

MBONED WG
Internet-Draft
Expires: December 7, 2006

Obsoletes (if approved): [RFC2932](#)

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June 5, 2006

IP Multicast MIB
draft-ietf-mboned-ip-mcast-mib-01.txt

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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes objects used for managing multicast function, independent of the specific multicast protocol(s) in use. This document obsoletes [RFC 2932](#).

Table of Contents

1.	Introduction	3
2.	History	3
3.	The Internet-Standard Management Framework	3
4.	Overview	4
5.	Definitions	4
6.	Security Considerations	41
6.1	SNMPv2	41
6.2	Writeable objects	41
6.3	Readable objects	42
7.	IANA Considerations	44
8.	Acknowledgements	44
9.	References	45
9.1	Normative References	45
9.2	Informative References	45
	Authors' Addresses	46
	Intellectual Property and Copyright Statements	48

1. Introduction

This MIB describes objects used for managing IP multicast function, including IP multicast routing. These objects are independent of the specific multicast routing protocol in use. Managed objects specific to particular multicast protocols are defined elsewhere.

2. History

This document obsoletes [[RFC2932](#)]. The MIB module defined by this document is a re-working of the MIB module from [[RFC2932](#)], with changes that include the following.

- o This MIB module is independent of address type, whereas [[RFC2932](#)] only supported IPv4.
- o This MIB module allows several multicast protocols to perform routing on a single interface, where [[RFC2932](#)] assumed each interface supported at most one multicast routing protocol.
- o This MIB module includes objects that are not specific to multicast routing. It allows management of multicast function on systems that do not perform routing, whereas [RFC 2932](#) was restricted to multicast routing.
- o This MIB module includes a table of Source-Specific Multicast (SSM) address ranges to which SSM semantics [[RFC3569](#)] should be applied.
- o This MIB module includes a table of local applications that are receiving multicast data.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [[RFC2119](#)].

3. The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to [section 7 of \[RFC3410\]](#).

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIV2, which is described in STD 58,

([\[RFC2578\]](#), [\[RFC2579\]](#) and [\[RFC2580\]](#)).

4. Overview

This MIB module contains two scalars and seven tables. The tables are:

1. The IP Multicast Interface Table containing multicast information specific to interfaces.
2. The IP Multicast SSM Range Table, which contains one row per range of multicast group addresses to which Source-Specific Multicast semantics [\[RFC3569\]](#) should be applied.
3. The IP Multicast Route Table containing multicast routing information for IP datagrams sent by particular sources to the IP multicast groups known to a system.
4. The IP Multicast Routing Next Hop Table containing information on next-hops for the routing of 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.
5. The IP Multicast Scope Boundary Table containing the boundaries configured for multicast scopes [\[RFC2365\]](#).
6. The IP Multicast Scope Name Table containing human-readable names of multicast scope.
7. The IP Multicast Local Listener Table containing identifiers for local applications that are receiving multicast data.

This MIB module uses textual conventions defined in the IF-MIB [\[RFC2863\]](#), the INET-ADDRESS-MIB [\[RFC4001\]](#) and the IANA-RTPROTO-MIB.

5. Definitions

```
IPMCAST-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    MODULE-IDENTITY, OBJECT-TYPE,  
    mib-2, Unsigned32, Counter32,  
    Counter64, Gauge32, TimeTicks      FROM SNMPv2-SMI  
    RowStatus, TEXTUAL-CONVENTION,  
    TruthValue, StorageType,  
    TimeStamp                          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,
InetAddressPrefixLength FROM INET-ADDRESS-MIB;

ipMcastMIB MODULE-IDENTITY

LAST-UPDATED "200606050000Z" -- 5 June 2006

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DESCRIPTION

"The MIB module for management of IP Multicast function.

This MIB module contains information about IP Multicast routing, data forwarding, and data reception. This MIB module is independent of the multicast protocol(s) and address type(s) that are in use.

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-- RFC Ed.: replace yyyy with actual RFC number & remove this note
REVISION "200606050000Z" -- 5 June 2006

DESCRIPTION

"Changes from [RFC 2932](#):

- 1) This MIB module is independent of address type, whereas [RFC 2932](#) only supported IPv4.
- 2) This MIB module allows several multicast protocols to perform routing on a single interface, whereas [RFC 2932](#) assumed each interface supported at most one multicast routing protocol. This MIB module retains but deprecates the object ipMcastInterfaceProtocol.
- 3) This MIB module includes objects that are not specific to multicast routing. It allows management of multicast function on systems that do not perform routing, whereas [RFC 2932](#) was restricted to multicast routing.
- 4) This MIB module includes a table of Source-Specific Multicast (SSM) address ranges to which [RFC 3569](#) SSM semantics should be applied.
- 5) This MIB module includes a table of local applications that are receiving multicast data.

Published as RFC yyyy."

-- RFC Ed.: replace yyyy with actual RFC number & remove this note

::= { mib-2 XXX }

-- RFC Ed.: replace XXX with IANA-assigned number & remove this note

--

-- Textual conventions

--

LanguageTag ::= TEXTUAL-CONVENTION

DISPLAY-HINT "99a"

STATUS current

DESCRIPTION

"A 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."

REFERENCE "[RFC 3283](#)"

SYNTAX OCTET STRING (SIZE (1..99))


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

ipMcastMIBObjects OBJECT IDENTIFIER ::= { ipMcastMIB 1 }

ipMcast      OBJECT IDENTIFIER ::= { ipMcastMIBObjects 1 }

ipMcastEnable OBJECT-TYPE
    SYNTAX      INTEGER { enabled(1), disabled(2) }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The enabled status of IP Multicast function on this
        system."
    ::= { ipMcast 1 }

ipMcastRouteEntryCount OBJECT-TYPE
    SYNTAX      Gauge32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of rows in the ipMcastRouteTable.  This can be
        used to check for multicast routing activity, and to monitor
        the multicast routing table size."
    ::= { ipMcast 7 }

--
-- The Multicast Interface Table
--

ipMcastInterfaceTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF IpMcastInterfaceEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The (conceptual) table used to manage the multicast
        protocol active on an interface."
    ::= { ipMcast 4 }

ipMcastInterfaceEntry OBJECT-TYPE
    SYNTAX      IpMcastInterfaceEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry (conceptual row) containing the multicast protocol
        information for a particular interface."
    INDEX      { ipMcastInterfaceIfIndex }
```



```
::= { ipMcastInterfaceTable 1 }
```

```
IpMcastInterfaceEntry ::= SEQUENCE {  
    ipMcastInterfaceIfIndex      InterfaceIndex,  
    ipMcastInterfaceTtl          Unsigned32,  
    ipMcastInterfaceProtocol     IANAipMRouteProtocol,  
    ipMcastInterfaceRateLimit    Unsigned32,  
    ipMcastInterfaceInMcastOctets Counter32,  
    ipMcastInterfaceOutMcastOctets Counter32,  
    ipMcastInterfaceInMcastPkts  Counter32,  
    ipMcastInterfaceOutMcastPkts Counter32,  
    ipMcastInterfaceHCInMcastOctets Counter64,  
    ipMcastInterfaceHCOutMcastOctets Counter64,  
    ipMcastInterfaceHCInMcastPkts Counter64,  
    ipMcastInterfaceHCOutMcastPkts Counter64  
}
```

```
ipMcastInterfaceIfIndex OBJECT-TYPE  
    SYNTAX      InterfaceIndex  
    MAX-ACCESS  not-accessible  
    STATUS      current  
    DESCRIPTION  
        "The ifIndex value of the interface for which this entry  
        contains information."  
    ::= { ipMcastInterfaceEntry 1 }
```

```
ipMcastInterfaceTtl OBJECT-TYPE  
    SYNTAX      Unsigned32 (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."  
    DEFVAL      { 0 }  
    ::= { ipMcastInterfaceEntry 2 }
```

```
ipMcastInterfaceProtocol OBJECT-TYPE  
    SYNTAX      IANAipMRouteProtocol  
    MAX-ACCESS  read-write  
    STATUS      deprecated  
    DESCRIPTION  
        "The multicast protocol running on this interface.  
  
        More than one multicast protocol can be used on an  
        interface, so this object is ambiguous. Use of this
```


object is deprecated."
 ::= { ipMcastInterfaceEntry 3 }

ipMcastInterfaceRateLimit OBJECT-TYPE

SYNTAX Unsigned32 (0..2147483647)
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 }
 ::= { ipMcastInterfaceEntry 4 }

ipMcastInterfaceInMcastOctets 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."
 ::= { ipMcastInterfaceEntry 5 }

ipMcastInterfaceOutMcastOctets 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."
 ::= { ipMcastInterfaceEntry 6 }

ipMcastInterfaceInMcastPkts OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The number of multicast packets that have arrived on the
 interface. In many cases, this object is identical to
 ifInMulticastPkts in the Interfaces MIB.

However, some implementations use ifXTable for Layer 2
 traffic statistics and ipMcastInterfaceTable at Layer 3. In
 this case a difference between these objects probably
 indicates that some Layer 3 multicast packets are being
 transmitted as unicast at Layer 2."

REFERENCE "[RFC 2863](#) ifInMulticastPkts"
 ::= { ipMcastInterfaceEntry 7 }

ipMcastInterfaceOutMcastPkts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of multicast packets that have been sent on the interface. In many cases, this object is identical to ifOutMulticastPkts in the Interfaces MIB.

However, some implementations use ifXTable for Layer 2 traffic statistics and ipMcastInterfaceTable at Layer 3. In this case a difference between these objects probably indicates that some Layer 3 multicast packets are being transmitted as unicast at Layer 2."

REFERENCE "[RFC 2863](#) ifOutMulticastPkts"
 ::= { ipMcastInterfaceEntry 8 }

ipMcastInterfaceHCInMcastOctets 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 ipMcastRouteInterfaceInMcastOctets. It is similar to ifHCInOctets in the Interfaces MIB, except that only multicast packets are counted."

::= { ipMcastInterfaceEntry 9 }

ipMcastInterfaceHCOutMcastOctets 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 ipMcastRouteInterfaceOutMcastOctets."

::= { ipMcastInterfaceEntry 10 }

ipMcastInterfaceHCInMcastPkts OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of multicast packets that have arrived on the

interface. In many cases, this object is identical to ifHCInMulticastPkts in the Interfaces MIB.

However, some implementations use ifXTable for Layer 2 traffic statistics and ipMcastInterfaceTable at Layer 3. In this case a difference between these objects probably indicates that some Layer 3 multicast packets are being transmitted as unicast at Layer 2."

REFERENCE "[RFC 2863](#) ifHCInMulticastPkts"

::= { ipMcastInterfaceEntry 11 }

ipMcastInterfaceHCOutMcastPkts OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of multicast packets that have been sent on the interface. In many cases, this object is identical to ifHCOutMulticastPkts in the Interfaces MIB.

However, some implementations use ifXTable for Layer 2 traffic statistics and ipMcastInterfaceTable at Layer 3. In this case a difference between these objects probably indicates that some Layer 3 multicast packets are being transmitted as unicast at Layer 2."

REFERENCE "[RFC 2863](#) ifHCOutMulticastPkts"

::= { ipMcastInterfaceEntry 12 }

--

-- The SSM Range Table

--

ipMcastSsmRangeTable OBJECT-TYPE

SYNTAX SEQUENCE OF IpMcastSsmRangeEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table is used to create and manage the range(s) of group addresses to which SSM semantics should be applied."

REFERENCE "[RFC 3569](#)"

::= { ipMcast 8 }

ipMcastSsmRangeEntry OBJECT-TYPE

SYNTAX IpMcastSsmRangeEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry (conceptual row) in the ssmRangeTable."


```
INDEX      { ipMcastSsmRangeAddressType,
              ipMcastSsmRangeAddress,
              ipMcastSsmRangePrefixLength }
 ::= { ipMcastSsmRangeTable 1 }
```

```
IpMcastSsmRangeEntry ::= SEQUENCE {
    ipMcastSsmRangeAddressType  InetAddressType,
    ipMcastSsmRangeAddress      InetAddress,
    ipMcastSsmRangePrefixLength InetAddressPrefixLength,
    ipMcastSsmRangeRowStatus    RowStatus,
    ipMcastSsmRangeStorageType  StorageType
}
```

ipMcastSsmRangeAddressType OBJECT-TYPE

```
SYNTAX      InetAddressType
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The address type of the multicast group prefix."
 ::= { ipMcastSsmRangeEntry 1 }
```

ipMcastSsmRangeAddress OBJECT-TYPE

```
SYNTAX      InetAddress (SIZE (4|8|16|20))
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The multicast group address which, when combined with
    ipMcastSsmRangePrefixLength, gives the group prefix for this
    SSM range. The InetAddressType is given by the
    ipMcastSsmRangeAddressType object.
```

This address object is only significant up to ipMcastSsmRangePrefixLength bits. The remainder of the address bits are zero. This is especially important for this index field, which is part of the index of this entry. Any non-zero bits would signify an entirely different entry.

For IPv6 SSM address ranges, only ranges within the space FF3x::/32 are permitted (where 'x' is any valid scope).

To configure non-global scope SSM range entries within a zone, consistent ipMcastBoundaryTable entries are required on routers at the zone boundary."

```
REFERENCE "RFC 4291 section 2.7 and RFC 3306 section 6"
 ::= { ipMcastSsmRangeEntry 2 }
```

ipMcastSsmRangePrefixLength OBJECT-TYPE

SYNTAX InetAddressPrefixLength (4..128)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The multicast group prefix length, which, when combined with ipMcastSsmRangeAddress, gives the group prefix for this SSM range. The InetAddressType is given by the ipMcastSsmRangeAddressType object. If 'ipv4' or 'ipv4z', this object must be in the range 4..32. If ipMcastSsmRangeAddressType is 'ipv6' or 'ipv6z', this object must be in the range 8..128."

::= { ipMcastSsmRangeEntry 3 }

ipMcastSsmRangeRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of this row, by which rows in this table can be created and destroyed.

This status object can be set to active(1) without setting any other columnar objects in this entry.

All writeable objects in this entry can be modified when the status of this entry is active(1)."

::= { ipMcastSsmRangeEntry 4 }

ipMcastSsmRangeStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The storage type for this row. Rows having the value 'permanent' need not allow write-access to any columnar objects in the row."

DEFVAL { nonVolatile }

::= { ipMcastSsmRangeEntry 5 }

--

-- The IP Multicast Routing Table

--

ipMcastRouteTable OBJECT-TYPE

SYNTAX SEQUENCE OF IpMcastRouteEntry

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."

::= { ipMcast 2 }

ipMcastRouteEntry OBJECT-TYPE

SYNTAX IpMcastRouteEntry

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."

INDEX { ipMcastRouteGroupAddressType,
ipMcastRouteGroup,
ipMcastRouteGroupPrefixLength,
ipMcastRouteSourceAddressType,
ipMcastRouteSource,
ipMcastRouteSourcePrefixLength }

::= { ipMcastRouteTable 1 }

IpMcastRouteEntry ::= SEQUENCE {

ipMcastRouteGroupAddressType	InetAddressType,
ipMcastRouteGroup	InetAddress,
ipMcastRouteGroupPrefixLength	InetAddressPrefixLength,
ipMcastRouteSourceAddressType	InetAddressType,
ipMcastRouteSource	InetAddress,
ipMcastRouteSourcePrefixLength	InetAddressPrefixLength,
ipMcastRouteUpstreamNeighborType	InetAddressType,
ipMcastRouteUpstreamNeighbor	InetAddress,
ipMcastRouteInIfIndex	InterfaceIndexOrZero,
ipMcastRouteTimeStamp	TimeStamp,
ipMcastRouteExpiryTime	TimeTicks,
ipMcastRoutePkts	Counter32,
ipMcastRouteDifferentInIfPackets	Counter32,
ipMcastRouteOctets	Counter32,
ipMcastRouteProtocol	IANAipMRouteProtocol,
ipMcastRouteRtProtocol	IANAipRouteProtocol,
ipMcastRouteRtAddressType	InetAddressType,
ipMcastRouteRtAddress	InetAddress,
ipMcastRouteRtPrefixLength	InetAddressPrefixLength,
ipMcastRouteRtType	INTEGER,
ipMcastRouteHCOctets	Counter64,
ipMcastRouteDifferentInIfOctets	Counter32

}

ipMcastRouteGroupAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A value indicating the address family of the address contained in ipMcastRouteGroup. Legal values correspond to the subset of address families for which multicast forwarding is supported."

::= { ipMcastRouteEntry 1 }

ipMcastRouteGroup OBJECT-TYPE

SYNTAX InetAddress (SIZE (0|4|8|16|20))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The IP multicast group address which when combined with the corresponding value specified in ipMcastRouteGroupPrefixLength identifies the groups for which this entry contains multicast routing information."

This address object is only significant up to ipMcastRouteGroupPrefixLength bits. The remainder of the address bits are zero. This is especially important for this index field, which is part of the index of this entry. Any non-zero bits would signify an entirely different entry."

::= { ipMcastRouteEntry 2 }

ipMcastRouteGroupPrefixLength OBJECT-TYPE

SYNTAX InetAddressPrefixLength (4..128)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The length in bits of the mask which when combined with the corresponding value of ipMcastRouteGroup identifies the groups for which this entry contains multicast routing information."

::= { ipMcastRouteEntry 3 }

ipMcastRouteSourceAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

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

::= { ipMcastRouteEntry 4 }

ipMcastRouteSource OBJECT-TYPE

SYNTAX InetAddress (SIZE (0|4|8|16|20))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The network address which when combined with the corresponding value of ipMcastRouteSourcePrefixLength identifies the sources for which this entry contains multicast routing information.

This address object is only significant up to ipMcastRouteGroupPrefixLength bits. The remainder of the address bits are zero. This is especially important for this index field, which is part of the index of this entry. Any non-zero bits would signify an entirely different entry."

::= { ipMcastRouteEntry 5 }

ipMcastRouteSourcePrefixLength OBJECT-TYPE

SYNTAX InetAddressPrefixLength (4..128)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The length in bits of the mask which when combined with the corresponding value of ipMcastRouteSource identifies the sources for which this entry contains multicast routing information."

::= { ipMcastRouteEntry 6 }

ipMcastRouteUpstreamNeighborType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { ipMcastRouteEntry 7 }

ipMcastRouteUpstreamNeighbor OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The address of the upstream neighbor (for example, RPF neighbor) from which IP datagrams from these sources to this multicast address are received. If the upstream neighbor is unknown, then ipMcastRouteUpstreamNeighbor

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 (for example,
in BIDIR-PIM)."

::= { ipMcastRouteEntry 8 }

ipMcastRouteInIfIndex 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 (for example, in BIDIR-PIM)."

::= { ipMcastRouteEntry 9 }

ipMcastRouteTimeStamp OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime at which the multicast routing
information represented by this entry was learned by the
router."

::= { ipMcastRouteEntry 10 }

ipMcastRouteExpiryTime 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. If ipMcastRouteNextHopState is pruned(1),
this object represents the remaining time until the prune
expires. If this timer expires, state reverts to
forwarding(2). Otherwise, this object represents the time
until this entry is removed from the table."

::= { ipMcastRouteEntry 11 }

ipMcastRoutePkts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of packets routed using this multicast route
entry."

Discontinuities in this monotonically increasing value occur at re-initialization of the management system. Discontinuities can also occur as a result of routes being removed and replaced, which can be detected by observing the value of ipMcastRouteTimeStamp."

::= { ipMcastRouteEntry 12 }

ipMcastRouteDifferentInIfPackets 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 ipMcastRouteInIfIndex. Packets which are not subject to an incoming interface check (for example, using BIDIR-PIM) are not counted.

If this counter increases rapidly, this indicates a problem. A significant quantity of multicast data is arriving at this router on unexpected RPF paths (Reverse Path Forwarding paths; the unicast routes to the expected origin of multicast data flows), and is not being forwarded.

For guidance, if the rate of increase of this counter exceeds 1% of the rate of increase of ipMcastRoutePkts, then there are multicast routing problems that require investigation.

Discontinuities in this monotonically increasing value occur at re-initialization of the management system. Discontinuities can also occur as a result of routes being removed and replaced, which can be detected by observing the value of ipMcastRouteTimeStamp."

::= { ipMcastRouteEntry 13 }

ipMcastRouteOctets 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.

Discontinuities in this monotonically increasing value occur at re-initialization of the management system.

Discontinuities can also occur as a result of routes being removed and replaced, which can be detected by observing the value of ipMcastRouteTimeStamp."

::= { ipMcastRouteEntry 14 }

ipMcastRouteProtocol OBJECT-TYPE

SYNTAX IANAipMRouteProtocol

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { ipMcastRouteEntry 15 }

ipMcastRouteRtProtocol 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."

::= { ipMcastRouteEntry 16 }

ipMcastRouteRtAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { ipMcastRouteEntry 17 }

ipMcastRouteRtAddress 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.

This address object is only significant up to ipMcastRouteGroupPrefixLength bits. The remainder of the address bits are zero."

::= { ipMcastRouteEntry 18 }

ipMcastRouteRtPrefixLength OBJECT-TYPE

SYNTAX InetAddressPrefixLength (4..128)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { ipMcastRouteEntry 19 }

ipMcastRouteRtType 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."

::= { ipMcastRouteEntry 20 }

ipMcastRouteHCOctets OBJECT-TYPE

SYNTAX Counter64

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. This object is a 64-bit version of ipMcastRouteOctets."

Discontinuities in this monotonically increasing value occur at re-initialization of the management system. Discontinuities can also occur as a result of routes being removed and replaced, which can be detected by observing the value of ipMcastRouteTimeStamp."

::= { ipMcastRouteEntry 21 }

ipMcastRouteDifferentInIfOctets OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of octets contained in IP datagrams 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 ipMcastRouteInIfIndex. Octets in IP datagrams which are not subject to an incoming interface check (for example, using BIDIR-PIM) are not counted.

If this counter increases rapidly, this indicates a problem. A significant quantity of multicast data is arriving at this router on unexpected RPF paths (Reverse Path Forwarding paths; the unicast routes to the expected origin of multicast data flows), and is not being forwarded.

For guidance, if the rate of increase of this counter exceeds 1% of the rate of increase of ipMcastRouteOctets, then there are multicast routing problems that require investigation.

Discontinuities in this monotonically increasing value occur at re-initialization of the management system. Discontinuities can also occur as a result of routes being removed and replaced, which can be detected by observing the value of ipMcastRouteTimeStamp."

::= { ipMcastRouteEntry 22 }

--

-- The IP Multicast Routing Next Hop Table

--

ipMcastRouteNextHopTable OBJECT-TYPE

SYNTAX SEQUENCE OF IpMcastRouteNextHopEntry

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."

::= { ipMcast 3 }

ipMcastRouteNextHopEntry OBJECT-TYPE

SYNTAX IpMcastRouteNextHopEntry

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 an IP multicast group address are routed."

```
INDEX      { ipMcastRouteNextHopGroupAddressType,
              ipMcastRouteNextHopGroup,
              ipMcastRouteNextHopSourceAddressType,
              ipMcastRouteNextHopSource,
              ipMcastRouteNextHopSourcePrefixLength,
              ipMcastRouteNextHopIfIndex,
              ipMcastRouteNextHopAddressType,
              ipMcastRouteNextHopAddress }
 ::= { ipMcastRouteNextHopTable 1 }
```

```
IpMcastRouteNextHopEntry ::= SEQUENCE {
    ipMcastRouteNextHopGroupAddressType    InetAddressType,
    ipMcastRouteNextHopGroup                InetAddress,
    ipMcastRouteNextHopSourceAddressType    InetAddressType,
    ipMcastRouteNextHopSource               InetAddress,
    ipMcastRouteNextHopSourcePrefixLength   InetAddressPrefixLength,
    ipMcastRouteNextHopIfIndex              InterfaceIndex,
    ipMcastRouteNextHopAddressType          InetAddressType,
    ipMcastRouteNextHopAddress              InetAddress,
    ipMcastRouteNextHopState                INTEGER,
    ipMcastRouteNextHopTimeStamp            TimeStamp,
    ipMcastRouteNextHopExpiryTime           TimeTicks,
    ipMcastRouteNextHopClosestMemberHops    Unsigned32,
    ipMcastRouteNextHopProtocol             IANAipMRouteProtocol,
    ipMcastRouteNextHopPkts                 Counter32,
    ipMcastRouteNextHopOctets               Counter32
}
```

ipMcastRouteNextHopGroupAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A value indicating the address family of the address contained in ipMcastRouteNextHopGroup. Legal values correspond to the subset of address families for which multicast forwarding is supported."

```
::= { ipMcastRouteNextHopEntry 1 }
```

ipMcastRouteNextHopGroup OBJECT-TYPE

SYNTAX InetAddress (SIZE (0|4|8|16|20))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The IP multicast group for which this entry specifies a next-hop on an outgoing interface."

::= { ipMcastRouteNextHopEntry 2 }

ipMcastRouteNextHopSourceAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

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

::= { ipMcastRouteNextHopEntry 3 }

ipMcastRouteNextHopSource OBJECT-TYPE

SYNTAX InetAddress (SIZE (0|4|8|16|20))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The network address which when combined with the corresponding value of the mask specified in ipMcastRouteNextHopSourcePrefixLength identifies the sources for which this entry specifies a next-hop on an outgoing interface.

This address object is only significant up to ipMcastRouteNextHopSourcePrefixLength bits. The remainder of the address bits are zero. This is especially important for this index field, which is part of the index of this entry. Any non-zero bits would signify an entirely different entry."

::= { ipMcastRouteNextHopEntry 4 }

ipMcastRouteNextHopSourcePrefixLength OBJECT-TYPE

SYNTAX InetAddressPrefixLength (4..128)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The length in bits of the mask which when combined with the corresponding value specified in ipMcastRouteNextHopSource identifies the sources for which this entry specifies a next-hop on an outgoing interface."

::= { ipMcastRouteNextHopEntry 5 }

ipMcastRouteNextHopIfIndex 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."

::= { ipMcastRouteNextHopEntry 6 }

ipMcastRouteNextHopAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

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

::= { ipMcastRouteNextHopEntry 7 }

ipMcastRouteNextHopAddress OBJECT-TYPE

SYNTAX InetAddress (SIZE (0|4|8|16|20))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

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

::= { ipMcastRouteNextHopEntry 8 }

ipMcastRouteNextHopState OBJECT-TYPE

SYNTAX INTEGER { pruned(1), forwarding(2) }

MAX-ACCESS read-only

STATUS current

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 'forwarding' indicates it is currently being used; the value 'pruned' indicates it is not."

::= { ipMcastRouteNextHopEntry 9 }

ipMcastRouteNextHopTimeStamp OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime at which the multicast routing information represented by this entry was learned by the router."


```
::= { ipMcastRouteNextHopEntry 10 }
```

ipMcastRouteNextHopExpiryTime 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 ipMcastRouteNextHopState 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 ipMcastRouteExpiryTime 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."

```
::= { ipMcastRouteNextHopEntry 11 }
```

ipMcastRouteNextHopClosestMemberHops OBJECT-TYPE

SYNTAX Unsigned32 (0..255)

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.

This is an optimization applied by multicast routing protocols that explicitly track hop counts to downstream listeners. Multicast protocols that are not aware of hop counts to downstream listeners set this object to zero."

```
::= { ipMcastRouteNextHopEntry 12 }
```

ipMcastRouteNextHopProtocol OBJECT-TYPE

SYNTAX IANAipMRouteProtocol

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The routing mechanism via which this next-hop was learned."

```
::= { ipMcastRouteNextHopEntry 13 }
```

ipMcastRouteNextHopPkts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of packets which have been forwarded using this route.

Discontinuities in this monotonically increasing value occur at re-initialization of the management system. Discontinuities can also occur as a result of routes being removed and replaced, which can be detected by observing the value of ipMcastRouteNextHopTimeStamp."

::= { ipMcastRouteNextHopEntry 14 }

ipMcastRouteNextHopOctets OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of octets of multicast packets that have been forwarded using this route.

Discontinuities in this monotonically increasing value occur at re-initialization of the management system. Discontinuities can also occur as a result of routes being removed and replaced, which can be detected by observing the value of ipMcastRouteNextHopTimeStamp."

::= { ipMcastRouteNextHopEntry 15 }

--

-- The IP Multicast Scope Boundary Table

--

ipMcastBoundaryTable OBJECT-TYPE

SYNTAX SEQUENCE OF IpMcastBoundaryEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The (conceptual) table listing the system's scoped multicast address boundaries."

::= { ipMcast 5 }

ipMcastBoundaryEntry OBJECT-TYPE

SYNTAX IpMcastBoundaryEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry (conceptual row) in the ipMcastBoundaryTable representing a scoped boundary."

INDEX { ipMcastBoundaryIfIndex,
ipMcastBoundaryAddressType,
ipMcastBoundaryAddress,


```
        ipMcastBoundaryAddressPrefixLength }  
 ::= { ipMcastBoundaryTable 1 }
```

```
IpMcastBoundaryEntry ::= SEQUENCE {  
    ipMcastBoundaryIfIndex      InterfaceIndex,  
    ipMcastBoundaryAddressType  InetAddressType,  
    ipMcastBoundaryAddress      InetAddress,  
    ipMcastBoundaryAddressPrefixLength  InetAddressPrefixLength,  
    ipMcastBoundaryStatus      RowStatus,  
    ipMcastBoundaryStorageType  StorageType,  
    ipMcastBoundaryDroppedMcastOctets  Counter32,  
    ipMcastBoundaryDroppedMcastPkts    Counter32,  
    ipMcastBoundaryHCDroppedMcastOctets Counter64,  
    ipMcastBoundaryHCDroppedMcastPkts  Counter64  
}
```

ipMcastBoundaryIfIndex 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."

```
 ::= { ipMcastBoundaryEntry 1 }
```

ipMcastBoundaryAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A value indicating the address family of the address contained in ipMcastBoundaryAddress. Legal values correspond to the subset of address families for which multicast forwarding is supported."

```
 ::= { ipMcastBoundaryEntry 2 }
```

ipMcastBoundaryAddress OBJECT-TYPE

SYNTAX InetAddress (SIZE (0|4|8|16|20))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The group address which when combined with the corresponding value of ipMcastBoundaryAddressPrefixLength identifies the group range for which the scoped boundary exists. 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.nn, where nn encodes the scope type and group identifier.

This address object is only significant up to ipMcastBoundaryAddressPrefixLength bits. The remainder of the address bits are zero. This is especially important for this index field, which is part of the index of this entry. Any non-zero bits would signify an entirely different entry."

REFERENCE "[RFC 2365](#), [RFC 4291](#)"

::= { ipMcastBoundaryEntry 3 }

ipMcastBoundaryAddressPrefixLength OBJECT-TYPE

SYNTAX InetAddressPrefixLength (4..128)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The length in bits of the mask which when combined with the corresponding value of ipMcastBoundaryAddress identifies the group range for which the scoped boundary exists."

::= { ipMcastBoundaryEntry 4 }

ipMcastBoundaryStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of this row, by which rows in this table can be created and destroyed.

This status object can be set to active(1) without setting any other columnar objects in this entry.

All writeable objects in this entry can be modified when the status of this entry is active(1)."

::= { ipMcastBoundaryEntry 5 }

ipMcastBoundaryStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The storage type for this row. Rows having the value 'permanent' need not allow write-access to any columnar objects in the row."

DEFVAL { nonVolatile }

::= { ipMcastBoundaryEntry 6 }

ipMcastBoundaryDroppedMcastOctets OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of octets of multicast packets that have been dropped as a result of this zone boundary configuration."

::= { ipMcastBoundaryEntry 7 }

ipMcastBoundaryDroppedMcastPkts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of multicast packets that have been dropped as a result of this zone boundary configuration."

::= { ipMcastBoundaryEntry 8 }

ipMcastBoundaryHCDroppedMcastOctets OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of octets of multicast packets that have been dropped as a result of this zone boundary configuration."

This object is a 64-bit version of
ipMcastBoundaryDroppedMcastOctets."

::= { ipMcastBoundaryEntry 9 }

ipMcastBoundaryHCDroppedMcastPkts OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of multicast packets that have been dropped as a result of this zone boundary configuration."

This object is a 64-bit version of
ipMcastBoundaryDroppedMcastPkts."

::= { ipMcastBoundaryEntry 10 }

--

-- The IP Multicast Scope Name Table

--

ipMcastScopeNameTable OBJECT-TYPE

SYNTAX SEQUENCE OF IpMcastScopeNameEntry

MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The (conceptual) table listing multicast scope names."
 ::= { ipMcast 6 }

ipMcastScopeNameEntry OBJECT-TYPE
SYNTAX IpMcastScopeNameEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "An entry (conceptual row) in the ipMcastScopeNameTable
 representing a multicast scope name."
INDEX { ipMcastScopeNameAddressType,
 ipMcastScopeNameAddress,
 ipMcastScopeNameAddressPrefixLength,
 IMPLIED ipMcastScopeNameLanguage }
 ::= { ipMcastScopeNameTable 1 }

IpMcastScopeNameEntry ::= SEQUENCE {
 ipMcastScopeNameAddressType InetAddressType,
 ipMcastScopeNameAddress InetAddress,
 ipMcastScopeNameAddressPrefixLength InetAddressPrefixLength,
 ipMcastScopeNameLanguage LanguageTag,
 ipMcastScopeNameString SnmpAdminString,
 ipMcastScopeNameDefault TruthValue,
 ipMcastScopeNameStatus RowStatus,
 ipMcastScopeNameStorageType StorageType
}

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

ipMcastScopeNameAddress OBJECT-TYPE
SYNTAX InetAddress (SIZE (0|4|8|16|20))
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The group address which when combined with the
 corresponding value of ipMcastScopeNameAddressPrefixLength

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 the range ff.nn.nn.nn.nn.nn.nn, where nn encodes the scope type and group identifier.

This address object is only significant up to ipMcastScopeNameAddressPrefixLength bits. The remainder of the address bits are zero. This is especially important for this index field, which is part of the index of this entry. Any non-zero bits would signify an entirely different entry."

REFERENCE "[RFC 2365](#), [RFC 4291](#)"

::= { ipMcastScopeNameEntry 2 }

ipMcastScopeNameAddressPrefixLength OBJECT-TYPE

SYNTAX InetAddressPrefixLength (4..128)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

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

::= { ipMcastScopeNameEntry 3 }

ipMcastScopeNameLanguage OBJECT-TYPE

SYNTAX LanguageTag

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Language tag associated with the scope name."

REFERENCE "[RFC 3283](#)"

::= { ipMcastScopeNameEntry 4 }

ipMcastScopeNameString 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 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."


```
::= { ipMcastScopeNameEntry 5 }
```

```
ipMcastScopeNameDefault 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 }
```

```
::= { ipMcastScopeNameEntry 6 }
```

```
ipMcastScopeNameStatus OBJECT-TYPE
```

```
SYNTAX      RowStatus
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The status of this row, by which rows in this table can
    be created and destroyed. Before the row can be activated,
    the object ipMcastScopeNameString must be set to a valid
    value. All writeable objects in this entry can be modified
    when the status is active(1)."
```

```
::= { ipMcastScopeNameEntry 7 }
```

```
ipMcastScopeNameStorageType OBJECT-TYPE
```

```
SYNTAX      StorageType
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The storage type for this row. Rows having the value
    'permanent' need not allow write-access to any columnar
    objects in the row."
```

```
DEFVAL { nonVolatile }
```

```
::= { ipMcastScopeNameEntry 8 }
```

```
--
```

```
-- The Multicast Listeners Table
```

```
--
```

```
ipMcastLocalListenerTable OBJECT-TYPE
```

```
SYNTAX      SEQUENCE OF IpMcastLocalListenerEntry
```

```
MAX-ACCESS  not-accessible
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The (conceptual) table listing local applications or
    services that have joined multicast groups as listeners."
```


Entries exist for all addresses in the multicast range for all applications and services as they are classified on this device."

::= { ipMcast 9 }

ipMcastLocalListenerEntry OBJECT-TYPE

SYNTAX IpMcastLocalListenerEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry (conceptual row) in the LocalListenerTable."

INDEX { ipMcastLocalListenerGroupAddressType,
ipMcastLocalListenerGroupAddress,
ipMcastLocalListenerSourceAddressType,
ipMcastLocalListenerSourceAddress,
ipMcastLocalListenerSourcePrefixLength,
ipMcastLocalListenerRunIndex }

::= { ipMcastLocalListenerTable 1 }

IpMcastLocalListenerEntry ::= SEQUENCE {

ipMcastLocalListenerGroupAddressType InetAddressType,

ipMcastLocalListenerGroupAddress InetAddress,

ipMcastLocalListenerSourceAddressType InetAddressType,

ipMcastLocalListenerSourceAddress InetAddress,

ipMcastLocalListenerSourcePrefixLength InetAddressPrefixLength,

ipMcastLocalListenerRunIndex Unsigned32

}

ipMcastLocalListenerGroupAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A value indicating the address family of the address contained in ipMcastLocalListenerGroupAddress. Legal values correspond to the subset of address families for which multicast is supported."

::= { ipMcastLocalListenerEntry 1 }

ipMcastLocalListenerGroupAddress OBJECT-TYPE

SYNTAX InetAddress (SIZE (0|4|8|16|20))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The IP multicast group for which this entry specifies locally joined applications or services."

::= { ipMcastLocalListenerEntry 2 }

ipMcastLocalListenerSourceAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

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

::= { ipMcastLocalListenerEntry 3 }

ipMcastLocalListenerSourceAddress OBJECT-TYPE

SYNTAX InetAddress (SIZE (0|4|8|16|20))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The network address which when combined with the corresponding value of the mask specified in ipMcastLocalListenerSourcePrefixLength identifies the sources for which this entry specifies a local listener.

This address object is only significant up to ipMcastLocalListenerSourcePrefixLength bits. The remainder of the address bits are zero. This is especially important for this index field, which is part of the index of this entry. Any non-zero bits would signify an entirely different entry."

::= { ipMcastLocalListenerEntry 4 }

ipMcastLocalListenerSourcePrefixLength OBJECT-TYPE

SYNTAX InetAddressPrefixLength (4..128)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The length in bits of the mask which when combined with the corresponding value specified in ipMcastLocalListenerSource identifies the sources for which this entry specifies a locally listener. A mask length of zero corresponds to all sources within the group."

::= { ipMcastLocalListenerEntry 5 }

ipMcastLocalListenerRunIndex OBJECT-TYPE

SYNTAX Unsigned32 (0..2147483647)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A unique value corresponding to a piece of software running on this router or host system. Where possible, this should be the system's native, unique identification number."

This identifier is platform-specific. It may correspond to a process ID or application instance number.

A value of zero indicates that the application instance(s) cannot be identified. A value of zero indicates that one or more unidentified applications have joined the specified multicast groups (for the specified sources) as listeners."

REFERENCE "[RFC 2287](#) sysApplRunIndex"

::= { ipMcastLocalListenerEntry 6 }

--

-- Conformance information

--

ipMcastMIBConformance

OBJECT IDENTIFIER ::= { ipMcastMIB 2 }

ipMcastMIBCompliances

OBJECT IDENTIFIER ::= { ipMcastMIBConformance 1 }

ipMcastMIBGroups OBJECT IDENTIFIER ::= { ipMcastMIBConformance 2 }

--

-- Compliance statements

--

ipMcastMIBCompliance MODULE-COMPLIANCE

STATUS current

DESCRIPTION

"Implementations of all the mandatory MIB groups listed below can claim full compliance.

This MIB contains several InetAddressType and InetAddress objects, but not all IP address types are supported by all protocol implementations.

A MIB implementation can claim full compliance if all IP address types supported by the protocol implementation are supported by the MIB implementation."

MODULE -- this module

MANDATORY-GROUPS { ipMcastMIBBasicGroup }

OBJECT ipMcastEnable

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

GROUP ipMcastMIBRouteGroup

DESCRIPTION

"This group is mandatory if the system is a router."

OBJECT ipMcastInterfaceTtl

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT ipMcastInterfaceRateLimit

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

GROUP ipMcastMIBHopCountGroup

DESCRIPTION

"This group is optional."

GROUP ipMcastMIBPktsOutGroup

DESCRIPTION

"This group is optional."

GROUP ipMcastMIBHCInterfaceGroup

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."

GROUP ipMcastMIBRouteProtoGroup

DESCRIPTION

"This group is mandatory if the system is a router."

GROUP ipMcastMIBSsmGroup

DESCRIPTION

"This group is optional."

GROUP ipMcastMIBLocalListenerGroup

DESCRIPTION

"This group is optional."

GROUP ipMcastMIBBoundaryIfGroup

DESCRIPTION

"This group is mandatory if the system is a router that
supports administratively-scoped multicast address
boundaries."

OBJECT ipMcastBoundaryStatus

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

GROUP ipMcastMIBScopeNameGroup

DESCRIPTION

"This group is mandatory if the system is a router that supports multicast scope names."

OBJECT ipMcastScopeNameString

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT ipMcastScopeNameDefault

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

OBJECT ipMcastScopeNameStatus

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required."

GROUP ipMcastMIBIfPktsGroup

DESCRIPTION

"This group is optional."

GROUP ipMcastMIBRouteOctetsGroup

DESCRIPTION

"This group is optional."

::= { ipMcastMIBCompliances 1 }

ipMcastMIBRouteCompliance MODULE-COMPLIANCE

STATUS deprecated

DESCRIPTION

"Implementations of this compliance statement are equivalent to compliance with the deprecated IPMROUTE-MIB module."

MODULE -- this module

MANDATORY-GROUPS { ipMcastMIBRouteBasicGroup }

::= { ipMcastMIBCompliances 2 }

--

-- Units of conformance

--

ipMcastMIBRouteBasicGroup OBJECT-GROUP

OBJECTS { ipMcastEnable, ipMcastRouteEntryCount,
ipMcastRouteUpstreamNeighborType,
ipMcastRouteUpstreamNeighbor, ipMcastRouteInIfIndex,
ipMcastRouteTimeStamp, ipMcastRouteExpiryTime,


```
    ipMcastRouteNextHopState,  
    ipMcastRouteNextHopTimeStamp,  
    ipMcastRouteNextHopExpiryTime,  
    ipMcastRouteNextHopProtocol,  
    ipMcastRouteNextHopPkts,  
    ipMcastInterfaceTtl,  
    ipMcastInterfaceProtocol,  
    ipMcastInterfaceRateLimit,  
    ipMcastInterfaceInMcastOctets,  
    ipMcastInterfaceOutMcastOctets  
}
```

STATUS deprecated

DESCRIPTION

"A collection of objects to support basic management of IP Multicast routing.

This conformance group is deprecated. It is replaced by ipMcastMIBBasicGroup and ipMcastMIBRouteGroup"

::= { ipMcastMIBGroups 1 }

ipMcastMIBHopCountGroup OBJECT-GROUP

OBJECTS { ipMcastRouteNextHopClosestMemberHops }

STATUS current

DESCRIPTION

"A collection of objects to support management of the use of hop counts in IP Multicast routing."

::= { ipMcastMIBGroups 2 }

ipMcastMIBPktsOutGroup OBJECT-GROUP

OBJECTS { ipMcastRouteNextHopPkts }

STATUS current

DESCRIPTION

"A collection of objects to support management of packet counters for each outgoing interface entry of a route."

::= { ipMcastMIBGroups 3 }

ipMcastMIBHCInterfaceGroup OBJECT-GROUP

OBJECTS { ipMcastInterfaceHCInMcastOctets,
 ipMcastInterfaceHCOutMcastOctets,
 ipMcastInterfaceHCInMcastPkts,
 ipMcastInterfaceHCOutMcastPkts,
 ipMcastRouteHCOctets,
 ipMcastBoundaryHCDroppedMcastOctets,
 ipMcastBoundaryHCDroppedMcastPkts }

STATUS current

DESCRIPTION

"A collection of objects providing information specific to high speed (greater than 20,000,000 bits/second) network


```
        interfaces."
 ::= { ipMcastMIBGroups 4 }

ipMcastMIBRouteProtoGroup OBJECT-GROUP
    OBJECTS { ipMcastRouteProtocol, ipMcastRouteRtProtocol,
               ipMcastRouteRtAddressType, ipMcastRouteRtAddress,
               ipMcastRouteRtPrefixLength, ipMcastRouteRtType }
    STATUS current
    DESCRIPTION
        "A collection of objects providing information on the
        relationship between multicast routing information and the
        IP Forwarding Table."
 ::= { ipMcastMIBGroups 5 }

ipMcastMIBBasicGroup OBJECT-GROUP
    OBJECTS { ipMcastEnable, ipMcastRouteEntryCount
              }
    STATUS current
    DESCRIPTION
        "A collection of objects to support basic management of IP
        Multicast protocols."
 ::= { ipMcastMIBGroups 6 }

ipMcastMIBRouteGroup OBJECT-GROUP
    OBJECTS { ipMcastRouteUpstreamNeighborType,
               ipMcastRouteUpstreamNeighbor, ipMcastRouteInIfIndex,
               ipMcastRouteTimeStamp, ipMcastRouteExpiryTime,
               ipMcastRoutePkts,
               ipMcastRouteDifferentInIfPackets,
               ipMcastRouteOctets,
               ipMcastRouteNextHopState, ipMcastRouteNextHopTimeStamp,
               ipMcastRouteNextHopExpiryTime,
               ipMcastRouteNextHopProtocol,
               ipMcastRouteNextHopPkts,
               ipMcastInterfaceTtl,
               ipMcastInterfaceRateLimit,
               ipMcastInterfaceInMcastOctets,
               ipMcastInterfaceOutMcastOctets
              }
    STATUS current
    DESCRIPTION
        "A collection of objects to support basic management of IP
        Multicast routing."
 ::= { ipMcastMIBGroups 7 }

ipMcastMIBSsmGroup OBJECT-GROUP
    OBJECTS { ipMcastSsmRangeRowStatus, ipMcastSsmRangeStorageType }
    STATUS current
```


DESCRIPTION

"A collection of objects to support management of the use of Source-Specific Multicast routing."

::= { ipMcastMIBGroups 8 }

ipMcastMIBLocalListenerGroup OBJECT-GROUP

OBJECTS { ipMcastLocalListenerRunIndex }

STATUS current

DESCRIPTION

"A collection of objects to support management of local listeners on hosts or routers."

::= { ipMcastMIBGroups 9 }

ipMcastMIBBoundaryIfGroup OBJECT-GROUP

OBJECTS { ipMcastBoundaryStatus,
ipMcastBoundaryStorageType,
ipMcastBoundaryDroppedMcastOctets,
ipMcastBoundaryDroppedMcastPkts }

STATUS current

DESCRIPTION

"A collection of objects to support management of scoped multicast address boundaries."

::= { ipMcastMIBGroups 10 }

ipMcastMIBScopeNameGroup OBJECT-GROUP

OBJECTS { ipMcastScopeNameString, ipMcastScopeNameDefault,
ipMcastScopeNameStatus, ipMcastScopeNameStorageType }

STATUS current

DESCRIPTION

"A collection of objects to support management of multicast address scope names."

::= { ipMcastMIBGroups 11 }

ipMcastMIBIfPktsGroup OBJECT-GROUP

OBJECTS { ipMcastInterfaceInMcastPkts,
ipMcastInterfaceOutMcastPkts }

STATUS current

DESCRIPTION

"A collection of objects to support management of packet counters for each interface entry."

::= { ipMcastMIBGroups 12 }

ipMcastMIBRouteOctetsGroup OBJECT-GROUP

OBJECTS { ipMcastRouteOctets, ipMcastRouteNextHopOctets,
ipMcastRouteDifferentInIfOctets }

STATUS current

DESCRIPTION

"A collection of objects to support management of octet


```
        counters for each forwarding entry."
 ::= { ipMcastMIBGroups 13 }
```

END

6. Security Considerations

6.1 SNMPv2

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secured (for example by using IPSec), there is still no control over whom on the secure network is allowed to access (read/change/create/delete) the objects in this MIB module.

It is RECOMMENDED that implementers consider the security features as provided by the SNMPv3 framework (see [\[RFC3410\]](#), [section 8](#)), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate rights to access (read/change/create/delete) them.

6.2 Writeable objects

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create. This section discusses and lists these elements.

Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

In this MIB module, possible effects that can be induced by SET operations on writeable objects include:

- o Modifications multicast routing behavior that prevent or disrupt services provided by the network, including (but not limited to) multicast data traffic delivery.
- o Modifications multicast routing behavior that allow interception or subversion of information that is carried by the network. For

example, attacks can be envisaged that would pass nominated multicast data streams through a nominated location, without the sources or listeners becoming aware of this subversion.

The following are the read-write and read-create objects defined in this MIB module.

ipMcastEnable
ipMcastInterfaceTable
ipMcastInterfaceEntry
ipMcastInterfaceIfIndex
ipMcastInterfaceTtl
ipMcastInterfaceProtocol
ipMcastInterfaceRateLimit
ipMcastSsmRangeTable
ipMcastSsmRangeEntry
ipMcastSsmRangeAddressType
ipMcastSsmRangeAddress
ipMcastSsmRangePrefixLength
ipMcastSsmRangeRowStatus
ipMcastSsmRangeStorageType
ipMcastBoundaryTable
ipMcastBoundaryEntry
ipMcastBoundaryIfIndex
ipMcastBoundaryAddressType
ipMcastBoundaryAddress
ipMcastBoundaryAddressPrefixLength
ipMcastBoundaryStatus
ipMcastBoundaryStorageType
ipMcastScopeNameTable
ipMcastScopeNameEntry
ipMcastScopeNameAddressType
ipMcastScopeNameAddress
ipMcastScopeNameAddressPrefixLength
ipMcastScopeNameLanguage
ipMcastScopeNameString
ipMcastScopeNameDefault
ipMcastScopeNameStatus
ipMcastScopeNameStorageType

6.3 Readable objects

As well as the writeable objects discussed above, there are a number of readable objects (i.e., objects with a MAX-ACCESS other than not-accessible) that may be considered sensitive or vulnerable in some network environments. It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via

SNMP.

In this MIB module, possible effects that can be induced by GET and/or NOTIFY operations include:

- o Determination of the topology, disposition, and composition of the network. This information may be commercially sensitive, and may also be used in preparation for attacks, including any of the attacks described above.
- o Determination of whether multicast data is flowing in the network, or has flowed recently, as well as the locations of senders and recipients. An attacker can apply 'traffic analysis' to this data. In some cases, the information revealed by traffic analyses can be as damaging as full knowledge of the data being transported.

The following are the read-only objects defined in this MIB module.

ipMcastRouteEntryCount
ipMcastInterfaceInMcastOctets
ipMcastInterfaceOutMcastOctets
ipMcastInterfaceInMcastPkts
ipMcastInterfaceOutMcastPkts
ipMcastInterfaceHCInMcastOctets
ipMcastInterfaceHCOutMcastOctets
ipMcastInterfaceHCInMcastPkts
ipMcastInterfaceHCOutMcastPkts
ipMcastRouteTable
ipMcastRouteEntry
ipMcastRouteGroupAddressType
ipMcastRouteGroup
ipMcastRouteGroupPrefixLength
ipMcastRouteSourceAddressType
ipMcastRouteSource
ipMcastRouteSourcePrefixLength
ipMcastRouteUpstreamNeighborType
ipMcastRouteUpstreamNeighbor
ipMcastRouteInIfIndex
ipMcastRouteTimeStamp
ipMcastRouteExpiryTime
ipMcastRoutePkts
ipMcastRouteDifferentInIfPackets
ipMcastRouteOctets
ipMcastRouteProtocol
ipMcastRouteRtProtocol
ipMcastRouteRtAddressType
ipMcastRouteRtAddress

ipMcastRouteRtPrefixLength
ipMcastRouteRtType
ipMcastRouteHCOctets
ipMcastRouteDifferentInIfOctets
ipMcastRouteNextHopTable
ipMcastRouteNextHopEntry
ipMcastRouteNextHopGroupAddressType
ipMcastRouteNextHopGroup
ipMcastRouteNextHopSourceAddressType
ipMcastRouteNextHopSource
ipMcastRouteNextHopSourcePrefixLength
ipMcastRouteNextHopIfIndex
ipMcastRouteNextHopAddressType
ipMcastRouteNextHopAddress
ipMcastRouteNextHopState
ipMcastRouteNextHopTimeStamp
ipMcastRouteNextHopExpiryTime
ipMcastRouteNextHopClosestMemberHops
ipMcastRouteNextHopProtocol
ipMcastRouteNextHopPkts
ipMcastRouteNextHopOctets
ipMcastLocalListenerTable
ipMcastLocalListenerEntry
ipMcastLocalListenerGroupAddressType
ipMcastLocalListenerGroupAddress
ipMcastLocalListenerSourceAddressType
ipMcastLocalListenerSourceAddress
ipMcastLocalListenerSourcePrefixLength
ipMcastLocalListenerRunIndex

7. IANA Considerations

IP-MCAST-MIB should be rooted under the mib-2 subtree. IANA is requested to assign { mib-2 XXX } to the IP-MCAST-MIB module specified in this document.

8. Acknowledgements

This MIB module is based on the original work in [[RFC2932](#)] by K. McCloghrie, D. Farinacci and D. Thaler.

Suggested IPv6 multicast MIBs by R. Sivaramu and R. Raghunarayan have been used for comparison while editing this MIB module.

The authors are also grateful to Bharat Joshi for his input and for several corrections.

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Acknowledgment

Funding for the RFC Editor function is currently provided by the Internet Society.

