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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 ipng@sunroof.eng.sun.com.

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-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-
RTPROTO-MIB

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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 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](#)].

2 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](#)].

3 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.

In addition, there is one deprecated table and object, and one obsolete table and object, representing previous revisions of this MIB.

1. The obsolete object ipForwardNumber represents the number of entries in the obsolete ipForwardTable.
2. The obsolete ipForwardTable updates the [RFC 1213](#) ipRouteTable to display multipath IP Routes. This is in turn obsoleted by the ipCidrRouteTable.
3. The deprecated object ipCidrRouteNumber represents the number of entries in the deprecated ipCidrRouteTable.

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4. The deprecated ipCidrRouteTable updates the [RFC 1213](#) ipRouteTable to display multipath IP Routes having the same network number but differing network masks.

4 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
InterfaceIndex	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 "200308281500Z"

ORGANIZATION

"IETF IPv6 Working Group

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

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-- RFC Ed: please verify mailing list address at publication
-- and delete this note

DESCRIPTION

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

Copyright (C) The Internet Society (2003). 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 "200308281500Z"

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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.

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

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 entries in the inetCidrRouteTable which
         were chosen to be discarded even though they are valid.
         One possible reason for discarding such an entry could
         be to free-up buffer space for other routing 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

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

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 InterfaceIndex,
 inetCidrRouteType INTEGER,
 inetCidrRouteProto IANAipRouteProtocol,
 inetCidrRouteAge Gauge32,
 inetCidrRouteNextHopAS InetAutonomousSystemNumber,
 inetCidrRouteMetric1 Integer32,
 inetCidrRouteMetric2 Integer32,
 inetCidrRouteMetric3 Integer32,
 inetCidrRouteMetric4 Integer32,
 inetCidrRouteMetric5 Integer32,
 inetCidrRouteStatus RowStatus

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}

inetCidrRouteDestType OBJECT-TYPE

SYNTAX InetAddressType
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The type of the inetCidrRouteDest address, as defined
 in the InetAddress MIB [[RFC3291](#)]."
::= { inetCidrRouteEntry 1 }

inetCidrRouteDest OBJECT-TYPE

SYNTAX InetAddress
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The destination IP address of this route.

 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 mask
 formed from the corresponding instance of the
 inetCidrRoutePfxLen object is not equal to x."
::= { 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.

 Any assignment (implicit or otherwise) of an instance
 of this object to a value x MUST be rejected if the
 bitwise logical-AND of the mask formed from x with the
 value of the corresponding instance of the
 inetCidrRouteDest object is not equal to
 inetCidrRouteDest."
::= { inetCidrRouteEntry 3 }

inetCidrRoutePolicy OBJECT-TYPE

SYNTAX OBJECT IDENTIFIER
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "Represents the general set of conditions that would
 cause the selection of one multipath route (set of next
 hops for a given destination) over another (referred to
 as policy). The value { 0 0 } shall be used for the
 default policy or if no particular policy applies."
::= { 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 [[RFC3291](#)].

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

::= { 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."

::= { inetCidrRouteEntry 6 }

inetCidrRouteIfIndex OBJECT-TYPE

SYNTAX InterfaceIndex

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."

::= { 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.

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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

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

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        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
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."

```

```

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```

```

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."
    MODULE -- this module
    MANDATORY-GROUPS { inetForwardCidrRouteGroup }
    ::= { 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
    MIN-ACCESS   read-only
    DESCRIPTION
        "Write access is not required."

    OBJECT      inetCidrRouteType
    MIN-ACCESS   read-only
    DESCRIPTION

```

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```

        "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
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,
                inetCidrRouteMetric2, inetCidrRouteMetric3,
                inetCidrRouteMetric4, inetCidrRouteMetric5,
                inetCidrRouteStatus, inetCidrRouteNumber
            }
    STATUS      current
    DESCRIPTION
        "The IP version-independent CIDR Route Table."
    ::= { ipForwardGroups 4 }

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-- 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
}

::= { ipCidrRouteTable 1 }

IpCidrRouteEntry ::= SEQUENCE {

ipCidrRouteDest IpAddress,
ipCidrRouteMask IpAddress,
ipCidrRouteTos Integer32,
ipCidrRouteNextHop IpAddress,
ipCidrRouteIfIndex Integer32,

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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 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

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-- 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	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	

::= { 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 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

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 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
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

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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

"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 }

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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

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    MAX-ACCESS  read-create
    STATUS      deprecated
    DESCRIPTION
        "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."

    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."
 ::= { ipForwardGroups 3 }

-- 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

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-- 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."

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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)
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

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
 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

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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 }

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

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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 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
    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

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    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

```


5 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.

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[6](#) Intellectual Property

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7 Changes from [RFC 2096](#)

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

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

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8 Normative References

- [RFC2119] S. Bradner, "Key words for use in RFCs to Indicate Requirement Levels", [RFC 2119](#), [BCP14](#), March 1999.
- [RFC2578] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Structure of Management Information Version 2 (SMIv2)", STD 58, [RFC 2578](#), April 1999.
- [RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J.,

Rose, M. and S. Waldbusser, "Textual Conventions for SMIV2", STD 58, [RFC 2579](#), April 1999.

[RFC2580] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Conformance Statements for SMIV2", STD 58, [RFC 2580](#), April 1999.

[RFC3291] Daniele, M., Haberman, B., Routhier, S., Schoenwaelder, J., "Textual Conventions for Internet Network Addresses", [RFC 3291](#), May 2002.

-- RFC Ed : An update to [RFC 3291](#) is in the works, in the case that
-- [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.

[2011upd] Routhier, S., "Management Information Base for the Internet Protocol (IP),
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9 Informative References

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[RFC2096] Baker, F., "IP Forwarding Table MIB", [RFC 2096](#), January 1997.

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10 Authors and Acknowledgements

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