmr-multicast-routemib-1](#)

June 2000

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10. Acknowledgements

This MIB module was updated based on feedback from the IETF's Inter-Domain Multicast Routing (IDMR) Working Group.

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Thaler, Adams, Siadak Experimental/Expires Dec 2000 25
[draft-thaler-idmr-multicast-routemib-1](#) June 2000

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26
June 2000

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[draft-thaler-idmr-multicast-routemib-1](#)

27

June 2000

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Table of Contents

1. Abstract.....	1
2. Introduction.....	1
3. The SNMP Management Framework.....	1
4. Overview.....	2
5. Definitions.....	3
6. IANA Considerations.....	24
7. Security Considerations.....	24
8. Intellectual Property Notice.....	24
10. Acknowledgements.....	25
11. Authors' Addresses.....	25
12. References.....	25
11. Full Copyright Statement.....	28