

Network Working Group  
Request for Comments: 2096  
Obsoletes: 1354  
Category: Standards Track

F. Baker  
Cisco Systems  
January 1997

## IP Forwarding Table MIB

### Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

### Table of Contents

1. Introduction .....	1
2. The SNMP Network Management Framework .....	2
2.1 Object Definitions .....	2
3. Overview .....	2
4. Definitions .....	3
5. Acknowledgements .....	20
6. References .....	20
7. Security Considerations .....	21
8. Author's Address .....	21

### 1. Introduction

This memo defines an update to RFC 1354, "IP Forwarding Table MIB", for Classless Inter-Domain Routing (CIDR). That document was developed by the Router Requirements Working Group as an update to RFC 1213's ipRouteTable, with the display of multiple routes as a primary objective. The significant difference between this MIB and RFC 1354 is the recognition (explicitly discussed but by consensus left to future work) that CIDR routes may have the same network number but different network masks. Note that this MIB obsoletes a number of objects from RFC 1354. The reader should pay careful attention to the STATUS field.

## 2. The SNMP Network Management Framework

The SNMP Network Management Framework presently consists of three major components. They are:

- o the SMI, described in RFC 1902 [1], - the mechanisms used for describing and naming objects for the purpose of management.
- o the MIB-II, STD 17, RFC 1213 [2], - the core set of managed objects for the Internet suite of protocols.
- o the protocol, RFC 1157 [6] and/or RFC 1905 [4], - the protocol for accessing managed information.

Textual conventions are defined in RFC 1903 [3], and conformance statements are defined in RFC 1904 [5].

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

### 2.1. Object Definitions

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the subset of Abstract Syntax Notation One (ASN.1) defined in the SMI. In particular, each object object type is named by an OBJECT IDENTIFIER, an administratively assigned name. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, we often use a textual string, termed the descriptor, to refer to the object type.

## 3. Overview

The MIB consists of two tables and two global objects.

- (1) The object `ipForwardNumber` indicates the number of current routes. This is primarily to avoid having to read the table in order to determine this number.
- (2) The `ipForwardTable` updates the RFC 1213 `ipRouteTable` to display multipath IP Routes. This is in turn obsoleted by the `ipCidrRouteTable`.
- (3) The `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
        FROM SNMPv2-SMI
    RowStatus
        FROM SNMPv2-TC
    ip
        FROM RFC1213-MIB
    MODULE-COMPLIANCE, OBJECT-GROUP
        FROM SNMPv2-CONF;
```

```
ipForward MODULE-IDENTITY
```

```
    LAST-UPDATED "9609190000Z"      -- Thu Sep 26 16:34:47 PDT 1996
```

```
    ORGANIZATION "IETF OSPF Working Group"
```

```
    CONTACT-INFO
```

```
        "      Fred Baker
```

```
        Postal: Cisco Systems
```

```
              519 Lado Drive
```

```
              Santa Barbara, California 93111
```

```
        Phone:  +1 805 681 0115
```

```
        Email:  fred@cisco.com
```

```
        "
```

```
    DESCRIPTION
```

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

```
    REVISION      "9609190000Z"
```

```
    DESCRIPTION
```

```
        "Revisions made by the OSPF WG."
```

```
    ::= { ip 24 }
```

```
ipCidrRouteNumber OBJECT-TYPE
```

```
    SYNTAX      Gauge32
```

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

```
    STATUS      current
```

```
    DESCRIPTION
```

```
        "The number of current ipCidrRouteTable entries
```

```
        that are not invalid."
```

```
    ::= { 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      current
    DESCRIPTION
        "This entity's IP Routing table."
    REFERENCE
        "RFC 1213 Section 6.6, The IP Group"
    ::= { ipForward 4 }
```

```
ipCidrRouteEntry OBJECT-TYPE
    SYNTAX      IpCidrRouteEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    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,
        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 current

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 current

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 ipCidrRoute-  
Dest."

```
::= { 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

MAX-ACCESS read-only

STATUS current

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 current

DESCRIPTION

"On remote routes, the address of the next sys-  
tem en route; Otherwise, 0.0.0.0."

```
::= { ipCidrRouteEntry 4 }
```

```
ipCidrRouteIfIndex OBJECT-TYPE
```

```
SYNTAX      Integer32
```

```
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."

```
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      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. 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 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."

```

```

 ::= { ipCidrRouteEntry 7 }

```

```

ipCidrRouteAge OBJECT-TYPE

```

```

    SYNTAX Integer32

```

```

    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."

```

```

    DEFVAL { 0 }

```

```

 ::= { ipCidrRouteEntry 8 }

```

```

ipCidrRouteInfo OBJECT-TYPE

```

```

    SYNTAX OBJECT IDENTIFIER

```

```

    MAX-ACCESS read-create

```

```

    STATUS current

```

```

    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."

```



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

-- conformance information

```
ipForwardConformance OBJECT IDENTIFIER ::= { ipForward 5 }
```

```
ipForwardGroups      OBJECT IDENTIFIER ::= { ipForwardConformance 1 }
ipForwardCompliances OBJECT IDENTIFIER ::= { ipForwardConformance 2 }

-- compliance statements

ipForwardCompliance MODULE-COMPLIANCE
    STATUS      current
    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      current
    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
-- 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

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 ipForwardPro- to 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 iden-

tified 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

```
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

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
    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. Acknowledgements

This work was originally performed by the Router Requirements Working Group at the request of the OSPF Working Group. This update was performed under the auspices of the OSPF Working Group. John Moy of Proteon Incorporated is the chair.

## 6. References

- [1] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Structure of Management Information for version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1442, SNMP Research, Inc., Hughes LAN Systems, Dover Beach Consulting, Inc., Carnegie Mellon University, April 1993.
- [2] Galvin, J., and K. McCloghrie, "Administrative Model for version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1445, Trusted Information Systems, Hughes LAN Systems, April 1993.
- [3] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Protocol Operations for version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1448, SNMP Research, Inc., Hughes LAN Systems, Dover Beach Consulting, Inc., Carnegie Mellon University, April 1993.
- [4] McCloghrie, K., and M. Rose, "Management Information Base for Network Management of TCP/IP-based internets - MIB-II", STD 17, RFC 1213, Hughes LAN Systems, Performance Systems International, March 1991.
- [5] Postel, J., "Internet Protocol", STD 5, RFC 791, USC/Information Sciences Institute, September 1981.
- [6] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Textual Conventions for version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1443, SNMP Research, Inc., Hughes LAN Systems, Dover Beach Consulting, Inc., Carnegie Mellon University, April 1993.
- [7] Baker, F., "IP Forwarding Table MIB", RFC 1354, July 1992.

## 7. Security Considerations

Security is an objective not in this MIB view.

## 8. Author's Address

Fred Baker  
Cisco Systems  
519 Lado Drive  
Santa Barbara, California 93111

Phone: +1 805 681 0115  
EMail: fred@cisco.com

