                        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

   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  destina-
         tion, 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 Ad-
        dress 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 destina-
       tion.

       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 rout-
        ing 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 responsi-
        ble 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  identif-
```

```
        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  destina-
        tion, 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 Ad-
        dress 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 ipForward-
       Dest."
    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  ei-
       ther 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 sys-
       tem 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 destina-
       tion.

       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 current-
            ly in use. Proper interpretation of such en-
            tries requires examination of the relevant ip-
            ForwardType 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 rout-
            ing 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 responsi-
          ble 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  identif-
          ier, 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