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B. Haberman
Caspian Networks
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IP Forwarding Table MIB

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This document is a product of the IPv6 MIB Revision Design Team and it is a working item of the IPv6 Working Group. Comments should be addressed to the editors, or to the IPv6 Working Group mailing list at ipv6@ietf.org.

Abstract

This document defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects related to the forwarding of Internet Protocol (IP) packets in an IP version-independent manner. This document obsoletes [RFC 2096](#).

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Revision History

[Note to RFC Editor: Please remove prior to publication]

Changes from [draft-ietf-ipv6-rfc2096-update-06.txt](#):

09 Feb 2004 Removed range from inetCidrRoutePfxLen

Clarified text in DESCRIPTION clause of
inetCidrRoutePfxLen and inetCidrRouteDest to exclude
bit-wise comparison of zone indexes

Changed syntax of inetCidrRouteIfIndex to
InterfaceIndexOrZero

Changes from [draft-ietf-ipv6-rfc2096-update-05.txt](#):

07 Jan 2004 Corrected editor information

Changed mailing list information

Limited InetAddress objects to (ipv4, ipv6, ipv4z,
ipv6z)

Updated MODULE-IDENTITY REVISION clause to detail the
replacement of ipCidrRouteTable with
inetCidrRouteTable

Updated DESCRIPTION clause of ipForwardCompliance to

indicate the replacement of ipForwardCompliance with
ipForwardFullCompliance and
ipForwardReadOnlyCompliance

Added statement to DESCRIPTION clause of
ipForwardCidrRouteGroup pointing out its replacement

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with inetForwardCidrRouteGroup

Added detail to [section 3](#) on relationship of this MIB
with previous versions

Fixed references within DESCRIPTION clauses

Added SYNTAX statements to read-only OBJECTs

21 Jan 2004 Added clarifying text to Introduction on the usage of
the MIB definition

Enhanced Overview section to include explicit text on
relationship to other RFCs

Clarified DESCRIPTION text for inetCidrRouteDiscards

Added text to DESCRIPTION clause of
inetCidrRouteIfIndex to allow the value of 0

28 Jan 2004 Added range of (0..128) to inetCidrRoutePfxLen

Changes from [draft-ietf-ipv6-rfc2096-update-04.txt](#):

28 Aug 2003 Corrected copyright statement in DESCRIPTION clause

Added inetCidrRouteNumber to
inetForwardCidrRouteGroup conformance statement

Removed SIZE constraints for inetCidrRouteDest and
inetCidrRouteNextHop

Added constraints statement to DESCRIPTION clause of
inetCidrRouteEntry

Added Intellectual Property section per requirements
of [RFC 2026](#)

Removed reference to [RFC 2026](#)

Removed ipForwardCompliance2

Changed definition of inetCidrRouteAge from Integer32 to Gauge32

Changes from [draft-ietf-ipv6-rfc2096-update-03.txt](#):

27 Jun 2003 Updated text to DESCRIPTION of inetCidrRouteDiscards

Re-instated inetCidrRouteNumber

Added references for IF-MIB, IP-MIB, and IANA-

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RTPROTO-MIB

Changed reference to [RFC 2096](#) from normative to informative

Added RFC editor note to remove Revision History at publication time

Updated REVISION clause

Added section describing changes from [RFC 2096](#)

Added REVISION clause for original publication as [RFC 1354](#)

Added MIB Copyright statement to DESCRIPTION

Changes from [draft-ietf-ipv6-rfc2096-update-02.txt](#):

16 Jan 2003 Changed lower-case 'h' to upper-case 'H' in hex number.

Updated REVISION and LAST UPDATED dates.

13 Jun 2003 Changed inetCidrRouteDscp to inetCidrRoutePolicy.

Updated MIB Boilerplate.

17 Jun 2003 Added read-only compliance statement.

Added text to DESCRIPTION clause for inetCidrRouteStatus to indicate a row cannot be modified when it is active.

Removed numbered references from DESCRIPTION clauses.

Removed Unsigned32 from IMPORTS list.

Changed section numbers to conform with ID-nits.

Split references into normative/informative.

Updated security section.

Changes from [draft-ietf-ipv6-rfc2096-update-01.txt](#):

- 02 Nov 2002 Fixed bugs that caused the MIB not to compile.
- Changed the type of inetCidrRouteDscp to Dscp.
- Improved the revision information.
- Removed inetCidrRouteNumber and inetCidrRouteWeight.
- Other editorial changes.

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Changes from [draft-ietf-ipv6-rfc-2096-update-00.txt](#):

- 22 Aug 2002 Minor editorial changes and clean-up

Changes from [draft-ietf-ipngwg-rfc2096-update-00.txt](#):

- 27 Jun 2002 Added inetCidrRouteDscp index and inetCidrRouteWeight object to the inetCidrRouteTable.
- Restored inetCidrRouteNextHopType variable (may be different from inetCidrRouteDestType, due to global vs. non-global distinction in new InetAddress TCs).
- Removed inetCidrRouteInstance object. Use to identify a conceptual routing table is obviated by new InetAddress types and inclusion of DSCP index.
- Changed editor, moved author information to end, several editorial changes.
- Changed name to [draft-ietf-ipv6-rfc-2096-update-*.txt](#)
- 13 Jul 2002 Removed inetCidrRouteNextHopType.

Changes from [draft-ops-rfc2096-update-00.txt](#):

- 12 Jul 2001 Renamed to IPNG working group draft
- Added scopes to the uses of instance
- Added inetCidrRouteDiscards to replace ipRoutingDiscards
- Fixed some remaining ipCidr*/inetCidr* confusion in DESCRIPTIONS

Changes from first draft posted to v6mib mailing list:

23 Feb 2001 Updated MODULE-IDENTITY

Deleted inetCidrRouteTos, add inetCidrRouteInstance
in INDEX of inetCidrRouteTable.

Used InterfaceIndex, InetAddressPrefixLength and
InetAutonomousSystemNumber TC's, and limited the SIZE
of inetCidrRouteDest and inetCidrRouteNextHop

Updated conformance info. Added copyright and table
of contents.

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1 Introduction

This document defines a portion of the Management Information Base (MIB) for use in managing objects related to the forwarding of Internet Protocol (IP) packets in an IP version-independent manner.

It should be noted that the MIB definition described herein does not support multiple instances based on the same address family type. However, it does support an instance of the MIB per address family.

2 Conventions Used In This Document

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 [RFC 2119](#) [[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 RFC 3410](#) [[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, [RFC 2578](#) [[RFC2578](#)], STD 58, [RFC 2579](#) [[RFC2579](#)] and STD 58, [RFC 2580](#) [[RFC2580](#)].

4 Overview

The MIB consists of one current table and two current global objects.

1. The object `inetCidrRouteNumber` indicates the number of current routes. This is primarily to avoid having to read the table in order to determine this number.
2. The object `inetCidrRouteDiscards` counts the number of valid routes that were discarded from `inetCidrRouteTable` for any reason. This object replaces the `ipRoutingDiscards` and `ipv6DiscardedRoutes` objects.
3. The `inetCidrRouteTable` provides the ability to display IP version-independent multipath CIDR routes.

[4.1 Relationship to other MIBs](#)

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This MIB definition contains several deprecated and obsolete tables and objects. The following subsections describe the relationship between these objects and other MIB modules.

[4.1.1 RFC 1213](#)

The `ipRouteTable` object was originally defined in [RFC 1213](#). It was updated by `ipForwardTable` in [RFC 1354](#).

[4.1.2 RFC 1354](#)

The `ipForwardTable` object replaced the `ipRouteTable` object from [RFC 1213](#). It was in turn obsoleted by the `ipCidrRouteTable` defined in [RFC 2096](#).

In addition, [RFC 1354](#) introduced `ipForwardNumber`. This object reflects the number of entries found in `ipForwardTable`. It was obsoleted by `ipCidrRouteNumber`, defined in [RFC 2096](#).

[4.1.3 RFC 2096](#)

In [RFC 2096](#), the `ipCidrRouteTable` and `ipCidrRouteNumber` were

introduced. The ipCidrRouteTable object supports multipath IP routes having the same network number but differing network masks. The number of entries in that table is reflected in ipCidrRouteNumber. These objects are deprecated by the definitions contained in this MIB definition.

[4.1.4](#) [RFC 2011](#) and 2465

[RFC 2011](#) contains the ipRoutingDiscards object which counts the number of valid routes which have been removed from the ipCidrRouteTable object. The corresponding ipv6DiscardedRoutes object is defined in [RFC 2465](#). These objects are deprecated in favor of the version-independent object inetCidrRouteDiscards defined in this MIB.

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5 Definitions

IP-FORWARD-MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY, OBJECT-TYPE,	
IpAddress, Integer32, Gauge32,	
Counter32	FROM SNMPv2-SMI
RowStatus	FROM SNMPv2-TC
MODULE-COMPLIANCE, OBJECT-GROUP	FROM SNMPv2-CONF
InterfaceIndexOrZero	FROM IF-MIB
ip	FROM IP-MIB
IANAipRouteProtocol	FROM IANA-RTPROTO-MIB
InetAddress, InetAddressType,	
InetAddressPrefixLength,	
InetAddressAutonomousSystemNumber	FROM INET-ADDRESS-MIB;

ipForward MODULE-IDENTITY

LAST-UPDATED "200402091200Z"

ORGANIZATION

"IETF IPv6 Working Group

<http://www.ietf.org/html.charters/ipv6-charter.html>"

CONTACT-INFO

"Editor:

Brian Haberman

Caspian Networks

753 Bridgewater Drive

Sykesville, MD 21784

Phone: +1 410 552-1421

Email: brian@innovationslab.net

Send comments to <ipv6@ietf.org>"

DESCRIPTION

"The MIB module for the management of CIDR multipath IP Routes.

Copyright (C) The Internet Society (2004). This version of this MIB module is a part of RFC xxxx; see the RFC itself for full legal notices."

-- RFC Ed : replace xxxx with actual RFC number & remove note

REVISION "200402091200Z"

DESCRIPTION

"IPv4/v6 version-independent revision. Minimal changes were made to the original [RFC 2096](#) MIB, to allow easy upgrade of existing IPv4 implementations to the version-independent MIB. These changes include:

Adding inetCidrRouteDiscards as a replacement for the deprecated ipRoutingDiscards and ipv6DiscardedRoutes objects.

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Adding a new conformance statement to support the implementation of the IP Forwarding MIB in a read-only mode.

The inetCidrRouteTable replaces the IPv4-specific ipCidrRouteTable, its related objects, and related conformance statements.

Published as RFC xxxx."

-- RFC Ed : replace xxxx with actual RFC number & remove note

```

REVISION      "199609190000Z"
DESCRIPTION
    "Revised to support CIDR routes.
     Published as RFC 2096."

REVISION      "199207022156Z"
DESCRIPTION
    "Initial version, published as RFC 1354."
 ::= { ip 24 }

inetCidrRouteNumber OBJECT-TYPE
    SYNTAX      Gauge32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of current inetCidrRouteTable entries that
         are not invalid."
 ::= { ipForward 6 }

inetCidrRouteDiscards OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The number of valid route entries discarded from
         inetCidrRouteTable. Discarded route entries do not
         appear in inetCidrRouteTable. One possible reason for
         discarding an entry would be to free-up buffer space
         for other route table entries."
 ::= { ipForward 8 }

-- Inet CIDR Route Table

-- The Inet CIDR Route Table deprecates and replaces the
-- ipCidrRoute Table currently in the IP Forwarding Table MIB.
-- It adds IP protocol independence.

inetCidrRouteTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF InetCidrRouteEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This entity's IP Routing table."

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REFERENCE
    "RFC 1213 Section 6.6, The IP Group"
 ::= { ipForward 7 }

```

inetCidrRouteEntry OBJECT-TYPE

SYNTAX InetCidrRouteEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A particular route to a particular destination, under a particular policy (as reflected in the inetCidrRoutePolicy object).

Dynamically created rows will survive an agent reboot.

Implementers need to be aware that if the total number of elements (octets or sub-identifiers) in inetCidrRouteDest, inetCidrRoutePolicy, and inetCidrRouteNextHop exceeds 111 then OIDs of column instances in this table will have more than 128 sub-identifiers and cannot be accessed using SNMPv1, SNMPv2c, or SNMPv3."

INDEX {

inetCidrRouteDestType,
inetCidrRouteDest,
inetCidrRoutePfxLen,
inetCidrRoutePolicy,
inetCidrRouteNextHopType,
inetCidrRouteNextHop
}

::= { inetCidrRouteTable 1 }

InetCidrRouteEntry ::= SEQUENCE {

inetCidrRouteDestType	InetAddressType,
inetCidrRouteDest	InetAddress,
inetCidrRoutePfxLen	InetAddressPrefixLength,
inetCidrRoutePolicy	OBJECT IDENTIFIER,
inetCidrRouteNextHopType	InetAddressType,
inetCidrRouteNextHop	InetAddress,
inetCidrRouteIfIndex	InterfaceIndexOrZero,
inetCidrRouteType	INTEGER,
inetCidrRouteProto	IANAipRouteProtocol,
inetCidrRouteAge	Gauge32,
inetCidrRouteNextHopAS	InetAutonomousSystemNumber,
inetCidrRouteMetric1	Integer32,
inetCidrRouteMetric2	Integer32,
inetCidrRouteMetric3	Integer32,
inetCidrRouteMetric4	Integer32,
inetCidrRouteMetric5	Integer32,
inetCidrRouteStatus	RowStatus

}

inetCidrRouteDestType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The type of the inetCidrRouteDest address, as defined in the InetAddress MIB.

Only those address types that may appear in an actual routing table are allowed as values of this object."

REFERENCE "[RFC 3291](#)"

::= { inetCidrRouteEntry 1 }

inetCidrRouteDest OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The destination IP address of this route.

The type of this address is determined by the value of the inetCidrRouteDestType object.

The values for the index objects inetCidrRouteDest and inetCidrRoutePfxLen must be consistent. When the value of inetCidrRouteDest (excluding the zone index, if one is present) is x, then the bitwise logical-AND of x with the value of the mask formed from the corresponding index object inetCidrRoutePfxLen MUST be equal to x. If not, then the index pair is not consistent and an inconsistentName error must be returned on SET or CREATE requests."

::= { inetCidrRouteEntry 2 }

inetCidrRoutePfxLen OBJECT-TYPE

SYNTAX InetAddressPrefixLength

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Indicates the number of leading one bits which form the mask to be logical-ANDed with the destination address before being compared to the value in the inetCidrRouteDest field.

The values for the index objects inetCidrRouteDest and inetCidrRoutePfxLen must be consistent. When the value of inetCidrRouteDest (excluding the zone index, if one is present) is x, then the bitwise logical-AND of x with the value of the mask formed from the

corresponding index object inetCidrRoutePfxLen MUST be equal to x. If not, then the index pair is not consistent and an inconsistentName error must be returned on SET or CREATE requests."

::= { inetCidrRouteEntry 3 }

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inetCidrRoutePolicy OBJECT-TYPE

SYNTAX OBJECT IDENTIFIER

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This object is an opaque object without any defined semantics. Its purpose is to serve as an additional index which may delineate between multiple entries to the same destination. The value { 0 0 } shall be used as the default value for this object."

::= { inetCidrRouteEntry 4 }

inetCidrRouteNextHopType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The type of the inetCidrRouteNextHop address, as defined in the InetAddress MIB.

Value should be set to unknown(0) for non-remote routes.

Only those address types that may appear in an actual routing table are allowed as values of this object."

REFERENCE "[RFC 3291](#)"

::= { inetCidrRouteEntry 5 }

inetCidrRouteNextHop OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"On remote routes, the address of the next system en route. For non-remote routes, a zero length string.

The type of this address is determined by the value of the inetCidrRouteNextHopType object."

::= { inetCidrRouteEntry 6 }

inetCidrRouteIfIndex OBJECT-TYPE

SYNTAX InterfaceIndexOrZero

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The ifIndex value which identifies the local interface through which the next hop of this route should be reached. A value of 0 is valid and represents the scenario where no interface is specified."

::= { inetCidrRouteEntry 7 }

inetCidrRouteType OBJECT-TYPE

SYNTAX INTEGER {

other (1), -- not specified by this MIB
reject (2), -- route which discards traffic and
 -- returns ICMP notification
local (3), -- local interface
remote (4), -- remote destination
blackhole(5) -- route which discards traffic
 -- silently
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The type of route. Note that local(3) refers to a route for which the next hop is the final destination; remote(4) refers to a route for which the next hop is not the final destination.

Routes which do not result in traffic forwarding or rejection should not be displayed even if the implementation keeps them stored internally.

reject(2) refers to a route which, if matched, discards the message as unreachable and returns a notification (e.g. ICMP error) to the message sender. This is used in some protocols as a means of correctly aggregating routes.

blackhole(5) refers to a route which, if matched, discards the message silently."

::= { inetCidrRouteEntry 8 }

inetCidrRouteProto OBJECT-TYPE

SYNTAX IANAipRouteProtocol

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The routing mechanism via which this route was learned. Inclusion of values for gateway routing protocols is not intended to imply that hosts should support those protocols."

::= { inetCidrRouteEntry 9 }

inetCidrRouteAge OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of seconds since this route was last updated or otherwise determined to be correct. Note that no semantics of 'too old' can be implied except through knowledge of the routing protocol by which the route was learned."

::= { inetCidrRouteEntry 10 }

inetCidrRouteNextHopAS OBJECT-TYPE

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SYNTAX InetAutonomousSystemNumber

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The Autonomous System Number of the Next Hop. The semantics of this object are determined by the routing-protocol specified in the route's inetCidrRouteProto value. When this object is unknown or not relevant its value should be set to zero."

DEFVAL { 0 }

::= { inetCidrRouteEntry 11 }

inetCidrRouteMetric1 OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The primary routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route's inetCidrRouteProto value. If this metric is not used, its value should be set to -1."

DEFVAL { -1 }

::= { inetCidrRouteEntry 12 }

inetCidrRouteMetric2 OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"An alternate routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route's inetCidrRouteProto value. If this metric is not used, its value should be set to -1."

DEFVAL { -1 }

::= { inetCidrRouteEntry 13 }

inetCidrRouteMetric3 OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"An alternate routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route's inetCidrRouteProto value. If this metric is not used, its value should be set to -1."

DEFVAL { -1 }

::= { inetCidrRouteEntry 14 }

inetCidrRouteMetric4 OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-create

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STATUS current

DESCRIPTION

"An alternate routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route's inetCidrRouteProto value. If this metric is not used, its value should be set to -1."

DEFVAL { -1 }

::= { inetCidrRouteEntry 15 }

inetCidrRouteMetric5 OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"An alternate routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route's inetCidrRouteProto value. If this metric is not used, its value should be set to -1."

DEFVAL { -1 }


```

        ::= { inetCidrRouteEntry 16 }

inetCidrRouteStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The row status variable, used according to row
         installation and removal conventions.

         A row entry cannot be modified when the status is
         marked as active(1)."
    ::= { inetCidrRouteEntry 17 }

-- Conformance information

ipForwardConformance
    OBJECT IDENTIFIER ::= { ipForward 5 }

ipForwardGroups
    OBJECT IDENTIFIER ::= { ipForwardConformance 1 }

ipForwardCompliances
    OBJECT IDENTIFIER ::= { ipForwardConformance 2 }

-- Compliance statements

ipForwardFullCompliance MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "When this MIB is implemented for read-create, the
         implementation can claim full compliance.

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```

There are a number of INDEX objects that cannot be represented in the form of OBJECT clauses in SMIV2, but for which there are compliance requirements, expressed in OBJECT clause form in this description:

```

-- OBJECT      inetCidrRouteDestType
-- SYNTAX      InetAddressType (ipv4(1), ipv6(2),
--                               ipv4z(3), ipv6z(4))
-- DESCRIPTION
--     This MIB requires support for global and
--     non-global ipv4 and ipv6 addresses.
--
-- OBJECT      inetCidrRouteDest
-- SYNTAX      InetAddress (SIZE (4 | 8 | 16 | 20))
-- DESCRIPTION

```

```

--      This MIB requires support for global and
--      non-global IPv4 and IPv6 addresses.
--
-- OBJECT      inetCidrRouteNextHopType
-- SYNTAX      InetAddressType (unknown(0), ipv4(1),
--                               ipv6(2), ipv4z(3)
--                               ipv6z(4))
-- DESCRIPTION
--      This MIB requires support for global and
--      non-global ipv4 and ipv6 addresses.
--
-- OBJECT      inetCidrRouteNextHop
-- SYNTAX      InetAddress (SIZE (0 | 4 | 8 | 16 | 20))
-- DESCRIPTION
--      This MIB requires support for global and
--      non-global IPv4 and IPv6 addresses.
"

```

```

MODULE -- this module
MANDATORY-GROUPS { inetForwardCidrRouteGroup }

```

```

OBJECT      inetCidrRouteStatus
SYNTAX      RowStatus { active(1), notInService (2) }
WRITE-SYNTAX RowStatus { active(1), notInService (2),
                        createAndGo(4), destroy(6) }
DESCRIPTION "Support for createAndWait is not required."

```

```

::= { ipForwardCompliances 3 }

```

```

ipForwardReadOnlyCompliance MODULE-COMPLIANCE

```

```

STATUS      current
DESCRIPTION
    "When this MIB is implemented without support for read-
    create (i.e. in read-only mode), the implementation can
    claim read-only compliance."

```

```

MODULE -- this module
MANDATORY-GROUPS { inetForwardCidrRouteGroup }

```

```

OBJECT      inetCidrRouteIfIndex

```

```

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```

```

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

```

```

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

```

```

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

OBJECT      inetCidrRouteMetric1
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

OBJECT      inetCidrRouteMetric2
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

OBJECT      inetCidrRouteMetric3
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

OBJECT      inetCidrRouteMetric4
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

OBJECT      inetCidrRouteMetric5
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

OBJECT      inetCidrRouteStatus
SYNTAX      RowStatus { active(1) }
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

::= { ipForwardCompliances 4 }

-- units of conformance

inetForwardCidrRouteGroup OBJECT-GROUP
    OBJECTS { inetCidrRouteDiscards,
                inetCidrRouteIfIndex, inetCidrRouteType,
                inetCidrRouteProto,  inetCidrRouteAge,
                inetCidrRouteNextHopAS, inetCidrRouteMetric1,

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                inetCidrRouteMetric2, inetCidrRouteMetric3,
                inetCidrRouteMetric4, inetCidrRouteMetric5,

```

```

        inetCidrRouteStatus, inetCidrRouteNumber
    }
    STATUS      current
    DESCRIPTION
        "The IP version-independent CIDR Route Table."
    ::= { ipForwardGroups 4 }

-- Deprecated Objects

ipCidrRouteNumber OBJECT-TYPE
    SYNTAX      Gauge32
    MAX-ACCESS  read-only
    STATUS      deprecated
    DESCRIPTION
        "The number of current ipCidrRouteTable entries that are
         not invalid. This object is deprecated in favor of
         inetCidrRouteNumber and the inetCidrRouteTable."
    ::= { ipForward 3 }

-- IP CIDR Route Table

-- The IP CIDR Route Table obsoletes and replaces the ipRoute
-- Table current in MIB-I and MIB-II and the IP Forwarding Table.
-- It adds knowledge of the autonomous system of the next hop,
-- multiple next hops, and policy routing, and Classless
-- Inter-Domain Routing.

ipCidrRouteTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF IpCidrRouteEntry
    MAX-ACCESS  not-accessible
    STATUS      deprecated
    DESCRIPTION
        "This entity's IP Routing table. This table has been
         deprecated in favor of the IP version neutral
         inetCidrRouteTable."
    REFERENCE
        "RFC 1213 Section 6.6, The IP Group"
    ::= { ipForward 4 }

ipCidrRouteEntry OBJECT-TYPE
    SYNTAX      IpCidrRouteEntry
    MAX-ACCESS  not-accessible
    STATUS      deprecated
    DESCRIPTION
        "A particular route to a particular destination, under a
         particular policy."
    INDEX {
        ipCidrRouteDest,
        ipCidrRouteMask,
        ipCidrRouteTos,
        ipCidrRouteNextHop
    }

```

}

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::= { ipCidrRouteTable 1 }

```
IpCidrRouteEntry ::= SEQUENCE {
    ipCidrRouteDest      IPAddress,
    ipCidrRouteMask      IPAddress,
    ipCidrRouteTos       Integer32,
    ipCidrRouteNextHop   IPAddress,
    ipCidrRouteIfIndex   Integer32,
    ipCidrRouteType      INTEGER,
    ipCidrRouteProto     INTEGER,
    ipCidrRouteAge       Integer32,
    ipCidrRouteInfo      OBJECT IDENTIFIER,
    ipCidrRouteNextHopAS Integer32,
    ipCidrRouteMetric1   Integer32,
    ipCidrRouteMetric2   Integer32,
    ipCidrRouteMetric3   Integer32,
    ipCidrRouteMetric4   Integer32,
    ipCidrRouteMetric5   Integer32,
    ipCidrRouteStatus    RowStatus
}
```

ipCidrRouteDest OBJECT-TYPE

SYNTAX IPAddress

MAX-ACCESS read-only

STATUS deprecated

DESCRIPTION

"The destination IP address of this route.

This object may not take a Multicast (Class D) address value.

Any assignment (implicit or otherwise) of an instance of this object to a value x must be rejected if the bitwise logical-AND of x with the value of the corresponding instance of the ipCidrRouteMask object is not equal to x."

::= { ipCidrRouteEntry 1 }

ipCidrRouteMask OBJECT-TYPE

SYNTAX IPAddress

MAX-ACCESS read-only

STATUS deprecated

DESCRIPTION

"Indicate the mask to be logical-ANDed with the destination address before being compared to the value in the ipCidrRouteDest field. For those systems that

do not support arbitrary subnet masks, an agent constructs the value of the ipCidrRouteMask by reference to the IP Address Class.

Any assignment (implicit or otherwise) of an instance of this object to a value x must be rejected if the bitwise logical-AND of x with the value of the corresponding instance of the ipCidrRouteDest object is

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```

        not equal to ipCidrRouteDest."
 ::= { ipCidrRouteEntry 2 }

```

```

-- The following convention is included for specification
-- of TOS Field contents.  At this time, the Host Requirements
-- and the Router Requirements documents disagree on the width
-- of the TOS field.  This mapping describes the Router
-- Requirements mapping, and leaves room to widen the TOS field
-- without impact to fielded systems.

```

```

ipCidrRouteTos OBJECT-TYPE
    SYNTAX      Integer32 (0..2147483647)
    MAX-ACCESS  read-only
    STATUS      deprecated
    DESCRIPTION
        "The policy specifier is the IP TOS Field.  The encoding
        of IP TOS is as specified by the following convention.
        Zero indicates the default path if no more specific
        policy applies.

```

+-----+-----+-----+-----+-----+-----+-----+-----+				+-----+-----+-----+-----+-----+-----+-----+-----+							
	PRECEDENCE				TYPE OF SERVICE				0		
+-----+-----+-----+-----+-----+-----+-----+-----+				+-----+-----+-----+-----+-----+-----+-----+-----+							

		IP TOS				IP TOS	
Field	Contents	Policy	Code	Field	Contents	Policy	Code
	0 0 0 0	==>	0		0 0 0 1	==>	2
	0 0 1 0	==>	4		0 0 1 1	==>	6
	0 1 0 0	==>	8		0 1 0 1	==>	10
	0 1 1 0	==>	12		0 1 1 1	==>	14
	1 0 0 0	==>	16		1 0 0 1	==>	18
	1 0 1 0	==>	20		1 0 1 1	==>	22
	1 1 0 0	==>	24		1 1 0 1	==>	26
	1 1 1 0	==>	28		1 1 1 1	==>	30"

```

 ::= { ipCidrRouteEntry 3 }

```

ipCidrRouteNextHop OBJECT-TYPE

SYNTAX IpAddress

MAX-ACCESS read-only

STATUS deprecated

DESCRIPTION

"On remote routes, the address of the next system en
route; Otherwise, 0.0.0.0."

::= { ipCidrRouteEntry 4 }

ipCidrRouteIfIndex OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-create

STATUS deprecated

DESCRIPTION

"The ifIndex value which identifies the local interface

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through which the next hop of this route should be
reached."

DEFVAL { 0 }

::= { ipCidrRouteEntry 5 }

ipCidrRouteType OBJECT-TYPE

SYNTAX INTEGER {

other (1), -- not specified by this MIB

reject (2), -- route which discards traffic

local (3), -- local interface

remote (4) -- remote destination

}

MAX-ACCESS read-create

STATUS deprecated

DESCRIPTION

"The type of route. Note that local(3) refers to a
route for which the next hop is the final destination;
remote(4) refers to a route for which the next hop is
not the final destination.

Routes which do not result in traffic forwarding or
rejection should not be displayed even if the
implementation keeps them stored internally.

reject (2) refers to a route which, if matched,
discards the message as unreachable. This is used in
some protocols as a means of correctly aggregating
routes."

::= { ipCidrRouteEntry 6 }

ipCidrRouteProto OBJECT-TYPE

SYNTAX INTEGER {

```

other      (1),  -- not specified
local      (2),  -- local interface
netmgmt    (3),  -- static route
icmp       (4),  -- result of ICMP Redirect

-- the following are all dynamic
-- routing protocols
egp        (5),  -- Exterior Gateway Protocol
ggp        (6),  -- Gateway-Gateway Protocol
hello      (7),  -- FuzzBall HelloSpeak
rip        (8),  -- Berkeley RIP or RIP-II
isIs       (9),  -- Dual IS-IS
esIs       (10), -- ISO 9542
ciscoIgrp  (11), -- Cisco IGRP
bbnSpfIgp  (12), -- BBN SPF IGP
ospf       (13), -- Open Shortest Path First
bgp        (14), -- Border Gateway Protocol
idpr       (15), -- InterDomain Policy Routing
ciscoEigrp (16)  -- Cisco EIGRP
}
MAX-ACCESS read-only
STATUS      deprecated

```

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DESCRIPTION

"The routing mechanism via which this route was learned.
Inclusion of values for gateway routing protocols is
not intended to imply that hosts should support those
protocols."

::= { ipCidrRouteEntry 7 }

ipCidrRouteAge OBJECT-TYPE

```

SYNTAX      Integer32
MAX-ACCESS  read-only
STATUS      deprecated

```

DESCRIPTION

"The number of seconds since this route was last updated
or otherwise determined to be correct. Note that no
semantics of 'too old' can be implied except through
knowledge of the routing protocol by which the route
was learned."

DEFVAL { 0 }

::= { ipCidrRouteEntry 8 }

ipCidrRouteInfo OBJECT-TYPE

```

SYNTAX      OBJECT IDENTIFIER
MAX-ACCESS  read-create
STATUS      deprecated
DESCRIPTION

```


"A reference to MIB definitions specific to the particular routing protocol which is responsible for this route, as determined by the value specified in the route's ipCidrRouteProto value. If this information is not present, its value should be set to the OBJECT IDENTIFIER { 0 0 }, which is a syntactically valid object identifier, and any implementation conforming to ASN.1 and the Basic Encoding Rules must be able to generate and recognize this value."

::= { ipCidrRouteEntry 9 }

ipCidrRouteNextHopAS OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-create

STATUS deprecated

DESCRIPTION

"The Autonomous System Number of the Next Hop. The semantics of this object are determined by the routing-protocol specified in the route's ipCidrRouteProto value. When this object is unknown or not relevant its value should be set to zero."

DEFVAL { 0 }

::= { ipCidrRouteEntry 10 }

ipCidrRouteMetric1 OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-create

STATUS deprecated

DESCRIPTION

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"The primary routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route's ipCidrRouteProto value. If this metric is not used, its value should be set to -1."

DEFVAL { -1 }

::= { ipCidrRouteEntry 11 }

ipCidrRouteMetric2 OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-create

STATUS deprecated

DESCRIPTION

"An alternate routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route's ipCidrRouteProto value. If this metric is not used, its value should be set to -1."

```

    DEFVAL { -1 }
    ::= { ipCidrRouteEntry 12 }

ipCidrRouteMetric3 OBJECT-TYPE
    SYNTAX      Integer32
    MAX-ACCESS  read-create
    STATUS      deprecated
    DESCRIPTION
        "An alternate routing metric for this route.  The
         semantics of this metric are determined by the routing-
         protocol specified in the route's ipCidrRouteProto
         value.  If this metric is not used, its value should be
         set to -1."
    DEFVAL { -1 }
    ::= { ipCidrRouteEntry 13 }

ipCidrRouteMetric4 OBJECT-TYPE
    SYNTAX      Integer32
    MAX-ACCESS  read-create
    STATUS      deprecated
    DESCRIPTION
        "An alternate routing metric for this route.  The
         semantics of this metric are determined by the routing-
         protocol specified in the route's ipCidrRouteProto
         value.  If this metric is not used, its value should be
         set to -1."
    DEFVAL { -1 }
    ::= { ipCidrRouteEntry 14 }

ipCidrRouteMetric5 OBJECT-TYPE
    SYNTAX      Integer32
    MAX-ACCESS  read-create
    STATUS      deprecated
    DESCRIPTION
        "An alternate routing metric for this route.  The
         semantics of this metric are determined by the routing-
         protocol specified in the route's ipCidrRouteProto
         value.  If this metric is not used, its value should be
         set to -1."
    DEFVAL { -1 }
    ::= { ipCidrRouteEntry 15 }

ipCidrRouteStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      deprecated
    DESCRIPTION

```

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```

        "The row status variable, used according to row
        installation and removal conventions."
    ::= { ipCidrRouteEntry 16 }

-- compliance statements

ipForwardCompliance MODULE-COMPLIANCE
    STATUS      deprecated
    DESCRIPTION
        "The compliance statement for SNMPv2 entities which
        implement the ipForward MIB.

        This compliance statement has been deprecated and
        replaced with ipForwardFullCompliance and
        ipForwardReadOnlyCompliance."

    MODULE -- this module
    MANDATORY-GROUPS { ipForwardCidrRouteGroup }

    ::= { ipForwardCompliances 1 }

-- units of conformance

ipForwardCidrRouteGroup OBJECT-GROUP
    OBJECTS { ipCidrRouteNumber,
        ipCidrRouteDest, ipCidrRouteMask, ipCidrRouteTos,
        ipCidrRouteNextHop, ipCidrRouteIfIndex,
        ipCidrRouteType, ipCidrRouteProto, ipCidrRouteAge,
        ipCidrRouteInfo, ipCidrRouteNextHopAS,
        ipCidrRouteMetric1, ipCidrRouteMetric2,
        ipCidrRouteMetric3, ipCidrRouteMetric4,
        ipCidrRouteMetric5, ipCidrRouteStatus
    }
    STATUS      deprecated
    DESCRIPTION
        "The CIDR Route Table.

        This group has been deprecated and replaced with
        inetForwardCidrRouteGroup."
    ::= { ipForwardGroups 3 }

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-- Obsoleted Definitions - Objects

ipForwardNumber OBJECT-TYPE
    SYNTAX      Gauge32
    MAX-ACCESS  read-only

```

```

STATUS      obsolete
DESCRIPTION
    "The number of current ipForwardTable entries that are
    not invalid."
::= { ipForward 1 }

-- IP Forwarding Table

-- The IP Forwarding Table obsoletes and replaces the ipRoute
-- Table current in MIB-I and MIB-II. It adds knowledge of
-- the autonomous system of the next hop, multiple next hop
-- support, and policy routing support.

ipForwardTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF IpForwardEntry
    MAX-ACCESS  not-accessible
    STATUS      obsolete
    DESCRIPTION
        "This entity's IP Routing table."
    REFERENCE
        "RFC 1213 Section 6.6, The IP Group"
    ::= { ipForward 2 }

ipForwardEntry OBJECT-TYPE
    SYNTAX      IpForwardEntry
    MAX-ACCESS  not-accessible
    STATUS      obsolete
    DESCRIPTION
        "A particular route to a particular destination, under a
        particular policy."
    INDEX {
        ipForwardDest,
        ipForwardProto,
        ipForwardPolicy,
        ipForwardNextHop
    }
    ::= { ipForwardTable 1 }

IpForwardEntry ::= SEQUENCE {
    ipForwardDest      IPAddress,
    ipForwardMask      IPAddress,
    ipForwardPolicy    Integer32,
    ipForwardNextHop   IPAddress,
    ipForwardIfIndex   Integer32,
    ipForwardType      INTEGER,
    ipForwardProto     INTEGER,
    ipForwardAge       Integer32,
    ipForwardInfo      OBJECT IDENTIFIER,
    ipForwardNextHopAS Integer32,

```

```
        ipForwardMetric1      Integer32,
        ipForwardMetric2      Integer32,
        ipForwardMetric3      Integer32,
        ipForwardMetric4      Integer32,
        ipForwardMetric5      Integer32
    }

ipForwardDest OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  read-only
    STATUS      obsolete
    DESCRIPTION
        "The destination IP address of this route.  An entry
        with a value of 0.0.0.0 is considered a default route.

        This object may not take a Multicast (Class D) address
        value.

        Any assignment (implicit or otherwise) of an instance
        of this object to a value x must be rejected if the
        bitwise logical-AND of x with the value of the
        corresponding instance of the ipForwardMask object is
        not equal to x."
    ::= { ipForwardEntry 1 }

ipForwardMask OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  read-create
    STATUS      obsolete
    DESCRIPTION
        "Indicate the mask to be logical-ANDed with the
        destination address before being compared to the value
        in the ipForwardDest field.  For those systems that do
        not support arbitrary subnet masks, an agent constructs
        the value of the ipForwardMask by reference to the IP
        Address Class.

        Any assignment (implicit or otherwise) of an instance
        of this object to a value x must be rejected if the
        bitwise logical-AND of x with the value of the
        corresponding instance of the ipForwardDest object is
        not equal to ipForwardDest."
    DEFVAL { '00000000'H }      -- 0.0.0.0
    ::= { ipForwardEntry 2 }

-- The following convention is included for specification
-- of TOS Field contents.  At this time, the Host Requirements
-- and the Router Requirements documents disagree on the width
-- of the TOS field.  This mapping describes the Router
```

```
-- Requirements mapping, and leaves room to widen the TOS field
-- without impact to fielded systems.
```

```
ipForwardPolicy OBJECT-TYPE
    SYNTAX      Integer32 (0..2147483647)
```

```
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```

```
MAX-ACCESS read-only
STATUS      obsolete
DESCRIPTION
```

```
"The general set of conditions that would cause
the selection of one multipath route (set of
next hops for a given destination) is referred
to as 'policy'.
```

```
Unless the mechanism indicated by ipForwardProto
specifies otherwise, the policy specifier is
the IP TOS Field.  The encoding of IP TOS is as
specified by the following convention.  Zero
indicates the default path if no more specific
policy applies.
```

+	+	+	+	+	+	+	+	+	+
		PRECEDENCE			TYPE OF SERVICE			0	
+	+	+	+	+	+	+	+	+	+

IP TOS			IP TOS		
Field	Policy		Field	Policy	
Contents	Code		Contents	Code	
0 0 0 0	==>	0	0 0 0 1	==>	2
0 0 1 0	==>	4	0 0 1 1	==>	6
0 1 0 0	==>	8	0 1 0 1	==>	10
0 1 1 0	==>	12	0 1 1 1	==>	14
1 0 0 0	==>	16	1 0 0 1	==>	18
1 0 1 0	==>	20	1 0 1 1	==>	22
1 1 0 0	==>	24	1 1 0 1	==>	26
1 1 1 0	==>	28	1 1 1 1	==>	30

```
Protocols defining 'policy' otherwise must either
define a set of values which are valid for
this object or must implement an integer-instanced
policy table for which this object's
value acts as an index."
```

```
::= { ipForwardEntry 3 }
```

```
ipForwardNextHop OBJECT-TYPE
```

SYNTAX IpAddress
 MAX-ACCESS read-only
 STATUS obsolete
 DESCRIPTION
 "On remote routes, the address of the next system en
 route; Otherwise, 0.0.0.0."
 ::= { ipForwardEntry 4 }

ipForwardIfIndex OBJECT-TYPE

SYNTAX Integer32
 MAX-ACCESS read-create

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STATUS obsolete
 DESCRIPTION
 "The ifIndex value which identifies the local interface
 through which the next hop of this route should be
 reached."
 DEFVAL { 0 }
 ::= { ipForwardEntry 5 }

ipForwardType OBJECT-TYPE

SYNTAX INTEGER {
 other (1), -- not specified by this MIB
 invalid (2), -- logically deleted
 local (3), -- local interface
 remote (4) -- remote destination
 }

MAX-ACCESS read-create

STATUS obsolete

DESCRIPTION

"The type of route. Note that local(3) refers to a route for which the next hop is the final destination; remote(4) refers to a route for which the next hop is not the final destination.

Setting this object to the value invalid(2) has the effect of invalidating the corresponding entry in the ipForwardTable object. That is, it effectively disassociates the destination identified with said entry from the route identified with said entry. It is an implementation-specific matter as to whether the agent removes an invalidated entry from the table. Accordingly, management stations must be prepared to receive tabular information from agents that corresponds to entries not currently in use. Proper interpretation of such entries requires examination of the relevant ipForwardType object."

DEFVAL { invalid }

```
::= { ipForwardEntry 6 }
```

```
ipForwardProto OBJECT-TYPE
```

```
SYNTAX      INTEGER {
    other      (1),  -- not specified
    local      (2),  -- local interface
    netmgmt    (3),  -- static route
    icmp       (4),  -- result of ICMP Redirect

    -- the following are all dynamic
    -- routing protocols
    egp        (5),  -- Exterior Gateway Protocol
    ggp        (6),  -- Gateway-Gateway Protocol
    hello      (7),  -- FuzzBall HelloSpeak
    rip        (8),  -- Berkeley RIP or RIP-II
    is-is      (9),  -- Dual IS-IS
    es-is      (10), -- ISO 9542
    ciscoIgrp  (11), -- Cisco IGRP
```

```
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```
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```

```
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```

```
    bbnSpfIgp (12), -- BBN SPF IGP
    ospf      (13), -- Open Shortest Path First
    bgp       (14), -- Border Gateway Protocol
    idpr      (15)  -- InterDomain Policy Routing
}
```

```
MAX-ACCESS read-only
```

```
STATUS      obsolete
```

```
DESCRIPTION
```

```
    "The routing mechanism via which this route was learned.
    Inclusion of values for gateway routing protocols is
    not intended to imply that hosts should support those
    protocols."
```

```
::= { ipForwardEntry 7 }
```

```
ipForwardAge OBJECT-TYPE
```

```
SYNTAX      Integer32
```

```
MAX-ACCESS read-only
```

```
STATUS      obsolete
```

```
DESCRIPTION
```

```
    "The number of seconds since this route was last updated
    or otherwise determined to be correct. Note that no
    semantics of 'too old' can be implied except through
    knowledge of the routing protocol by which the route
    was learned."
```

```
DEFVAL { 0 }
```

```
::= { ipForwardEntry 8 }
```

```
ipForwardInfo OBJECT-TYPE
```

```
SYNTAX      OBJECT IDENTIFIER
```


MAX-ACCESS read-create
 STATUS obsolete
 DESCRIPTION
 "A reference to MIB definitions specific to the particular routing protocol which is responsible for this route, as determined by the value specified in the route's ipForwardProto value. If this information is not present, its value should be set to the OBJECT IDENTIFIER { 0 0 }, which is a syntactically valid object identifier, and any implementation conforming to ASN.1 and the Basic Encoding Rules must be able to generate and recognize this value."
 ::= { ipForwardEntry 9 }

ipForwardNextHopAS OBJECT-TYPE
 SYNTAX Integer32
 MAX-ACCESS read-create
 STATUS obsolete
 DESCRIPTION
 "The Autonomous System Number of the Next Hop. When this is unknown or not relevant to the protocol indicated by ipForwardProto, zero."
 DEFVAL { 0 }
 ::= { ipForwardEntry 10 }

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ipForwardMetric1 OBJECT-TYPE
 SYNTAX Integer32
 MAX-ACCESS read-create
 STATUS obsolete
 DESCRIPTION
 "The primary routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route's ipForwardProto value. If this metric is not used, its value should be set to -1."
 DEFVAL { -1 }
 ::= { ipForwardEntry 11 }

ipForwardMetric2 OBJECT-TYPE
 SYNTAX Integer32
 MAX-ACCESS read-create
 STATUS obsolete
 DESCRIPTION
 "An alternate routing metric for this route. The semantics of this metric are determined by the routing-protocol specified in the route's ipForwardProto value. If this metric is not used, its value should be set to

```

        -1."
    DEFVAL { -1 }
    ::= { ipForwardEntry 12 }

ipForwardMetric3 OBJECT-TYPE
    SYNTAX      Integer32
    MAX-ACCESS  read-create
    STATUS      obsolete
    DESCRIPTION
        "An alternate routing metric for this route.  The
        semantics of this metric are determined by the routing-
        protocol specified in the route's ipForwardProto value.
        If this metric is not used, its value should be set to
        -1."
    DEFVAL { -1 }
    ::= { ipForwardEntry 13 }

ipForwardMetric4 OBJECT-TYPE
    SYNTAX      Integer32
    MAX-ACCESS  read-create
    STATUS      obsolete
    DESCRIPTION
        "An alternate routing metric for this route.  The
        semantics of this metric are determined by the routing-
        protocol specified in the route's ipForwardProto value.
        If this metric is not used, its value should be set to
        -1."
    DEFVAL { -1 }
    ::= { ipForwardEntry 14 }

ipForwardMetric5 OBJECT-TYPE
    SYNTAX      Integer32

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    MAX-ACCESS  read-create
    STATUS      obsolete
    DESCRIPTION
        "An alternate routing metric for this route.  The
        semantics of this metric are determined by the routing-
        protocol specified in the route's ipForwardProto value.
        If this metric is not used, its value should be set to
        -1."
    DEFVAL { -1 }
    ::= { ipForwardEntry 15 }

-- Obsoleted Definitions - Groups
-- compliance statements

ipForwardOldCompliance MODULE-COMPLIANCE

```

```

STATUS      obsolete
DESCRIPTION
    "The compliance statement for SNMP entities which
    implement the ipForward MIB."

MODULE  -- this module
MANDATORY-GROUPS { ipForwardMultiPathGroup }

::= { ipForwardCompliances 2 }

ipForwardMultiPathGroup OBJECT-GROUP
    OBJECTS { ipForwardNumber,
               ipForwardDest, ipForwardMask, ipForwardPolicy,
               ipForwardNextHop, ipForwardIfIndex, ipForwardType,
               ipForwardProto, ipForwardAge, ipForwardInfo,
               ipForwardNextHopAS,
               ipForwardMetric1, ipForwardMetric2, ipForwardMetric3,
               ipForwardMetric4, ipForwardMetric5
            }
    STATUS      obsolete
    DESCRIPTION
        "IP Multipath Route Table."
    ::= { ipForwardGroups 2 }

END

```

6 Security Considerations

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create. 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. These are the tables and objects and their sensitivity/vulnerability:

1. The `inetCidrRouteTable` contains routing and forwarding information that is critical to the operation of the network node (especially routers). Allowing unauthenticated write access to this table can compromise the validity of the forwarding information.

Some of the readable objects in this MIB module (i.e., objects with a MAX-ACCESS other than not-accessible) 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. These are the tables and objects and their sensitivity/vulnerability:

1. The `inetCidrRouteTable` contains routing and forwarding information that can be used to compromise a network. Specifically, this table can be used to construct a map of the network in preparation for a denial-of-service attack on the network infrastructure.
2. The `inetCidrRouteProto` object identifies the routing protocols in use within a network. This information can be used to determine how a denial-of-service attack should be launched.

SNMP versions prior to SNMPv3 did not include adequate security. 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 GET/SET (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 indeed GET or SET (change/create/delete) them.

[7](#) Intellectual Property Statement

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8 Changes from [RFC 2096](#)

This document updates [RFC 2096](#) in the following ways:

1. Replaces `ipCidrRouteTable` with `inetCidrRouteTable`. This applies to corresponding objects and conformance statements.
2. Utilized the `InetAddress` TC to support IP version-independent implementations of the forwarding MIB. This gives common forwarding MIB support for IPv4 and IPv6.
3. Created a read-only conformance statement to support implementations that only wish to retrieve data.
4. Created the `inetCidrRouteDiscards` object to replace the deprecated `ipRoutingDiscards` and `ipv6DiscardedRoutes` objects.

The `inetCidrRouteTable` retains the logical structure of the `ipCidrRouteTable` in order to allow the easy upgrade of existing IPv4 implementations to the version-independent MIB.

9 Normative References

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- [RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Textual Conventions for SMIV2", STD 58, [RFC 2579](#), April 1999.
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-- [draft-ietf-ops-rfc3291bis](#) is published before or at the same
-- time as this document, please update this reference and the two
-- citations in the document. Afterwards, please remove this note.
- [RFC2863] McCloghrie, K., and Kastenholz, F., "The Interfaces Group MIB", [RFC 2863](#), June 2000.
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10 Informative References

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11 Authors and Acknowledgements

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The following people provided text for this version of the document, or were authors of previous versions:

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12 Editors' Contact Information

Comments or questions regarding this document should be sent to:

Brian Haberman
Caspian Networks
753 Bridgewater Drive Phone: +1 410-552-1421
Sykesville, MD 21784 USA Email: brian@innovationslab.net

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