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**Definitions of Managed Objects
for the Fourth Version of Border Gateway Protocol (BGP-4),
Second Version**
<draft-ietf-idr-bgp4-mibv2-04.txt>

Status of this Memo

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Abstract

   This memo defines a portion of the Management Information Base (MIB)
   for use with network management protocols in TCP/IP-based internets.
   In particular, this MIB defines objects that facilitate the

management of the Border Gateway Protocol Version 4 (BGP4).

Distribution of this memo is unlimited.

1. Introduction

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects used for managing the Border Gateway Protocol Version 4.

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

2. Objectives

This MIB Module is meant to broadly update and replace a prior MIB Module defined in RFC 1657 [RFC1657]. Additionally, there is another effort underway to address very specific limited objectives in updating points in the RFC 1657 object definition and managed object attributes [MIB-DRAFT]. The MIB Module described herein is intended to fully serve the functions and scope of RFC 1657 and these RFC 1657 updates.

2.1. Protocol Extensions

Additionally, however, there are a number of ways in which the BGP Protocol has been enhanced through its ability for added capabilities. Implementations of those capabilities have not been able to have any management capabilities present in RFC 1657-compliant MIB module agents, since the capabilities themselves postdated the adoption of RFC 1657. For several significant capabilities, in the form of BGP Communities [RFC1997], Autonomous System Confederation

[RFC3065] , BGP Multiprotocol Extensions [RFC2858], and Route Reflec-
tion [RFC2796], the MIB Module defined in this document exposes
object types to manage those extended capabilities and their opera-
tion.

One of these extensions in particular (the multiprotocol extensions)
requires a thorough redefinition of MIB table row indices from the
RFC 1657 state. This allows transport-independent address indices
consistent with the Address Family Identifier (AFI) and Subsequent
Address Family Identifier (SAFI) mechanisms of that extension.

2.2. Mechanisms for MIB Extensibility

Moreover, the requirement for the incremental update of support for
capabilities such as these begs the issue of placing modular extensi-
bility for protocol extensions within the framework of the MIB
itself. Going forward, it would be very desirable to have attributes
of the MIB structure, and administrative procedures, to allow the
incremental update of the MIB scope to cover any such new protocol
extensions, without requiring a reissue of the entire MIB. In this
sense, we seek to structure the MIB much like the underlying BGP4
itself, allowing capability-by-capability update.

2.3. BGP Configuration

Finally, the definition and adoption of Version 3 of the SNMP has
occurred since the adoption of the RFC 1657 MIB. As a result, the
ability to deploy secure configuration of managed elements via SNMP
in a standardized way has become a reality for managed networks. In
this MIB definition effort, we seek to expose a more thorough capac-
ity for configuration of BGP4 and its capabilities than was present
in RFC 1657 or than was common practice at the time of its adoption.

3. MIB Organization

The MIB is broken down into several top level sections. This sec-
tionalization is important to create an organization for extensibil-
ity.

In general, a top level section of the MIB module will identify some
number of "core" scalar and tabular objects rooted off of it. If
there is sufficient depth within a subsection of one of these top-
level sections, the "core" subdivision off of the top level section
may provide multiple levels to the OBJECT IDENTIFIER scope necessary
to define its management data.

Once this core section is defined, however, each top-level section
has an explicit provision for an 'extensions' section OBJECT IDENTI-
FIER. The intent of the extensions section is to be containment for
discrete per-extension sections. By 'extension' here, we refer to
protocol mechanisms, capabilities, and exchanges which are not
defined in the base Border Gateway Protocol definition, or is not
configuration for protocol operations of similarly 'core' status.
Currently, we propose keying the identification within the per-exten-
sion section in one of two ways.

Where the extension is keyed to a defined capability which has an
associated BGP capability number assigned by IANA (for example, mul-
tiprotocol BGP extensions), the per extension section will be that
defined IANA capability number. Where the extension has management
information suitable for a MIB extension but does not correspond to
an exchanged protocol capability (for example, BGP Route Reflection),
the extension section shall have its final OBJECT IDENTIFIER fragment
correspond to the RFC number which first uniquely defined the exten-
sion (i.e., not requiring renumbering at the time a defining RFC for
a protocol mechanism is outdated by a later RFC).

3.1. bgpM2BaseScalars

The bgpM2BaseScalars section (and corresponding OBJECT IDENTIFIER) is
used to delineate object types used for basic management and monitor-
ing of the protocol implementation.   These are core parameters for
the local configuration. While notifications are designed to be
extensible into any other section in the MIB module, the currently
defined traps are located here, in a subsection 'bgpM2BaseNotifica-
tions'. This is rooted at index level zero (0) here, owing to con-
ventions established in [RFC2576].

Support for multiple concurrently supported versions of BGP is
exposed through the entries of the bgpM2VersionTable. Similarly,
support for multiple capabilities and authentication mechanisms, as
identified by their assigned numbers, are reported in the bgpM2Sup-
portedCapabilitiesTable and bgpM2SupportedAuthTable respectively.

In the MIB document, there are currently scalar extension mechanisms
to allow the agent to report membership of a local BGP Confederation
[RFC3065] or Route Reflection Cluster ID [RFC2796], as well as
whether these capabilities are in fact supported by the implementa-
tion. These are consistent with the non-capability based extension
section indexing guidelines as presented above.

bgpM2BaseScalars also is the root for a subsection, bgpM2BaseScalar-
Configuration, which contains the companion configuration objects for

the base scalar objects delineated in the preceding paragraphs.
These are presented as a series of scalar read-write objects, with a
single OBJECT-TYPE of syntax StorageType to designate the persistence
of the instance value data for these configuration scalars.

3.2. bgpM2PeerData

The bgpM2PeerData section is per-peer object type definitions. The
predominant table of read-only STATUS object types in that section
(bgpM2PeerTable) describes the session, negotiation state, and
authentication state on a per peer basis. A second table (bgpM2Pre-
fixCountersTable) exposes information about individual route prefixes
received over each peer session. A separate subsection and its sub-
ordinate table (bgpM2PeerErrorsTable) reports information about the
last error encountered on a given peering session.

Further subsections report authentication state with the peer, peer-
ing session detected errors, and elapsed time it has taken to
advance the peering session into various states defined in the proto-
col FSM.

The bgpM2PeerConfiguredTimersTable reports and allows dynamic reset
of key timers on the peer session. These currently allow reset of
hold time and keepalive timer, for compatibility with the same capa-
bilities in RFC 1657 [RFC1657]. For these resettable timers, their
end-to-end negotiated current values are reflected in the
bgpM2PeerNegotiatedTimersTable.

As currently defined, these tables describing authentication, error
state, and timer values (in addition to the configuration tables for
session timers) are tightly coupled enough to the logical per-row
view exposed in the bgpM2PeerTable row entries on a session that
these subordinate "tables" are defined as AUGMENTing the
bgpM2PeerTable itself. The other primary design criterion behind
this decision is that using this AUGMENTation does not increase the
per-row-data requirements of bgpM2PeerTable instance retrieval so as
to make such per-row retrieval unwieldy for the management applica-
tion.

3.2.1. bgpM2PeerCapabilities

bgpM2PeerCapabilitiesData has objects and tables to describe BGP
capabilities locally supported, and those reported and negotiated
over each peer session.   For tables supporting each of these capa-
bility sets, capability code and data value are provided. Attention
must be given to the fact that multiple instances of a given

capability can be transmitted between BGP speakers.

3.2.2. bgpM2PeerCounters

The bgpM2CountersTable and bgpM2PrefixCountersTable report protocol
exchanges/FSM transitions, and discrete number of NLRIs exchanged per
peering session, respectively. This is independent of actual
exchanged path attributes, which are tabularized later in the MIB
module. Note that session transitions as reflected in changes of
instances within this table may also be reflected in issuance of
bgpM2Established and bgpM2BackwardTransition NOTIFICATION-TYPE PDUs.

3.2.3. Peering Data Extensions

Route reflector status on a per-peer basis (whether the peer is a
client or nonClient of the local BGP router's reflected route propa-
gation), and peer confederation membership is reported in non capa-
bility extensions of the peering data section.

3.2.4. Configuring Peering Sessions

The MIB has several tables indexed on a per-peer level of granularity
to control creation and activation of new peering sessions, and to
allow control on running sessions (those reflected in bgpM2PeerTable
row instances) regardless of what caused their creation in the BGP
routing process.

The bgpM2CfgPeerAdminStatusTable allows creation and specification of
a row by a bgpM2PeerIndex value (which is how its associated row
instance is identified in the bgpM2PeerTable). For each such row
instance, the set of the bgpM2CfgPeerAdminStatus OBJECT-TYPE of MAX-
ACCESS read-write can allow management application start and stop of
the session.

This is contrasted with the function of the bgpM2CfgPeerTable, and
its related AUGMENTed tables bgpM2CfgPeerTimersTable and bgpM2Cfg-
PeerAuthTable. These are used to facilitate direct creation of peer-
ing sessions by the management application. The function of columnar
OBJECT-TYPEs within the bgpM2CfgPeerTable for local and remote
address, version negotiation, and various row-administrative
attributes (RowStatus and StorageType SYNTAXes) are straightforward
enough. The only subtlety with respect to how peering sessions are
activated from usage of this table, and how the activated sessions
are reflected through their bgpM2PeerTable and bgpM2CfgPeerAdminSta-
tusTable entries, is in the usage of the bgpM2CfgPeerTable columnar
object bgpM2CfgPeerStatus. bgpM2CfgPeerStatus can take on two

values. When a peering session, as reflected through its row
instance in the bgpM2CfgPeerTable, has the bgpM2CfgPeerStatus
instance value in that row set to running(2) at the time of the SYN-
TAX RowStatus object instance of bgpM2CfgPeerRowEntryStatus set to
active(1), the peering session will in fact be activated in the BGP
routing process (in addition to having its row instance created in
the bgpM2CfgPeerTable and bgpM2CfgPeerAdminStatusTable). In this
case, the associated row of the bgpM2CfgPeerAdminStatusTable row
bgpM2CfgPeerAdminStatus instance would have the value of start(2).
If, in the prior example, the bgpM2CfgPeerStatus is halted(1) at the
time of the bgpM2CfgPeerRowEntryStatus instance set to active(1),
only the peering table entries would be created at this time of acti-
vation, without the peering session being automatically started. The
bgpM2CfgPeerAdminStatusTable row bgpM2CfgPeerAdminStatus instance
associated with the session would in this case reflect a value of
stop(1).

Since the row entries of the per-peer configuration tables which AUG-
MENT the bgpM2CfgPeerTable logically fate-share the row instances in
the bgpM2CfgPeerTable which they are AUGMENTing, they also share the
same StorageType and RowStatus SYNTAX object sense of the bgpM2Cfg-
PeerTable rows which they augment.

3.3. BGP Routing Information Base Data

An important table for providing index information for other tables
in the MIB module is the bgpM2NlriTable. This discriminates on a
given network prefix (by AFI/SAFI), and the peer which advertised the
prefix (since it can be heard of from multiple speakers). The
bgpM2PathAttrIndex column which identifies each row in this table is
used as an index for other per-attribute tables through the remainder
of the MIB module.

RFC 3107 [RFC3107] specifies a capability for exchanged routes
between BGP peers to attach attribute information to a route indicat-
ing, specifically, related MPLS label path information. The MIB sup-
ports the presentation of this attribute information by generalizing
how these attributes are presented to accommodate further extensions
of this particular type. Within a given bgpM2NlriTable entry, we
speak of attribute data of this type as being 'opaque' to BGP, and
use the columnar OBJECT-TYPEs bgpM2NlriOpaqueType and bgpM2Nlri-
OpaquePointer to refer to it. In the case of the RFC 3107 MPLS label
encoding (which is the only usage of these columnar fields in the
bgpM2NlriTable right now), a MPLS label stack would be referenced by
bgpM2NlriOpaquePointer by its per-NLRI instance pointing to a row
instance in the MPLS LSR MIB mplsLabelStackTable, and the bgpM2Nlri-
OpaqueType instance having a value of bgpMplsLabelStack(1).

The bgpM2AdjRibsOutTable row entries reflect data on routes which
have been placed, per peering session, in the Adj-Rib-Out for adver-
tisement to the associated peer.

The bgpM2PathAttrTable provides discrete BGP NLRI attributes which
were received with the advertisement of the prefix by its advertising
peer. Specific information about the autonomous system path (AS
Path) advertised with the NLRI, on a per AS value, is to be found in
the bgpM2AsPathTable.

Finally, where attributes which were unable to be reported in the
bgpM2PathAttrTable, the AS Path table, or any defined per-NLRI tables
in the agent were received with the prefix, those attributes are
reported via the bgpM2PathAttrUnknownTable. Short of advertised
attribute type, no semantic breakdown of the unknown attribute data
is provided. That data is only available as a raw OCTET STRING in
the bgpM2PathAttrUnknownValue column of this table.

3.3.1. Routing Information Base Extensions

There are two extension sections and five subordinate tables to the
bgpM2PathAttrTable and RIB data OBJECT IDENTIFIER-delimited MIB mod-
ule section. The bgpM2PathAttrRouteReflectionExts and its contained
bgpM2PathAttrOriginatorIdTable report on the originating route
reflector. The bgpM2PathAttrClusterTable specifically reports on the
reflection route a NLRI has traversed to get to the local BGP routing
process.

The bgpM2PathAttrCommunityExts section deals with extended and non-
extended communities for network routes. The bgpM2PathAttrCommTable
bgpM2PathAttrExtCommTable contained herein report community member-
ship (if any) on a per network-prefix basis.

3.4. Consideration On Table Indexing

There are certain efficiency concerns for row index management for
management applications which are useful to take into consideration,
given the nature of some of the tables implied in the preceding sec-
tion.

In the first place, it is valuable to exploit the direct relationship
of entries in, for example, the bgpM2PrefixCountersTable as they
relate to the entry in the bgpM2PeerTable to which they are related.
More compelling is the example case of the one-to-many relationship
between a row entry in the bgpM2PeerTable and the bgpM2PathAttrTable,
the latter of which maintains per-row entries for potentially many
NLRIs as received from a peer in a BGP UPDATE message. From the

point of view of normalizing these relationships, it would be useful
to have a direct reference to the "governing" bgpM2PeerTable row
entry for the peer which is a "dependency" for the subordinate table
row entry for other peer data.

Second, the nature of protocol-independent addressing makes the
indexing of these entries indirectly even more compelling. Even
accounting for the addressing requirements of IPv6 and the provision
of AFI and SAFI qualifiers, the logical addressing of a row in the
bgpPathAttrClusterTable (for example) would extend out some 50 bytes
if there was no direct index linkage to the "governing" bgpPathAt-
trTable, and bgpPeerTable entries.

For this reason, the tables are structured in such a way that, where
there is such a linkage to a "dependent" table (where, for example,
the bgpPrefixCountersTable "depends on" the bgpPeerTable), a table
will contain a per-row numeric index (e.g., bgpPeerIndex), which the
"dependent" table will use as one of its own row index values. These
indices are manufactured by the agent, and are otherwise opaque to
the management application (or, for that matter, even to the organi-
zation of the "dependent" table[s]).

Where considerations of per-row retrieval overhead (in terms of typi-
cal row instance data size, as a function of liability to have a sin-
gle row retrieval exceed PDU size, for example), and those of general
logical data organization permit, certain tables logically at the
sub-peering-session level have been specified as AUGMENTing the pri-
mary tables (bgpM2PeerTable and bgpM2CfgPeerTable) to which those
sub-peering-session row entries relate. This is to facilitate ease
on the part of a management application of assembling (for example,
via GET-BULK operations across a lexicographically contiguous row
scope) a management image of control information on a given peering
session.

[4]. Definitions

BGP4-V2-MIB DEFINITIONS ::= BEGIN

    IMPORTS
        MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,
        Counter32, Gauge32, mib-2, Unsigned32, Integer32,
      TimeTicks
            FROM SNMPv2-SMI
        InetAddressType, InetAddress, InetPortNumber,
        InetAutonomousSystemNumber, InetAddressPrefixLength
            FROM INET-ADDRESS-MIB
        TEXTUAL-CONVENTION, TruthValue, RowPointer, StorageType,
        RowStatus

```
            FROM SNMPv2-TC
        MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
            FROM SNMPv2-CONF
        SnmpAdminString
            FROM SNMP-FRAMEWORK-MIB;


    bgpM2 MODULE-IDENTITY
        LAST-UPDATED "200401120000Z"
        ORGANIZATION "IETF IDR Working Group"
        CONTACT-INFO "E-mail:  idr@merit.net

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        DESCRIPTION
            "This MIB module defines management objects for
             the Border Gateway Protocol, Version 4."
        ::= { mib-2 XXX }
-- RFC Ed.: replace XXX with IANA-assigned number & remove this note

    BgpM2Identifier ::= TEXTUAL-CONVENTION
        DISPLAY-HINT "1d."
        STATUS        current
        DESCRIPTION
            "The representation of a BGP Identifier.  The BGP
             Identifier should be represented in the OCTET STRING
             as with the first OCTET of the string containing
             the first OCTET of the BGP Identifier received or sent
             in the OPEN packet and so on.

             Even though the BGP Identifier is trending away from
             an IP address it is still displayed as if it was one,
             even when it would be an illegal IP address."
        SYNTAX OCTET STRING(SIZE (4))


    BgpM2Afi ::= TEXTUAL-CONVENTION
        DISPLAY-HINT "d"
        STATUS        current
        DESCRIPTION
            "The representation of a BGP AFI"
        SYNTAX Unsigned32(0..65535)
```

```
     BgpM2Safi ::= TEXTUAL-CONVENTION
         DISPLAY-HINT "d"
         STATUS       current
         DESCRIPTION
             "The representation of a BGP SAFI"
         SYNTAX Unsigned32(0..255)


     BgpM2Community ::= TEXTUAL-CONVENTION
         DISPLAY-HINT "2d:"
         STATUS       current
         DESCRIPTION
             "The representation of a BGP Community."
         SYNTAX OCTET STRING(SIZE(4))


     BgpM2ExtendedCommunity ::= TEXTUAL-CONVENTION
         DISPLAY-HINT "1x:"
         STATUS       current
         DESCRIPTION
             "The representation of a BGP Extended Community."
         SYNTAX OCTET STRING(SIZE(8))


     bgpM2BaseScalars
         OBJECT IDENTIFIER ::= { bgpM2 1 }


     --
     -- Notifications
     --

     bgpM2BaseNotifications
         OBJECT IDENTIFIER ::= { bgpM2BaseScalars 0 }


     bgpM2Established NOTIFICATION-TYPE
         OBJECTS {
             bgpM2PeerLocalAddrType,
             bgpM2PeerLocalAddr,
             bgpM2PeerRemoteAddrType,
             bgpM2PeerRemoteAddr,
             bgpM2PeerLastErrorReceived,
             bgpM2PeerState
         }
         STATUS  current
         DESCRIPTION
             "The BGP Established event is generated when
```

```
          the BGP FSM enters the ESTABLISHED state."
      ::= { bgpM2BaseNotifications 1 }


  bgpM2BackwardTransition NOTIFICATION-TYPE
      OBJECTS {
          bgpM2PeerLocalAddrType,
          bgpM2PeerLocalAddr,
          bgpM2PeerRemoteAddrType,
          bgpM2PeerRemoteAddr,
          bgpM2PeerLastErrorReceived,
          bgpM2PeerLastErrorReceivedText,
          bgpM2PeerState
      }
      STATUS  current
      DESCRIPTION
          "The BGPBackwardTransition Event is generated
           when the BGP FSM moves from a higher numbered
           state to a lower numbered state."
      ::= { bgpM2BaseNotifications 2 }


  --
  -- BGP Supported Version Table
  --

  bgpM2Version
      OBJECT IDENTIFIER ::= { bgpM2BaseScalars 1 }


  bgpM2VersionTable OBJECT-TYPE
      SYNTAX     SEQUENCE OF BgpM2VersionEntry
      MAX-ACCESS not-accessible
      STATUS     current
      DESCRIPTION
          "Table of supported BGP versions."
      ::= { bgpM2Version 1 }


  bgpM2VersionEntry OBJECT-TYPE
      SYNTAX     BgpM2VersionEntry
      MAX-ACCESS not-accessible
      STATUS     current
      DESCRIPTION
          "Entry containing data on a given supported version
           of the Border Gateway Protocol and the level of
           support provided.  It is expected that any agent
           implementation supporting this MIB module will
```

```
             report support for Version 4 of the Border Gateway
             Protocol at the very minimum."
        INDEX {
            bgpM2VersionIndex
        }
        ::= { bgpM2VersionTable 1 }


    BgpM2VersionEntry ::= SEQUENCE {
            bgpM2VersionIndex
                Unsigned32,
            bgpM2VersionSupported
                TruthValue
    }


    bgpM2VersionIndex OBJECT-TYPE
        SYNTAX     Unsigned32(0..255)
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "The version number of the BGP Protocol."
        ::= { bgpM2VersionEntry 1 }


    bgpM2VersionSupported OBJECT-TYPE
        SYNTAX     TruthValue
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "This value is TRUE if this version of the BGP protocol
             identified in 'bgpM2VersionIndex' is supported.  The absence
             of a row for a particular bgpM2VersionIndex indicates that
             that bgpM2VersionIndex protocol version number is not
             supported."
        ::= { bgpM2VersionEntry 2 }


    --
    -- Supported BGP Capabilities
    --

    bgpM2SupportedCapabilities
        OBJECT IDENTIFIER ::= { bgpM2BaseScalars 2 }


    bgpM2CapabilitySupportAvailable OBJECT-TYPE
        SYNTAX     TruthValue
```

```
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "This value is TRUE if capability support is
             available and is enabled."
        ::= { bgpM2SupportedCapabilities 1 }


    bgpM2SupportedCapabilitiesTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF BgpM2SupportedCapabilityEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "Table of supported BGP-4 capabilities."
        ::= { bgpM2SupportedCapabilities 2 }


    bgpM2SupportedCapabilitiesEntry OBJECT-TYPE
        SYNTAX      BgpM2SupportedCapabilityEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "Information about supported capabilities indexed
             by capability number."
        INDEX {
            bgpM2SupportedCapabilityCode
        }
        ::= { bgpM2SupportedCapabilitiesTable 1 }


    BgpM2SupportedCapabilityEntry ::= SEQUENCE {
        bgpM2SupportedCapabilityCode
            Unsigned32,
        bgpM2SupportedCapability
            TruthValue
    }


    bgpM2SupportedCapabilityCode OBJECT-TYPE
        SYNTAX      Unsigned32 (0..255)
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "Index of supported capability.  The index directly
             corresponds with the BGP-4 Capability Advertisement
             Capability Code."
        ::= { bgpM2SupportedCapabilitiesEntry 1 }
```

```
     bgpM2SupportedCapability OBJECT-TYPE
         SYNTAX      TruthValue
         MAX-ACCESS read-only
         STATUS      current
         DESCRIPTION
             "This value is True if this capability is supported,
              False otherwise."
         ::= { bgpM2SupportedCapabilitiesEntry 2 }


     --
     -- Base Scalars
     --


     bgpM2AsSize OBJECT-TYPE
         SYNTAX      INTEGER {
             twoOctet(1),
             fourOctet(2)
         }
         MAX-ACCESS read-only
         STATUS      current
         DESCRIPTION
             "The size of the AS value in this implementation.

              The semantics of this are determined as per the
              as-4bytes draft."
         REFERENCE
             "draft-ietf-idr-as4bytes-04"
         ::= { bgpM2BaseScalars 4 }


     bgpM2LocalAs OBJECT-TYPE
         SYNTAX      InetAutonomousSystemNumber
         MAX-ACCESS read-only
         STATUS      current
         DESCRIPTION
             "The local autonomous system number.

              If the bgpM2AsSize is twoOctet, then the range is
              constrained to be 0-65535."
         ::= { bgpM2BaseScalars 5 }


     bgpM2LocalIdentifier OBJECT-TYPE
         SYNTAX      BgpM2Identifier
         MAX-ACCESS read-only
         STATUS      current
```

```
         DESCRIPTION
             "The BGP Identifier of local system.

              Current practice is trending away from this value being
              treated as an IP address and more as a generic
              identifier."
         ::= { bgpM2BaseScalars 6 }


    --
    -- Base Scalar Extensions
    --

    bgpM2BaseScalarExtensions
        OBJECT IDENTIFIER ::= { bgpM2BaseScalars 7 }


    bgpM2BaseScalarNonCapExts
        OBJECT IDENTIFIER ::= { bgpM2BaseScalarExtensions 1 }


    bgpM2BaseScalarCapExts
        OBJECT IDENTIFIER ::= { bgpM2BaseScalarExtensions 2 }


    --
    -- Base Scalar Route Reflection Extensions
    --

    bgpM2BaseScalarRouteReflectExts OBJECT IDENTIFIER ::=
        { bgpM2BaseScalarNonCapExts 2796 }


    bgpM2RouteReflector OBJECT-TYPE
        SYNTAX       TruthValue
        MAX-ACCESS   read-only
        STATUS       current
        DESCRIPTION
            "This value is TRUE if this implementation supports the
             BGP Route Reflection Extension and is enabled as a
             route reflector.  If the BGP Route Reflection extension
             is not supported this value must be FALSE."
        REFERENCE
            "RFC 2796 - BGP Route Reflection"
        ::= { bgpM2BaseScalarRouteReflectExts 1 }


    bgpM2ClusterId OBJECT-TYPE
```

```
        SYNTAX      BgpM2Identifier
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The configured Cluster-ID of the BGP Speaker.  This will
             default to the BGP Speaker's BgpM2Identifier if this
             speaker is functioning as a route reflector and an
             explicit Cluster-ID has not been configured.

             A value of 0.0.0.0 will be present if Route Reflection is
             not enabled."
        REFERENCE
            "RFC 2796 - BGP Route Reflection"
        ::= { bgpM2BaseScalarRouteReflectExts 2 }


    --
    -- Base Scalar AS Confederation Extensions
    --

    bgpM2BaseScalarASConfedExts OBJECT IDENTIFIER ::=
         { bgpM2BaseScalarNonCapExts 3065 }


    bgpM2ConfederationRouter OBJECT-TYPE
        SYNTAX      TruthValue
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "This value is TRUE if this implementation supports the
             BGP AS Confederations Extension and this router is
             configured to be in a confederation."
        REFERENCE
            "RFC 3065 - Autonomous System Confederations for BGP"
        ::= { bgpM2BaseScalarASConfedExts 1 }


    bgpM2ConfederationId OBJECT-TYPE
        SYNTAX      InetAutonomousSystemNumber
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "The local Confederation Identification Number.

             This value will be zero (0) if this BGP Speaker is not
             a confederation router."
        REFERENCE
            "RFC 3065 - Autonomous System Confederations for BGP"
```

```
        ::= { bgpM2BaseScalarASConfedExts 2 }


   --
   -- Base Configuration Objects
   --

   bgpM2BaseScalarConfiguration
       OBJECT IDENTIFIER ::= { bgpM2BaseScalars 8 }


   bgpM2CfgBaseScalarStorageType OBJECT-TYPE
       SYNTAX     StorageType
       MAX-ACCESS read-write
       STATUS     current
       DESCRIPTION
           "This object specifies the intended storage type for
            all configurable base scalars."
       ::= { bgpM2BaseScalarConfiguration 1 }


   bgpM2CfgLocalAs OBJECT-TYPE
       SYNTAX     InetAutonomousSystemNumber
       MAX-ACCESS read-write
       STATUS     current
       DESCRIPTION
           "The local autonomous system number.

            If the bgpM2AsSize is twoOctet, then the range is
            constrained to be 0-65535."
       ::= { bgpM2BaseScalarConfiguration 2 }


   bgpM2CfgLocalIdentifier OBJECT-TYPE
       SYNTAX     BgpM2Identifier
       MAX-ACCESS read-write
       STATUS     current
       DESCRIPTION
           "The BGP Identifier of local system.

            Current practice is trending away from this value being
            treated as an IP address and more as a generic
            identifier."
       ::= { bgpM2BaseScalarConfiguration 3 }


   --
   -- Base Scalar Extensions
```

```
     --

     bgpM2CfgBaseScalarExtensions
         OBJECT IDENTIFIER ::= { bgpM2BaseScalarConfiguration 4 }


     bgpM2CfgBaseScalarNonCapExts
         OBJECT IDENTIFIER ::= { bgpM2CfgBaseScalarExtensions 1 }


     bgpM2CfgBaseScalarCapExts
         OBJECT IDENTIFIER ::= { bgpM2CfgBaseScalarExtensions 2 }


     --
     -- Base Scalar Route Reflection Extensions
     --

     bgpM2CfgBaseScalarReflectorExts
         OBJECT IDENTIFIER ::= { bgpM2CfgBaseScalarNonCapExts 2796 }


     bgpM2CfgRouteReflector OBJECT-TYPE
         SYNTAX      TruthValue
         MAX-ACCESS  read-write
         STATUS      current
         DESCRIPTION
             "This value is set to true if this implementation will
              be supporting route reflection."
         REFERENCE
             "RFC 2796 - BGP Route Reflection"
         ::= { bgpM2CfgBaseScalarReflectorExts 1 }


     bgpM2CfgClusterId OBJECT-TYPE
         SYNTAX      BgpM2Identifier
         MAX-ACCESS  read-write
         STATUS      current
         DESCRIPTION
             "The configured Cluster-ID of the BGP Speaker.  This will
              default to the BGP Speaker's BgpM2Identifier if this
              speaker is functioning as a route reflector and an
              explicit Cluster-ID has not been configured.

              A value of 0.0.0.0 will be present if Route Reflection is
              not enabled."
         REFERENCE
             "RFC 2796 - BGP Route Reflection"
```

```
        ::= { bgpM2CfgBaseScalarReflectorExts 2 }



--
-- Base Scalar AS Confederation Extensions
--

bgpM2CfgBaseScalarASConfedExts
    OBJECT IDENTIFIER ::= { bgpM2CfgBaseScalarNonCapExts 3065 }


bgpM2CfgConfederationRouter OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS read-write
    STATUS      current
    DESCRIPTION
        "This value is set to true if this implementation will be
         supporting BGP AS Confederations."
    REFERENCE
        "RFC 3065 - Autonomous System Confederations for BGP"
    ::= { bgpM2CfgBaseScalarASConfedExts 1 }


bgpM2CfgConfederationId OBJECT-TYPE
    SYNTAX      InetAutonomousSystemNumber
    MAX-ACCESS read-write
    STATUS      current
    DESCRIPTION
        "The local Confederation Identification Number.

         This value will be zero (0) if this BGP Speaker is not
         a confederation router."
    REFERENCE
        "RFC 3065 - Autonomous System Confederations for BGP"
    ::= { bgpM2CfgBaseScalarASConfedExts 2 }



--
-- BGP Peer Data
--

bgpM2Peer
    OBJECT IDENTIFIER ::= { bgpM2 2 }


bgpM2PeerData
    OBJECT IDENTIFIER ::= { bgpM2Peer 1 }
```

```
     bgpM2PeerTable OBJECT-TYPE
         SYNTAX     SEQUENCE OF BgpM2PeerEntry
         MAX-ACCESS not-accessible
         STATUS     current
         DESCRIPTION
             "BGP peer table.

              This table contains, one entry per remote BGP peer,
              any information about the connections with the remote
              BGP peers."
         ::= { bgpM2PeerData 1 }


     bgpM2PeerEntry OBJECT-TYPE
         SYNTAX     BgpM2PeerEntry
         MAX-ACCESS not-accessible
         STATUS     current
         DESCRIPTION
             "Entry containing information about the connection with
              a remote BGP peer."
         INDEX {
          bgpM2PeerInstance,
             bgpM2PeerLocalAddrType,
             bgpM2PeerLocalAddr,
             bgpM2PeerRemoteAddrType,
             bgpM2PeerRemoteAddr
         }
         ::= { bgpM2PeerTable 1 }


     BgpM2PeerEntry ::= SEQUENCE {
      bgpM2PeerInstance
          Unsigned32,
         bgpM2PeerIdentifier
             BgpM2Identifier,
         bgpM2PeerState
             INTEGER,
         bgpM2PeerStatus
             INTEGER,
         bgpM2PeerConfiguredVersion
             Unsigned32,
         bgpM2PeerNegotiatedVersion
             Unsigned32,
         bgpM2PeerLocalAddrType
             InetAddressType,
         bgpM2PeerLocalAddr
             InetAddress,
         bgpM2PeerLocalPort
```

```
            InetPortNumber,
        bgpM2PeerLocalAs
            InetAutonomousSystemNumber,
        bgpM2PeerRemoteAddrType
            InetAddressType,
        bgpM2PeerRemoteAddr
            InetAddress,
        bgpM2PeerRemotePort
            InetPortNumber,
        bgpM2PeerRemoteAs
            InetAutonomousSystemNumber,
        bgpM2PeerIndex
            Unsigned32
    }


    bgpM2PeerInstance OBJECT-TYPE
     SYNTAX     Unsigned32
     MAX-ACCESS read-only
     STATUS     current
     DESCRIPTION
         "The routing instance index.

          Some BGP implementations permit the creation of
          multiple instances of a BGP routing process.  An
          example includes RFC 2547 PE-CE routers.

          Implementations that do not support multiple
          routing instances should return 1 for this object.

          XXX TODO - We need to provide a way to configure these
          in the peer configuration table."
         ::= { bgpM2PeerEntry 1 }


    bgpM2PeerIdentifier OBJECT-TYPE
        SYNTAX     BgpM2Identifier
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "The BGP Identifier of this entry's remote BGP peer.

             This entry should be 0.0.0.0 unless the bgpM2PeerState is
             in the OpenConfirm or the Established state."
        REFERENCE
            "draft-ietf-idr-bgp4-17.txt, Sec. 4.2"
        ::= { bgpM2PeerEntry 2 }
```

    bgpM2PeerState OBJECT-TYPE
        SYNTAX   INTEGER {
            idle(1),
            connect(2),
            active(3),
            opensent(4),
            openconfirm(5),
            established(6)
        }
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
            "The remote BGP peer's FSM state."
        REFERENCE
            "draft-ietf-idr-bgp4-17.txt, Sec. 8"
        ::= { bgpM2PeerEntry 3 }

    bgpM2PeerStatus OBJECT-TYPE
        SYNTAX   INTEGER {
            halted(1),
            running(2)
        }
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
            "Whether or not the BGP FSM for this remote peer is halted
             or running. The BGP FSM for a remote peer is halted after
             processing a Stop event. Likewise, it is in the running
             state after a Start event.

             The bgpM2PeerState will generally be in the idle state when
             the FSM is halted, although some extensions such as
             Graceful Restart will leave the peer in the Idle state
             but with the FSM running."
        ::= { bgpM2PeerEntry 4 }

    bgpM2PeerConfiguredVersion OBJECT-TYPE
        SYNTAX   Unsigned32 (1..255)
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
            "The configured version to originally start with this
             remote peer. The BGP speaker may permit negotiation to a
             lower version number of the protocol."
        ::= { bgpM2PeerEntry 5 }

```
bgpM2PeerNegotiatedVersion OBJECT-TYPE
    SYNTAX      Unsigned32 (1..255)
    MAX-ACCESS read-only
    STATUS      current
    DESCRIPTION
        "The negotiated version of BGP running between the two
         peers."
    ::= { bgpM2PeerEntry 6 }


bgpM2PeerLocalAddrType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS read-only
    STATUS      current
    DESCRIPTION
        "The address family of the local end of the peering
         session."
    ::= { bgpM2PeerEntry 7 }


bgpM2PeerLocalAddr OBJECT-TYPE
    SYNTAX      InetAddress (SIZE(4..20))
    MAX-ACCESS read-only
    STATUS      current
    DESCRIPTION
        "The address of the local end of the peering session."
    ::= { bgpM2PeerEntry 8 }


bgpM2PeerLocalPort OBJECT-TYPE
    SYNTAX      InetPortNumber
    MAX-ACCESS read-only
    STATUS      current
    DESCRIPTION
        "The local port for the TCP connection between the BGP
         peers."
    ::= { bgpM2PeerEntry 9 }


bgpM2PeerLocalAs OBJECT-TYPE
    SYNTAX      InetAutonomousSystemNumber
    MAX-ACCESS read-only
    STATUS      current
    DESCRIPTION
        "Some implementations of BGP can represent themselves
         as multiple ASs.  This is the AS that this peering
         session is representing itself as to the remote peer."
    ::= { bgpM2PeerEntry 10 }
```

        bgpM2PeerRemoteAddrType OBJECT-TYPE
            SYNTAX   InetAddressType
            MAX-ACCESS read-only
            STATUS   current
            DESCRIPTION
                "The address family of the remote end of the peering
                 session."
            ::= { bgpM2PeerEntry 11 }

        bgpM2PeerRemoteAddr OBJECT-TYPE
            SYNTAX   InetAddress (SIZE(4..20))
            MAX-ACCESS read-only
            STATUS   current
            DESCRIPTION
                "The address of the remote end of the peering session."
            ::= { bgpM2PeerEntry 12 }

        bgpM2PeerRemotePort OBJECT-TYPE
            SYNTAX   InetPortNumber
            MAX-ACCESS read-only
            STATUS   current
            DESCRIPTION
                "The remote port for the TCP connection between the BGP
                 peers. In the case of a transport for which the notion
                 of 'port' is irrelevant, an instance value of -1
                 should be returned by the agent for this object.

                 Note that the objects bgpM2PeerLocalAddr,
                 bgpM2PeerLocalPort, bgpM2PeerRemoteAddr and
                 bgpM2PeerRemotePort provide the appropriate reference to
                 the standard MIB TCP connection table. or even the ipv6
                 TCP MIB as in rfc2452."
            REFERENCE
                "RFC 2012 - SNMPv2 Management Information Base for the
                 Transmission Control Protocol using SMIv2.
                 RFC 2542 - IP Version 6 Management Information Base
                 for the Transmission Control Protocol."
            ::= { bgpM2PeerEntry 13 }

        bgpM2PeerRemoteAs OBJECT-TYPE
            SYNTAX   InetAutonomousSystemNumber
            MAX-ACCESS read-only
            STATUS   current
            DESCRIPTION
                "The remote autonomous system number."

```
        ::= { bgpM2PeerEntry 14 }


    bgpM2PeerIndex OBJECT-TYPE
        SYNTAX      Unsigned32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "This value is a unique index for the remote peer entry
             in the bgpM2PeerTable.  It is assigned by the agent
             at the point of creation of the bgpM2PeerTable row
             entry.  While its value is guaranteed to be unique at
             any time, it is otherwise opaque to the management
             application with respect to its value or the contiguity
             of bgpM2PeerIndex row instance values across rows of
             the bgpM2PeerTable.  It is used to provide an index
             structure for other tables whose data is logically
             per-peer.

             For explicitly configured peers, this value will remain
             consistent until this row is deleted by deleting the
             configured peers.  Unconfigured peers will generate
             a monotonically increasing number when a BGP FSM is
             built to process the peering session.  Values in the
             bgpM2PeerTable and other tables utilizing bgpM2PeerIndex
             are expected to remain in existence for an arbitrary
             time after the unconfigured peer has been deleted
             in order to allow management applications to extract
             useful management information for those peers.  Thus,
             an unconfigured peer using the same indices as the
             bgpM2PeerTable that comes up while this row still
             exists will re-utilize the same row."
          ::= { bgpM2PeerEntry 15 }


    --
    -- Errors
    --

    bgpM2PeerErrors
        OBJECT IDENTIFIER ::= { bgpM2Peer 2 }

    bgpM2PeerErrorsTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF BgpM2PeerErrorsEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "On a per peer basis, this table reflects the last
```

            protocol-defined error encountered and reported on
            the peer session. If no entry for a given peer,
            by its bgpM2PeerIndex, exists in this table, then no
            such errors have been observed, reported, and
            recorded on the session."
        ::= { bgpM2PeerErrors 1 }

    bgpM2PeerErrorsEntry OBJECT-TYPE
        SYNTAX   BgpM2PeerErrorsEntry
        MAX-ACCESS not-accessible
        STATUS   current
        DESCRIPTION
            "Each entry contains information about errors sent
             and received for a particular BGP peer."
        AUGMENTS {
            bgpM2PeerEntry
        }
        ::= { bgpM2PeerErrorsTable 1 }

    BgpM2PeerErrorsEntry ::= SEQUENCE {
        bgpM2PeerLastErrorReceived
            OCTET STRING,
        bgpM2PeerLastErrorSent
            OCTET STRING,
        bgpM2PeerLastErrorReceivedTime
            TimeTicks,
        bgpM2PeerLastErrorSentTime
            TimeTicks,
        bgpM2PeerLastErrorReceivedText
            SnmpAdminString,
        bgpM2PeerLastErrorSentText
            SnmpAdminString,
        bgpM2PeerLastErrorReceivedData
            OCTET STRING,
        bgpM2PeerLastErrorSentData
            OCTET STRING
    }

    bgpM2PeerLastErrorReceived OBJECT-TYPE
        SYNTAX   OCTET STRING (SIZE (2))
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
            "The last error code and subcode received by this BGP
             Speaker via a NOTIFICATION message for this peer.

          If no error has occurred, this field is zero.
          Otherwise, the first byte of this two byte
          OCTET STRING contains the error code, and the second
          byte contains the subcode."
     REFERENCE
          "draft-ietf-idr-bgp4-15.txt, Sec. 4.5"
     ::= { bgpM2PeerErrorsEntry 1 }

 bgpM2PeerLastErrorSent OBJECT-TYPE
     SYNTAX   OCTET STRING (SIZE (2))
     MAX-ACCESS read-only
     STATUS   current
     DESCRIPTION
         "The last error code and subcode sent by this BGP
          Speaker via a NOTIFICATION message to this peer.
          If no error has occurred, this field is zero.
          Otherwise, the first byte of this two byte
          OCTET STRING contains the error code, and the second
          byte contains the subcode."
     REFERENCE
          "draft-ietf-idr-bgp4-15.txt, Sec. 4.5"
     ::= { bgpM2PeerErrorsEntry 2 }

 bgpM2PeerLastErrorReceivedTime OBJECT-TYPE
     SYNTAX   TimeTicks
     MAX-ACCESS read-only
     STATUS   current
     DESCRIPTION
         "The timestamp that the last NOTIFICATION was received from
          this peer."
     REFERENCE
          "draft-ietf-idr-bgp4-15.txt, Sec. 4.5"
     ::= { bgpM2PeerErrorsEntry 3 }

 bgpM2PeerLastErrorSentTime OBJECT-TYPE
     SYNTAX   TimeTicks
     MAX-ACCESS read-only
     STATUS   current
     DESCRIPTION
         "The timestamp that the last NOTIFICATION was sent to
          this peer."
     REFERENCE
          "draft-ietf-idr-bgp4-15.txt, Sec. 4.5"
     ::= { bgpM2PeerErrorsEntry 4 }

```
    bgpM2PeerLastErrorReceivedText OBJECT-TYPE
        SYNTAX     SnmpAdminString
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "This object contains an implementation specific
             explanation of the error that was reported."
        ::= { bgpM2PeerErrorsEntry 5 }


    bgpM2PeerLastErrorSentText OBJECT-TYPE
        SYNTAX     SnmpAdminString
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "This object contains an implementation specific
             explanation of the error that is being reported."
        ::= { bgpM2PeerErrorsEntry 6 }


    bgpM2PeerLastErrorReceivedData OBJECT-TYPE
        SYNTAX     OCTET STRING (SIZE(0..4075))
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "The last error code's data seen by this peer."
        REFERENCE
            "draft-ietf-idr-bgp4-15.txt, Sec. 4.5"
        ::= { bgpM2PeerErrorsEntry 7 }


    bgpM2PeerLastErrorSentData OBJECT-TYPE
        SYNTAX     OCTET STRING (SIZE(0..4075))
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "The last error code's data sent to this peer."
        REFERENCE
            "draft-ietf-idr-bgp4-15.txt, Sec. 4.5"
        ::= { bgpM2PeerErrorsEntry 8 }


    --
    -- Peer Event Times
    --

    bgpM2PeerTimers
        OBJECT IDENTIFIER ::= { bgpM2Peer 3 }
```

     bgpM2PeerEventTimesTable OBJECT-TYPE
         SYNTAX   SEQUENCE OF BgpM2PeerEventTimesEntry
         MAX-ACCESS not-accessible
         STATUS   current
         DESCRIPTION
             "A table reporting the per-peering session amount
              of time elapsed and update events since the peering
              session advanced into the Established state."
         ::= { bgpM2PeerTimers 1 }

     bgpM2PeerEventTimesEntry OBJECT-TYPE
         SYNTAX   BgpM2PeerEventTimesEntry
         MAX-ACCESS not-accessible
         STATUS   current
         DESCRIPTION
             "Each row contains a set of statistics about time
              spent and events encountered in the peer session
              Established state."
         AUGMENTS {
             bgpM2PeerEntry
         }
         ::= { bgpM2PeerEventTimesTable 1 }

     BgpM2PeerEventTimesEntry ::= SEQUENCE {
         bgpM2PeerFsmEstablishedTime
             Gauge32,
         bgpM2PeerInUpdatesElapsedTime
             Gauge32
     }

     bgpM2PeerFsmEstablishedTime OBJECT-TYPE
         SYNTAX   Gauge32
         MAX-ACCESS read-only
         STATUS   current
         DESCRIPTION
             "This timer indicates how long (in seconds) this
              peer has been in the Established state or how long
              since this peer was last in the Established state.
              It is set to zero when a new peer is configured or
              the router is booted."
         ::= { bgpM2PeerEventTimesEntry 1 }

     bgpM2PeerInUpdatesElapsedTime OBJECT-TYPE
         SYNTAX   Gauge32

```
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "Elapsed time in seconds since the last BGP UPDATE
             message was received from the peer.  Each time
             bgpM2PeerInUpdates is incremented, the value of this
             object is set to zero (0).  This value shall also be
             zero (0) when the peer is not in the Established state"
        ::= { bgpM2PeerEventTimesEntry 2 }


    --
    -- Peer Configured Timers
    --

    bgpM2PeerConfiguredTimersTable OBJECT-TYPE
        SYNTAX     SEQUENCE OF BgpM2PeerConfiguredTimersEntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
            "Per peer management data on BGP session timers."
        ::= { bgpM2PeerTimers 2 }

    bgpM2PeerConfiguredTimersEntry OBJECT-TYPE
        SYNTAX     BgpM2PeerConfiguredTimersEntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
            "Each entry corresponds to the current state of
             BGP timers on a given peering session."
        AUGMENTS {
            bgpM2PeerEntry
        }
        ::= { bgpM2PeerConfiguredTimersTable 1 }


    BgpM2PeerConfiguredTimersEntry ::= SEQUENCE {
        bgpM2PeerConnectRetryInterval
            Unsigned32,
        bgpM2PeerHoldTimeConfigured
            Unsigned32,
        bgpM2PeerKeepAliveConfigured
            Unsigned32,
        bgpM2PeerMinASOrigInterval
            Unsigned32,
        bgpM2PeerMinRouteAdverInterval
            Unsigned32
    }
```

     bgpM2PeerConnectRetryInterval OBJECT-TYPE
         SYNTAX   Unsigned32 (1..65535)
         MAX-ACCESS read-only
         STATUS   current
         DESCRIPTION
             "Time interval in seconds for the ConnectRetry
              timer. The suggested value for this timer is 120
              seconds."
         ::= { bgpM2PeerConfiguredTimersEntry 1 }

     bgpM2PeerHoldTimeConfigured OBJECT-TYPE
         SYNTAX   Unsigned32 (0 | 3..65535)
         MAX-ACCESS read-only
         STATUS   current
         DESCRIPTION
             "Time interval in seconds for the Hold Time configured
              for this BGP speaker with this peer. This value
              is placed in an OPEN message sent to this peer by
              this BGP speaker, and is compared with the Hold
              Time field in an OPEN message received from the
              peer when determining the Hold Time (bgpM2PeerHoldTime)
              with the peer. This value must not be less than
              three seconds if it is not zero (0) in which case
              the Hold Time is NOT to be established with the
              peer. The suggested value for this timer is 90
              seconds."
         REFERENCE
             "draft-ietf-idr-bgp4-17.txt, Appendix 6.4"
         ::= { bgpM2PeerConfiguredTimersEntry 2 }

     bgpM2PeerKeepAliveConfigured OBJECT-TYPE
         SYNTAX   Unsigned32 (0 | 1..21845)
         MAX-ACCESS read-only
         STATUS   current
         DESCRIPTION
             "Time interval in seconds for the KeepAlive timer
              configured for this BGP speaker with this peer.
              The value of this object will only determine the
              KEEPALIVE messages frequency relative to the value
              specified in bgpM2PeerHoldTimeConfigured; the actual
              time interval for the KEEPALIVE messages is indicated
              by bgpM2PeerKeepAlive. A reasonable maximum value
              for this timer would be configured to be one third
              of that of bgpM2PeerHoldTimeConfigured.

              If the value of this object is zero (0), no

```
            periodical KEEPALIVE messages are sent to the peer
            after the BGP connection has been established.
            The suggested value for this timer is 30 seconds."
        REFERENCE
            "draft-ietf-idr-bgp4-17.txt, Appendix 6.4"
        ::= { bgpM2PeerConfiguredTimersEntry 3 }


    bgpM2PeerMinASOrigInterval OBJECT-TYPE
        SYNTAX      Unsigned32 (0..65535)
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "Time interval in seconds for the MinASOriginationInterval
             timer.  The suggested value for this timer is 15
             seconds."
        ::= { bgpM2PeerConfiguredTimersEntry 4 }


    bgpM2PeerMinRouteAdverInterval OBJECT-TYPE
        SYNTAX      Unsigned32 (0..65535)
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "Time interval in seconds for the
             MinRouteAdvertisementInterval timer.  The suggested
             value for this timer is 30 seconds."
        ::= { bgpM2PeerConfiguredTimersEntry 5 }


    --
    -- Peer Negotiated Timers
    --

    bgpM2PeerNegotiatedTimersTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF BgpM2PeerNegotiatedTimersEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "Current values of per-peer timers which can be
             dynamically set in the bgpM2PeerConfiguredTimersTable.
             Values reflected in this table are the current
             operational values, after negotiation from values
             derived from initial configuration or last set from
             bgpM2PeerConfiguredTimersTable row instances."
        ::= { bgpM2PeerTimers 3 }
```

```
     bgpM2PeerNegotiatedTimersEntry OBJECT-TYPE
         SYNTAX      BgpM2PeerNegotiatedTimersEntry
         MAX-ACCESS not-accessible
         STATUS      current
         DESCRIPTION
             "Each entry reflects a value of the currently
              operational, negotiated timers as reflected in the
              BgpM2PeerNegotiatedTimersEntry."
         AUGMENTS {
             bgpM2PeerEntry
         }
         ::= { bgpM2PeerNegotiatedTimersTable 1 }


     BgpM2PeerNegotiatedTimersEntry ::= SEQUENCE {
         bgpM2PeerHoldTime
             Unsigned32,
         bgpM2PeerKeepAlive
             Unsigned32
     }


     bgpM2PeerHoldTime OBJECT-TYPE
         SYNTAX      Unsigned32  ( 0 | 3..65535 )
         MAX-ACCESS read-only
         STATUS      current
         DESCRIPTION
             "The value of this object is calculated by this BGP
              Speaker as being;

              zero (0) - if this was the value sent by the peer and
              this value is permitted by this BGP Speaker.  In this
              case, no keepalive messages are sent and the Hold Timer
              is not set.

              At least three (3).  This value is the smaller of
              the value sent by this peer in the OPEN message and
              bgpM2PeerHoldTimeConfigured for this peer.

              This value is only defined when the peering session is
              in the Established state."
         REFERENCE
             "draft-ietf-idr-bgp4-17.txt, Sec. 4.2"
         ::= { bgpM2PeerNegotiatedTimersEntry 1 }


     bgpM2PeerKeepAlive OBJECT-TYPE
         SYNTAX      Unsigned32 ( 0 | 1..21845 )
```

```
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "Time interval in seconds for the KeepAlive timer
             established with the peer.  The value of this object
             is calculated by this BGP speaker such that, when
             compared with bgpM2PeerHoldTime, it has the same
             proportion as what bgpM2PeerKeepAliveConfigured has
             when compared with bgpM2PeerHoldTimeConfigured.  If
             the value of this object is zero (0), it indicates
             that the KeepAlive timer has not been established
             with the peer, or, the value of
             bgpM2PeerKeepAliveConfigured is zero (0).

             This value is only defined when the peering session is
             in the Established state."
        REFERENCE
            "draft-ietf-idr-bgp4-17, Sec. 4.4"
        ::= { bgpM2PeerNegotiatedTimersEntry 2 }


    --
    -- Peer Capabilities
    --

    bgpM2PeerCapabilities
        OBJECT IDENTIFIER ::= { bgpM2Peer 4 }


    --
    -- Announced Capabilities
    --

    bgpM2PeerCapsAnnouncedTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF BgpM2PeerCapsAnnouncedEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "This table contains the capabilities
             that are supported for a given peer."
        ::= { bgpM2PeerCapabilities 1 }


    bgpM2PeerCapsAnnouncedEntry OBJECT-TYPE
        SYNTAX      BgpM2PeerCapsAnnouncedEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
```

```
        "These entries are keyed by a BGP-4 peer remote
         address and the BGP Capability Code"
    INDEX {
        bgpM2PeerIndex,
        bgpM2PeerCapAnnouncedCode,
        bgpM2PeerCapAnnouncedIndex
    }
    ::= { bgpM2PeerCapsAnnouncedTable 1 }


BgpM2PeerCapsAnnouncedEntry ::= SEQUENCE {
    bgpM2PeerCapAnnouncedCode
        Unsigned32,
    bgpM2PeerCapAnnouncedIndex
        Unsigned32,
    bgpM2PeerCapAnnouncedValue
        OCTET STRING
}


bgpM2PeerCapAnnouncedCode OBJECT-TYPE
    SYNTAX    Unsigned32 (0..255)
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
        "The BGP Capability Advertisement Capability Code."
    ::= { bgpM2PeerCapsAnnouncedEntry 1 }


bgpM2PeerCapAnnouncedIndex OBJECT-TYPE
    SYNTAX    Unsigned32 (1..128)
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
        "Multiple instances of a given capability may be sent
         bgp a BGP speaker.  This variable is used to index them."
    ::= { bgpM2PeerCapsAnnouncedEntry 2 }


bgpM2PeerCapAnnouncedValue OBJECT-TYPE
    SYNTAX    OCTET STRING (SIZE(0..255))
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
        "The value of the announced capability."
    ::= { bgpM2PeerCapsAnnouncedEntry 3 }
```

```
     --
     -- Received Capabilities
     --

     bgpM2PeerCapsReceivedTable OBJECT-TYPE
         SYNTAX     SEQUENCE OF BgpM24PeerCapsReceivedEntry
         MAX-ACCESS not-accessible
         STATUS     current
         DESCRIPTION
             "This table contains the capabilities
             that are supported for a given peer."
         ::= { bgpM2PeerCapabilities 2 }


     bgpM2PeerCapsReceivedEntry OBJECT-TYPE
         SYNTAX     BgpM24PeerCapsReceivedEntry
         MAX-ACCESS not-accessible
         STATUS     current
         DESCRIPTION
             "These entries are keyed by a BGP-4 peer remote
             address and the BGP Capability Code"
         INDEX {
             bgpM2PeerIndex,
             bgpM2PeerCapReceivedCode,
             bgpM2PeerCapReceivedIndex
         }
         ::= { bgpM2PeerCapsReceivedTable 1 }


     BgpM24PeerCapsReceivedEntry ::= SEQUENCE {
         bgpM2PeerCapReceivedCode
             Unsigned32,
         bgpM2PeerCapReceivedIndex
             Unsigned32,
         bgpM2PeerCapReceivedValue
             OCTET STRING
     }


     bgpM2PeerCapReceivedCode OBJECT-TYPE
         SYNTAX     Unsigned32 (0..255)
         MAX-ACCESS read-only
         STATUS     current
         DESCRIPTION
             "The BGP Capability Advertisement Capability Code."
         ::= { bgpM2PeerCapsReceivedEntry 1 }
```

```
    bgpM2PeerCapReceivedIndex OBJECT-TYPE
        SYNTAX      Unsigned32 (1..128)
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "Multiple instances of a given capability may be sent
             bgp a BGP speaker.  This variable is used to index them."
        ::= { bgpM2PeerCapsReceivedEntry 2 }


    bgpM2PeerCapReceivedValue OBJECT-TYPE
        SYNTAX      OCTET STRING (SIZE(0..255))
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "The value of the announced capability."
        ::= { bgpM2PeerCapsReceivedEntry 3 }


    --
    -- Per-peer counters
    --

    bgpM2PeerCounters
        OBJECT IDENTIFIER ::= { bgpM2Peer 6 }


    bgpM2PeerCountersTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF BgpM2PeerCountersEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "The counters associated with a BGP Peer."
        ::= { bgpM2PeerCounters 1 }


    bgpM2PeerCountersEntry OBJECT-TYPE
        SYNTAX      BgpM2PeerCountersEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "Each entry contains counters of message transmissions
             and FSM transitions for a given BGP Peering session."
        AUGMENTS {
            bgpM2PeerEntry
        }
        ::= { bgpM2PeerCountersTable 1 }
```

```
     BgpM2PeerCountersEntry ::= SEQUENCE {
         bgpM2PeerInUpdates
             Counter32,
         bgpM2PeerOutUpdates
             Counter32,
         bgpM2PeerInTotalMessages
             Counter32,
         bgpM2PeerOutTotalMessages
             Counter32,
         bgpM2PeerFsmEstablishedTrans
             Counter32
     }


-- +++wayne need to describe what happens if connection is broken
-- and then reestablished. Does the prior counter value accumulate?
     bgpM2PeerInUpdates OBJECT-TYPE
         SYNTAX     Counter32
         MAX-ACCESS read-only
         STATUS     current
         DESCRIPTION
             "The number of BGP UPDATE messages received on this
              connection.  This object should be initialized to zero
              (0) when the connection is established."
         ::= { bgpM2PeerCountersEntry 1 }


     bgpM2PeerOutUpdates OBJECT-TYPE
         SYNTAX     Counter32
         MAX-ACCESS read-only
         STATUS     current
         DESCRIPTION
             "The number of BGP UPDATE messages transmitted on this
              connection.  This object should be initialized to zero
              (0) when the connection is established."
         ::= { bgpM2PeerCountersEntry 2 }


     bgpM2PeerInTotalMessages OBJECT-TYPE
         SYNTAX     Counter32
         MAX-ACCESS read-only
         STATUS     current
         DESCRIPTION
             "The total number of messages received from the remote
              peer on this connection.  This object should be
              initialized to zero when the connection is established."
         ::= { bgpM2PeerCountersEntry 3 }
```

      bgpM2PeerOutTotalMessages OBJECT-TYPE
          SYNTAX   Counter32
          MAX-ACCESS read-only
          STATUS   current
          DESCRIPTION
              "The total number of messages transmitted to the remote
               peer on this connection. This object should be
               initialized to zero when the connection is established."
          ::= { bgpM2PeerCountersEntry 4 }

      bgpM2PeerFsmEstablishedTrans OBJECT-TYPE
          SYNTAX   Counter32
          MAX-ACCESS read-only
          STATUS   current
          DESCRIPTION
          "The total number of times the BGP FSM
          transitioned into the established state
          for this peer."
          ::= { bgpM2PeerCountersEntry 5 }

      --
      -- Per-Peer Prefix Counters
      --

      bgpM2PrefixCountersTable OBJECT-TYPE
          SYNTAX   SEQUENCE OF BgpM2PrefixCountersEntry
          MAX-ACCESS not-accessible
          STATUS   current
          DESCRIPTION
              "Additional per-peer, per AFI SAFI counters for prefixes"
          ::= { bgpM2PeerCounters 2 }

      bgpM2PrefixCountersEntry OBJECT-TYPE
          SYNTAX   BgpM2PrefixCountersEntry
          MAX-ACCESS not-accessible
          STATUS   current
          DESCRIPTION
              "Entry containing information about a bgp-peers prefix
               counters."
          INDEX {
              bgpM2PeerIndex,
              bgpM2PrefixCountersAfi,
              bgpM2PrefixCountersSafi
          }
          ::= { bgpM2PrefixCountersTable 1 }

```
     BgpM2PrefixCountersEntry ::= SEQUENCE {
         bgpM2PrefixCountersAfi
             BgpM2Afi,
         bgpM2PrefixCountersSafi
             BgpM2Safi,
         bgpM2PrefixInPrefixes
             Gauge32,
         bgpM2PrefixInPrefixesAccepted
             Gauge32,
         bgpM2PrefixInPrefixesRejected
             Gauge32,
         bgpM2PrefixOutPrefixes
             Gauge32
     }


     bgpM2PrefixCountersAfi OBJECT-TYPE
         SYNTAX      BgpM2Afi
         MAX-ACCESS read-only
         STATUS      current
         DESCRIPTION
             "The AFI index of the per-peer, per prefix counters"
         ::= { bgpM2PrefixCountersEntry 1 }


     bgpM2PrefixCountersSafi OBJECT-TYPE
         SYNTAX      BgpM2Safi
         MAX-ACCESS read-only
         STATUS      current
         DESCRIPTION
             "The SAFI index of the per-peer, per prefix counters"
         ::= { bgpM2PrefixCountersEntry 2 }


     bgpM2PrefixInPrefixes OBJECT-TYPE
         SYNTAX      Gauge32
         MAX-ACCESS read-only
         STATUS      current
         DESCRIPTION
             "The number of prefixes received from a peer and are
              stored in the Adj-Ribs-In for that peer."
              -- jmh - note that we are allowing stuff to be discarded
         ::= { bgpM2PrefixCountersEntry 7 }


     bgpM2PrefixInPrefixesAccepted OBJECT-TYPE
         SYNTAX      Gauge32
         MAX-ACCESS read-only
```

```
     STATUS      current
     DESCRIPTION
         "The number of prefixes for a peer that are installed
          in the Adj-Ribs-In and are eligible to become active
          in the Loc-Rib."
     ::= { bgpM2PrefixCountersEntry 8 }


bgpM2PrefixInPrefixesRejected OBJECT-TYPE
    SYNTAX      Gauge32
    MAX-ACCESS read-only
    STATUS      current
    DESCRIPTION
        "The number of prefixes for a peer that are installed
         in the Adj-Ribs-In and are NOT eligible to become active
         in the Loc-Rib."
    ::= { bgpM2PrefixCountersEntry 9 }


bgpM2PrefixOutPrefixes OBJECT-TYPE
    SYNTAX      Gauge32
    MAX-ACCESS read-only
    STATUS      current
    DESCRIPTION
        "The number of prefixes for a peer that are installed
         in that peers Adj-Ribs-Out."
    ::= { bgpM2PrefixCountersEntry 10 }



bgpM2PeerExtensions
    OBJECT IDENTIFIER ::= { bgpM2Peer 7 }


bgpM2PeerNonCapExts
    OBJECT IDENTIFIER ::= { bgpM2PeerExtensions 1 }


bgpM2PeerCapExts
    OBJECT IDENTIFIER ::= { bgpM2PeerExtensions 2 }


--
-- Peer Route Reflection Extensions
--

bgpM2PeerRouteReflectionExts
    OBJECT IDENTIFIER ::= { bgpM2PeerNonCapExts 2796 }
```

```
     bgpM2PeerReflectorClientTable OBJECT-TYPE
         SYNTAX     SEQUENCE OF BgpM2PeerReflectorClientEntry
         MAX-ACCESS not-accessible
         STATUS     current
         DESCRIPTION
             "Table of route reflection client settings on a per-peer
              basis."
         REFERENCE
             "RFC 2796 - BGP Route Reflection"
         ::= { bgpM2PeerRouteReflectionExts 1 }


     bgpM2PeerReflectorClientEntry OBJECT-TYPE
         SYNTAX     BgpM2PeerReflectorClientEntry
         MAX-ACCESS not-accessible
         STATUS     current
         DESCRIPTION
             "Entry containing data on a per-peer basis on whether
              the peer is configured as a route reflector client."
         REFERENCE
             "RFC 2796 - BGP Route Reflection"
         AUGMENTS {
             bgpM2PeerEntry
         }
         ::= { bgpM2PeerReflectorClientTable 1 }


     BgpM2PeerReflectorClientEntry ::= SEQUENCE {
         bgpM2PeerReflectorClient
             INTEGER
     }

     bgpM2PeerReflectorClient OBJECT-TYPE
         SYNTAX    INTEGER {
             nonClient(0),
             client(1),
             meshedClient(2)
         }
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
             "This value indicates whether the given peer is a
              reflector client of this router, or not.  A value of
              nonClient indicates that this peer is not a reflector
              client.  A value of client indicates that this peer is a
              reflector client that is not fully meshed with other
              reflector clients.  A value of meshedClient indicates
              that the peer is a reflector client and is fully meshed
```

             with all other reflector clients.

             This value must be nonClient (0) for BGP external peers."
        REFERENCE
            "RFC 2796 - BGP Route Reflection"
        ::= { bgpM2PeerReflectorClientEntry 1 }

    --
    -- Peer AS Confederations Extensions
    --

    bgpM2PeerASConfederationExts
        OBJECT IDENTIFIER ::= { bgpM2PeerNonCapExts 3065 }

    bgpM2PeerConfedMemberTable OBJECT-TYPE
        SYNTAX   SEQUENCE OF BgpM2PeerConfedMemberEntry
        MAX-ACCESS not-accessible
        STATUS   current
        DESCRIPTION
            "Table of confederation member settings on a per-peer
             basis."
        REFERENCE
            "RFC 3065 - BGP Confederations"
        ::= { bgpM2PeerASConfederationExts 1 }

    bgpM2PeerConfedMemberEntry OBJECT-TYPE
        SYNTAX   BgpM2PeerConfedMemberEntry
        MAX-ACCESS not-accessible
        STATUS   current
        DESCRIPTION
            "Entry containing data on a per-peer basis on whether
             the peer is configured as a BGP confederation member."
        REFERENCE
            "RFC 3065 - BGP Confederations"
        AUGMENTS {
            bgpM2PeerEntry
        }
        ::= { bgpM2PeerConfedMemberTable 1 }

    BgpM2PeerConfedMemberEntry ::= SEQUENCE {
        bgpM2PeerConfedMember
            TruthValue
    }

        bgpM2PeerConfedMember OBJECT-TYPE
            SYNTAX   TruthValue
            MAX-ACCESS read-only
            STATUS   current
            DESCRIPTION
                "This value indicates whether the given peer is in our
                 confederation or not."
            REFERENCE
                "RFC 3065 - BGP Confederations"
            ::= { bgpM2PeerConfedMemberEntry 1 }

        --
        -- Peer configuration objects
        --

        bgpM2PeerConfiguration
            OBJECT IDENTIFIER ::= { bgpM2Peer 8 }

        --
        -- Administering activated peering sessions
        --

        bgpM2CfgPeerAdminStatusTable OBJECT-TYPE
            SYNTAX   SEQUENCE OF BgpM2CfgPeerAdminStatusEntry
            MAX-ACCESS not-accessible
            STATUS   current
            DESCRIPTION
                "Table containing rows for administratively starting and
                 stopping peering sessions."
            ::= { bgpM2PeerConfiguration 1 }

        bgpM2CfgPeerAdminStatusEntry OBJECT-TYPE
            SYNTAX   BgpM2CfgPeerAdminStatusEntry
            MAX-ACCESS not-accessible
            STATUS   current
            DESCRIPTION
                "Entry containing row for administratively starting and
                 stopping peers."
            INDEX {
                bgpM2PeerIndex
            }
            ::= { bgpM2CfgPeerAdminStatusTable 1 }

        BgpM2CfgPeerAdminStatusEntry ::= SEQUENCE {

```
        bgpM2CfgPeerAdminStatus
            INTEGER
    }


    bgpM2CfgPeerAdminStatus OBJECT-TYPE
        SYNTAX      INTEGER {
            stop(1),
            start(2)
        }
        MAX-ACCESS read-write
        STATUS  current
        DESCRIPTION
            "This object allows the Manual Stop and Manual Start
             events to be sent to an activated peering session."
        ::= { bgpM2CfgPeerAdminStatusEntry 1 }


    --
    -- Peer Configuration
    --

    bgpM2CfgPeerNextIndex OBJECT-TYPE
        SYNTAX      Integer32 (0..65535)
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "This object contains the next appropriate value to
             use as an index for creation of a row instance in
             in the bgpM2CfgPeerTable.  If the number of available
             entries in the bgpM2CfgPeerTable is exhausted, a
             retrieval value of this object instance will return
             0.  A value of 0 may also be returned if the agent
             is otherwise incapable of bgpM2CfgPeerTable row creation
             at the time of bgpM2CfgPeerNextIndex retrieval."
        ::= { bgpM2PeerConfiguration 2 }


    bgpM2CfgPeerTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF BgpM2CfgPeerEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "BGP configuration peer table.

             This table allows the configuration of the parameters
             for a session with a BGP peer.
```

```
            +++wayne provide description of how config should be done
            for a peer per table."
        ::= { bgpM2PeerConfiguration 3 }


    bgpM2CfgPeerEntry OBJECT-TYPE
        SYNTAX     BgpM2CfgPeerEntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
            "Entry containing information set up by a management
             entity to configure a connection with a BGP peer."
        INDEX { bgpM2CfgPeerIndex }
        ::= { bgpM2CfgPeerTable 1 }


    BgpM2CfgPeerEntry ::= SEQUENCE {
        bgpM2CfgPeerConfiguredVersion
            Unsigned32,
        bgpM2CfgAllowVersionNegotiation
            TruthValue,
        bgpM2CfgPeerLocalAddrType
            InetAddressType,
        bgpM2CfgPeerLocalAddr
            InetAddress,
        bgpM2CfgPeerLocalAs
            InetAutonomousSystemNumber,
        bgpM2CfgPeerRemoteAddrType
            InetAddressType,
        bgpM2CfgPeerRemoteAddr
            InetAddress,
        bgpM2CfgPeerRemoteAs
            InetAutonomousSystemNumber,
        bgpM2CfgPeerEntryStorageType
            StorageType,
        bgpM2CfgPeerError
            INTEGER,
        bgpM2CfgPeerBgpPeerEntry
            RowPointer,
        bgpM2CfgPeerRowEntryStatus
            RowStatus,
        bgpM2CfgPeerIndex
            Integer32,
        bgpM2CfgPeerStatus
            INTEGER
        }
```

     bgpM2CfgPeerConfiguredVersion OBJECT-TYPE
         SYNTAX   Unsigned32 (1..255)
         MAX-ACCESS read-create
         STATUS   current
         DESCRIPTION
             "The configured version to originally start with
              this peer. The BGP speaker may permit negotiation
              to a lower version number of the protocol depending on the
              set value of bgpM2CfgAllowVersionNegotiation."
         DEFVAL   { 4 }
         ::= { bgpM2CfgPeerEntry 1 }

     bgpM2CfgAllowVersionNegotiation OBJECT-TYPE
         SYNTAX   TruthValue
         MAX-ACCESS read-create
         STATUS   current
         DESCRIPTION
             "If set to true, during session establishment with this
              peer, negotiation to a version lower than that specified
              in bgpM2CfgPeerConfiguredVersion will be allowed."
         DEFVAL { false }
         ::= { bgpM2CfgPeerEntry 2 }

     bgpM2CfgPeerLocalAddrType OBJECT-TYPE
         SYNTAX   InetAddressType
         MAX-ACCESS read-create
         STATUS   current
         DESCRIPTION
             "The address family of the speakers of this BGP
              session."
         ::= { bgpM2CfgPeerEntry 3 }

     bgpM2CfgPeerLocalAddr OBJECT-TYPE
         SYNTAX   InetAddress (SIZE (4..20))
         MAX-ACCESS read-create
         STATUS   current
         DESCRIPTION
             "The address of the local end of the peering session."
         ::= { bgpM2CfgPeerEntry 4 }

     bgpM2CfgPeerLocalAs OBJECT-TYPE
         SYNTAX   InetAutonomousSystemNumber
         MAX-ACCESS read-create
         STATUS   current

        DESCRIPTION
            "Autonomous system represented to peer on peering
             session initialization. Some implementations of
             BGP can represent themselves as multiple ASes.
             These implementations can set this to an alternate
             autonomous system. If this object is set to zero
             (0) at the point this row instance is set to active,
             then the implementation will initialize this session
             representing itself as the value of bgpM2CfgLocalAs."
        DEFVAL { 0 }
        ::= { bgpM2CfgPeerEntry 5 }

    bgpM2CfgPeerRemoteAddrType OBJECT-TYPE
        SYNTAX   InetAddressType
        MAX-ACCESS read-create
        STATUS   current
        DESCRIPTION
            "The address family of the speakers of the remote BGP
             session."
        ::= { bgpM2CfgPeerEntry 6 }

    bgpM2CfgPeerRemoteAddr OBJECT-TYPE
        SYNTAX   InetAddress (SIZE(4..20))
        MAX-ACCESS read-create
        STATUS   current
        DESCRIPTION
            "The address of the remote end (destination address
             of peer) for peering session."
        ::= { bgpM2CfgPeerEntry 7 }

    bgpM2CfgPeerRemoteAs OBJECT-TYPE
        SYNTAX   InetAutonomousSystemNumber
        MAX-ACCESS read-create
        STATUS   current
        DESCRIPTION
            "Autonomous system number of the remote peer."
        ::= { bgpM2CfgPeerEntry 8 }

    bgpM2CfgPeerEntryStorageType OBJECT-TYPE
        SYNTAX   StorageType
        MAX-ACCESS read-create
        STATUS   current
        DESCRIPTION
            "This object type specifies the intended storage

```
            type for the bgpM2CfgPeerEntry row instance."
        ::= { bgpM2CfgPeerEntry 9 }



    bgpM2CfgPeerError  OBJECT-TYPE
        SYNTAX      INTEGER {
            unknown(0),
            notActivated (1),
            errDuplicatePeeringSession (2),
            activated (3)
            -- +++wayne more to follow
        }
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "This value indicates the current error status of
             the row denoting the configured error status.

             If this row is still under creation (has not been activated
             bgpM2CfgPeerRowEntryStatus), then this instance will be set to
             not-activated (1).

             At the point that the row is activated, bgpM2CfgPeerError
             will reflect the error status of the row data itself.  If
             there is another session already activated with the same
             local and remote addresses as denoted by
             {bgpM2CfgPeerLocalAddrType, bgpM2CfgPeerLocalAddr,
             bgpM2CfgPeerRemoteAddr}, then
             the value of this will be set to
             err-duplicate-peering-session (2).

             If this row is associated with a peer session whose
             initialization has been attempted, the value will be
             set to activated (3) (and, bgpM2PeerCfgPeerEntry will
             be set to the row instance of the entry in the
             bgpM2PeerTable which reflects the state of the peering
             session).

             Note that this object only reflects the error as a
             function of the attempted activation of this row as
             containing data for a bgp peering session.  The actual
             state of the session at the point of any protocol exchange
             or session state machine initiation is reflected in the
             bgpM2PeerTable row instance (as reflected through
             bgpM2CfgPeerPeerEntry) associated with this row instance."
        ::= { bgpM2CfgPeerEntry 10 }
```

```
     bgpM2CfgPeerBgpPeerEntry OBJECT-TYPE
         SYNTAX       RowPointer
         MAX-ACCESS  read-only
         STATUS       current
         DESCRIPTION
             "Upon activation of the session data contained in this
              row instance, this object points to an instance of a row
              within the bgpM2PeerTable reflecting the session in its
              initializing or operational state.  Retrieval of this
              column instance will always yield a value of {0.0} unless
              the session has successfully been activated (via
              bgpM2CfgPeerRowEntryStatus).  Such row instances will always
              have a value of bgpM2CfgPeerError which is activated (3)."
         ::= { bgpM2CfgPeerEntry 11 }


     bgpM2CfgPeerRowEntryStatus  OBJECT-TYPE
         SYNTAX       RowStatus
         MAX-ACCESS  read-create
         STATUS       current
         DESCRIPTION
             "This object type is used to control creation,
              activation, and deletion of this row instance."
             -- +++wayne need better directions for agent auto-removal
             -- of row instances which have moved to active or error
             -- state
         ::= { bgpM2CfgPeerEntry 12 }


     bgpM2CfgPeerIndex OBJECT-TYPE
         SYNTAX       Integer32 (1..65535)
         MAX-ACCESS  accessible-for-notify
         STATUS       current
         DESCRIPTION
             "Uniquely identifies an instance of a peer row, as
              an element of configuration."
         ::= { bgpM2CfgPeerEntry 13 }


     bgpM2CfgPeerStatus OBJECT-TYPE
         SYNTAX       INTEGER {
             halted(1),
             running(2)
         }
         MAX-ACCESS  read-create
         STATUS  current
         DESCRIPTION
             "This specifies the state of the peering session upon
```

```
            activation.  If disabled, the FSM is in the halted
            state and no Automatic Start events are generated.
            If enabled, the FSM is in the running state and
            Automatic Start events may be generated."
     ::= { bgpM2CfgPeerEntry 14 }


--
-- Per-peer timers table
--

bgpM2CfgPeerTimersTable OBJECT-TYPE
    SYNTAX     SEQUENCE OF BgpM2CfgPeerTimersEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
        "Table for configuration of per-peer timers."
    ::= {   bgpM2PeerConfiguration 4 }


bgpM2CfgPeerTimersEntry OBJECT-TYPE
    SYNTAX      BgpM2CfgPeerTimersEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
        "Entry containing per-peer timer configuration."
    AUGMENTS {
        bgpM2CfgPeerEntry
    }
    ::= { bgpM2CfgPeerTimersTable 1 }


BgpM2CfgPeerTimersEntry ::= SEQUENCE {
    bgpM2CfgPeerConnectRetryInterval
        Unsigned32,
    bgpM2CfgPeerHoldTimeConfigured
        Unsigned32,
    bgpM2CfgPeerKeepAliveConfigured
        Unsigned32,
    bgpM2CfgPeerMinASOrigInterval
        Unsigned32,
    bgpM2CfgPeerMinRouteAdverInter
        Unsigned32
}


bgpM2CfgPeerConnectRetryInterval OBJECT-TYPE
    SYNTAX     Unsigned32 (1..65535)
```

```
        MAX-ACCESS read-create
        STATUS     current
        DESCRIPTION
            "Time interval in seconds for the ConnectRetry
             timer.  The suggested value for this timer is 120
             seconds."
        DEFVAL {
            120
        }
        ::= { bgpM2CfgPeerTimersEntry 1 }


    bgpM2CfgPeerHoldTimeConfigured OBJECT-TYPE
        SYNTAX     Unsigned32 ( 0 | 3..65535 )
        MAX-ACCESS read-create
        STATUS     current
        DESCRIPTION
            "Time interval in seconds for the Hold Time configured
             for this BGP speaker with this peer.  This value
             is placed in an OPEN message sent to this peer by
             this BGP speaker, and is compared with the Hold
             Time field in an OPEN message received from the
             peer when determining the Hold Time (bgpM2PeerHoldTime)
             with the peer.  This value must not be less than
             three seconds if it is not zero (0) in which case
             the Hold Time is NOT to be established with the
             peer.  The suggested value for this timer is 90
             seconds."
        REFERENCE
            "draft-ietf-idr-bgp4-17.txt, Appendix 6.4"
        DEFVAL {
            90
        }
        ::= { bgpM2CfgPeerTimersEntry 2 }


    bgpM2CfgPeerKeepAliveConfigured OBJECT-TYPE
        SYNTAX     Unsigned32 ( 0 | 1..21845 )
        MAX-ACCESS read-create
        STATUS     current
        DESCRIPTION
            "Time interval in seconds for the KeepAlive timer
             configured for this BGP speaker with this peer.
             The value of this object will only determine the
             KEEPALIVE messages frequency relative to the value
             specified in bgpM2PeerHoldTimeConfigured; the actual
             time interval for the KEEPALIVE messages is indicated
             by bgpM2PeerKeepAlive.  A reasonable maximum value
```

```
            for this timer would be configured to be one third
            of that of bgpM2PeerHoldTimeConfigured.

            If the value of this object is zero (0), no
            periodical KEEPALIVE messages are sent to the peer
            after the BGP connection has been established.
            The suggested value for this timer is 30 seconds."
    REFERENCE
        "draft-ietf-idr-bgp4-17.txt, Appendix 6.4"
    DEFVAL {
        30
    }
    ::= { bgpM2CfgPeerTimersEntry 3 }


bgpM2CfgPeerMinASOrigInterval OBJECT-TYPE
    SYNTAX     Unsigned32 (0..65535)
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
        "Time interval in seconds for the MinASOriginationInterval
         timer.  The suggested value for this timer is 15
         seconds."
    DEFVAL {
        15
    }
    ::= { bgpM2CfgPeerTimersEntry 4 }


bgpM2CfgPeerMinRouteAdverInter OBJECT-TYPE
    SYNTAX     Unsigned32 (0..65535)
    MAX-ACCESS read-create
    STATUS     current
    DESCRIPTION
        "Time interval in seconds for the
         MinRouteAdvertisementInterval timer.  The suggested
         value for this timer is 30 seconds."
    DEFVAL {
        30
    }
    ::= { bgpM2CfgPeerTimersEntry 5 }


--
-- Per-peer configuration extensions
--

bgpM2CfgPeerExtensions
```

```
        OBJECT IDENTIFIER ::= { bgpM2PeerConfiguration 5 }


    bgpM2CfgPeerNonCapExts
        OBJECT IDENTIFIER ::= { bgpM2CfgPeerExtensions 1 }


    bgpM2CfgPeerCapExts
        OBJECT IDENTIFIER ::= { bgpM2CfgPeerExtensions 2 }


    --
    -- Peer route reflection configuration
    --

    bgpM2CfgPeerRouteReflectionExts
        OBJECT IDENTIFIER ::= { bgpM2CfgPeerNonCapExts 2796 }


    bgpM2CfgPeerReflectorClientTable OBJECT-TYPE
        SYNTAX     SEQUENCE OF BgpM2CfgPeerReflectorClientEntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
            "Table of route reflection client settings on a per-peer
             basis."
        REFERENCE
            "RFC 2796 - BGP Route Reflection"
        ::= { bgpM2CfgPeerRouteReflectionExts 1 }


    bgpM2CfgPeerReflectorClientEntry OBJECT-TYPE
        SYNTAX     BgpM2CfgPeerReflectorClientEntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
            "Entry containing data on a per-peer basis on whether
             the peer is configured as a route reflector client."
        REFERENCE
            "RFC 2796 - BGP Route Reflection"
        AUGMENTS {
            bgpM2CfgPeerEntry
        }
        ::= { bgpM2CfgPeerReflectorClientTable 1 }


    BgpM2CfgPeerReflectorClientEntry ::= SEQUENCE {
        bgpM2CfgPeerReflectorClient
```

```
            INTEGER
    }

    bgpM2CfgPeerReflectorClient OBJECT-TYPE
        SYNTAX     INTEGER {
            nonClient(0),
            client(1),
            meshedClient(2)
        }
        MAX-ACCESS  read-create
        STATUS      current
        DESCRIPTION
            "This value indicates whether the given peer is a
             reflector client of this router, or not.  A value of
             nonClient indicates that this peer is not a reflector
             client.  A value of client indicates that this peer is a
             reflector client that is not fully meshed with other
             reflector clients.  A value of meshedClient indicates
             that the peer is a reflector client and is fully meshed
             with all other reflector clients.

             This value must be nonClient (0) for BGP external peers."
        REFERENCE
            "RFC 2796 - BGP Route Reflection"
        ::= { bgpM2CfgPeerReflectorClientEntry 1 }


    --
    -- Peer AS Confederations Extensions
    --

    bgpM2CfgPeerASConfederationExts
        OBJECT IDENTIFIER ::= { bgpM2CfgPeerNonCapExts 3065 }


    bgpM2CfgPeerConfedMemberTable OBJECT-TYPE
        SYNTAX     SEQUENCE OF BgpM2CfgPeerConfedMemberEntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
            "Table of confederation member settings on a per-peer
             basis."
        REFERENCE
            "RFC 3065 - BGP Confederations"
        ::= { bgpM2CfgPeerASConfederationExts 1 }


    bgpM2CfgPeerConfedMemberEntry OBJECT-TYPE
```

```
        SYNTAX      BgpM2CfgPeerConfedMemberEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "Entry containing data on a per-peer basis on whether
             the peer is configured as a BGP confederation member."
        REFERENCE
            "RFC 3065 - BGP Confederations"
        AUGMENTS {
            bgpM2PeerEntry
        }
        ::= { bgpM2CfgPeerConfedMemberTable 1 }


    BgpM2CfgPeerConfedMemberEntry ::= SEQUENCE {
        bgpM2CfgPeerConfedMember
            TruthValue
    }


    bgpM2CfgPeerConfedMember OBJECT-TYPE
        SYNTAX      TruthValue
        MAX-ACCESS  read-create
        STATUS      current
        DESCRIPTION
            "This value indicates whether the given peer is in our
             confederation or not."
        REFERENCE
            "RFC 3065 - BGP Confederations"
        ::= { bgpM2CfgPeerConfedMemberEntry 1 }


    --
    -- BGP NLRI Data
    --

    bgpM2Rib
        OBJECT IDENTIFIER ::= { bgpM2 3 }


    --
    -- NLRI Table
    --

    bgpM2NlriTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF BgpM2NlriEntry
        MAX-ACCESS not-accessible
        STATUS      current
```

```
        DESCRIPTION
            "The BGP-4 Received Path Attribute Table contains
             information about paths to destination networks
             received from all BGP4 peers.  Collectively, this
             represents the Adj-Ribs-In.  The route where
             bgpM2NlriBest is TRUE represents, for this NLRI,
             the route that is installed in the LocRib from the
             Adj-Ribs-In."
        ::= { bgpM2Rib 1 }


    bgpM2NlriEntry OBJECT-TYPE
        SYNTAX     BgpM2NlriEntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
            "Information about a path to a network."
        INDEX {
            bgpM2PeerIndex,
            bgpM2NlriAfi,
            bgpM2NlriSafi,
            bgpM2NlriPrefix,
            bgpM2NlriPrefixLen,
            bgpM2NlriIndex
        }
        ::= { bgpM2NlriTable 1 }


    BgpM2NlriEntry ::= SEQUENCE {
        bgpM2NlriIndex
            Unsigned32,
        bgpM2NlriAfi
            BgpM2Afi,
        bgpM2NlriSafi
            BgpM2Safi,
     bgpM2NlriPrefixType
          InetAddressType,
        bgpM2NlriPrefix
            InetAddress,
        bgpM2NlriPrefixLen
            InetAddressPrefixLength,
        bgpM2NlriBest
            TruthValue,
        bgpM2NlriCalcLocalPref
            Unsigned32,
        bgpM2PathAttrIndex
            Unsigned32,
        bgpM2NlriOpaqueType
```

```
              INTEGER,
         bgpM2NlriOpaquePointer
              RowPointer
    }


    bgpM2NlriIndex OBJECT-TYPE
        SYNTAX     Unsigned32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "This index allows for multiple instances of a base
             prefix for a certain AFI SAFI from a given peer.
             This is currently useful for two things:
             1. Allowing for a peer in future implementations to
                send more than a single route instance.
             2. Allow for extensions which extend the NLRI field
                to send the same prefix while utilizing other
                extension specific information.  An example of
                this is RFC 3107 - Carrying MPLS labels in BGP."
        REFERENCE
            "RFC 3107 - Carrying Label Information in BGP-4"
        ::= { bgpM2NlriEntry 1 }


    bgpM2NlriAfi OBJECT-TYPE
        SYNTAX     BgpM2Afi
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "The address family of the prefix for this NLRI."
        ::= { bgpM2NlriEntry 2 }


    bgpM2NlriSafi OBJECT-TYPE
        SYNTAX     BgpM2Safi
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "The subsequent address family of the prefix for
             this NLRI"
        REFERENCE
            "RFC 2858 - Multiprotocol Extensions for BGP-4"
        ::= { bgpM2NlriEntry 3 }


    bgpM2NlriPrefixType OBJECT-TYPE
        SYNTAX     InetAddressType
```

        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
           "The type of the IP address prefix in the
          Network Layer Reachability Information field.
          The value of this object is derived from the
          appropriate value from the bgpM2NlriAfi field.
          Where an appropriate InetAddressType is not
          available, the value of the object must be
          unknown(0).

          XXX TODO - This seems like a hack."
        ::= { bgpM2NlriEntry 4 }

    bgpM2NlriPrefix OBJECT-TYPE
        SYNTAX   InetAddress (SIZE (4..20))
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
           "An IP address prefix in the Network Layer
            Reachability Information field. This object
            is an IP address containing the prefix with
            length specified by
            bgpM2PathAttrAddrPrefixLen.
            Any bits beyond the length specified by
            bgpM2PathAttrAddrPrefixLen are zeroed."
        ::= { bgpM2NlriEntry 5 }

    bgpM2NlriPrefixLen OBJECT-TYPE
        SYNTAX   InetAddressPrefixLength
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
           "Length in bits of the address prefix in
            the Network Layer Reachability Information field."
        ::= { bgpM2NlriEntry 6 }

    bgpM2NlriBest OBJECT-TYPE
        SYNTAX   TruthValue
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
           "An indication of whether or not this route
            was chosen as the best BGP4 route."
        ::= { bgpM2NlriEntry 7 }

     bgpM2NlriCalcLocalPref OBJECT-TYPE
         SYNTAX   Unsigned32
         MAX-ACCESS read-only
         STATUS   current
         DESCRIPTION
             "The degree of preference calculated by the
              receiving BGP4 speaker for an advertised
              route."
         ::= { bgpM2NlriEntry 8 }

     bgpM2PathAttrIndex OBJECT-TYPE
         SYNTAX   Unsigned32
         MAX-ACCESS read-only
         STATUS   current
         DESCRIPTION
             "This value is a unique index for the per-NLRI entry
              in the bgpM2PathAttrTable. It is assigned by the
              agent at the point of creation of the bgpM2PathAttrTable
              row entry. While its value is guaranteed to be unique
              at any time, it is otherwise opaque to the management
              application with respect to its value or the contiguity
              of bgpM2PathAttrIndex row instance values across rows
              of the bgpM2PeerAttrTable. It is used to provide an
              index structure for other tables whose data is logically
              per-peer, per-NLRI."
         ::= { bgpM2NlriEntry 9 }

     bgpM2NlriOpaqueType OBJECT-TYPE
         SYNTAX   INTEGER {
             none(0),
             bgpMplsLabelStack(1)
         }
         MAX-ACCESS read-only
         STATUS   current
         DESCRIPTION
             "This object enumerates the type of the row that is
              pointed to in the table row bgpM2NlriOpaquePointer
              instance, if bgpM2NlriOpaquePointer is in fact not
              a zero length. bgpM2NlriOpaqueType is necessary since
              the data referenced by bgpM2NlriOpaquePointer is
              opaque to BGP. For example, in the case of RFC 3107,
              the label stack that is pointed to may occur in the
              mplsLabelStackTable from the MPLS-LSR-MIB, and the
              instance value of bgpM2NlriOpaqueType would be
              bgpMplsLabelStack(1)."
         REFERENCE

                 "RFC 3107 - Carrying Label Information in BGP-4
                  draft-ietf-mpls-lsr-mib-08.txt"
            ::= { bgpM2NlriEntry 10 }

     bgpM2NlriOpaquePointer OBJECT-TYPE
         SYNTAX   RowPointer
         MAX-ACCESS read-only
         STATUS   current
         DESCRIPTION
             "Pointer to a row that decomposes the data that is
              opaque to the BGP MIB but is sent in the NLRI.
              This RowPointer has zero (0) length data instance
              if bgpM2NlriOpaqueType is none."
         ::= { bgpM2NlriEntry 11 }

     --
     -- Adj-Ribs-Out Table
     --

     bgpM2AdjRibsOutTable OBJECT-TYPE
         SYNTAX   SEQUENCE OF BgpM2AdjRibsOutEntry
         MAX-ACCESS not-accessible
         STATUS   current
         DESCRIPTION
             "This table contains on a per-peer basis one or more
              routes from the bgpM2NlriTable that have been
              placed in this peer's Adj-Ribs-Out."
         REFERENCE
             "draft-ietf-idr-bgp4-17.txt, Sec. 3.2"
         ::= { bgpM2Rib 2 }

     bgpM2AdjRibsOutEntry OBJECT-TYPE
         SYNTAX   BgpM2AdjRibsOutEntry
         MAX-ACCESS not-accessible
         STATUS   current
         DESCRIPTION
             "List of BGP routes that have been placed into a
              peer's Adj-Ribs-Out."
         INDEX {
             bgpM2PeerIndex,
             bgpM2NlriAfi,
             bgpM2NlriSafi,
             bgpM2NlriPrefix,
             bgpM2NlriPrefixLen,
             bgpM2AdjRibsOutIndex

```
        }
        ::= { bgpM2AdjRibsOutTable 1 }


    BgpM2AdjRibsOutEntry ::= SEQUENCE {
        bgpM2AdjRibsOutIndex
            Unsigned32,
        bgpM2AdjRibsOutRoute
            RowPointer
    }


    bgpM2AdjRibsOutIndex OBJECT-TYPE
        SYNTAX      Unsigned32
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "Certain extensions to BGP permit multiple instance of
             a per afi, per safi prefix to be advertised to a peer.
             This object allows the enumeration of them."
        ::= { bgpM2AdjRibsOutEntry 1 }


    bgpM2AdjRibsOutRoute OBJECT-TYPE
        SYNTAX      RowPointer
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "This object points to the route in the bgpM2NlriTable
             that corresponds to the entry in the peer's
             Adj-Rib-Out.  Outgoing route maps are not
             reflected at this point as those are part of the
             Update-Send process."
        REFERENCE
            "draft-ietf-idr-bgp4-17.txt, Sec. 9.2"
        ::= { bgpM2AdjRibsOutEntry 2 }


    --
    -- BGP Rib Path Attributes Table
    --


    --
    -- Path Attribute Counter
    --

    bgpM2PathAttrCount OBJECT-TYPE
        SYNTAX      Counter32
```

```
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "The number of entries in the bgpM2PathAttrTable."
        ::= { bgpM2Rib 3 }



    --
    -- Path Attributes Table
    --

    bgpM2PathAttrTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF BgpM2PathAttrEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "Provides per advertised network-prefix attribute data,
             as advertised over a peering session."
        ::= { bgpM2Rib 4 }


    bgpM2PathAttrEntry OBJECT-TYPE
        SYNTAX      BgpM2PathAttrEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "Each entry contains data about a given network
             prefix, per-prefix and per-advertising peer."
        INDEX {
            bgpM2PathAttrIndex
        }
        ::= { bgpM2PathAttrTable 1 }


    BgpM2PathAttrEntry ::= SEQUENCE {
        bgpM2PathAttrOrigin
            INTEGER,
        bgpM2PathAttrNextHopAddrType
            InetAddressType,
        bgpM2PathAttrNextHop
            InetAddress,
        bgpM2PathAttrMedPresent
            TruthValue,
        bgpM2PathAttrMed
            Unsigned32,
        bgpM2PathAttrLocalPrefPresent
            TruthValue,
        bgpM2PathAttrLocalPref
```

```
        Unsigned32,
    bgpM2PathAttrAtomicAggregate
        INTEGER,
    bgpM2PathAttrAggregatorAS
        InetAutonomousSystemNumber,
    bgpM2PathAttrAggregatorAddr
        BgpM2Identifier,
    bgpM2AsPathCalcLength
        Unsigned32,
    bgpM2AsPathString
        SnmpAdminString,
    bgpM2AsPathIndex
        Unsigned32
}


bgpM2PathAttrOrigin OBJECT-TYPE
    SYNTAX    INTEGER {
        igp(1),-- networks are interior
        egp(2),-- networks learned via the EGP protocol
        incomplete(3) -- undetermined
        }
    MAX-ACCESS read-only
    STATUS    current
    DESCRIPTION
        "The ultimate origin of the path information."
    ::= { bgpM2PathAttrEntry 1 }


bgpM2PathAttrNextHopAddrType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The address family of the address for
         the border router that should be used
         to access the destination network."
    ::= { bgpM2PathAttrEntry 2 }


bgpM2PathAttrNextHop OBJECT-TYPE
    SYNTAX    InetAddress (SIZE(4..20))
    MAX-ACCESS read-only
    STATUS    current
    DESCRIPTION
        "The address of the border router that
         should be used to access the destination
         network.  This address is the nexthop
```

            address received in the UPDATE packet.
            The address family of this object will be the
            same as that of the prefix in this row.

            Note that for RFC2545 style double nexthops,
            this object will always contain the global scope
            nexthop. bgpM2LinkLocalNextHopTable will contain
            the linklocal scope nexthop.

            In the case that the mechanism documented in
            draft-kato-bgp-ipv6-link-local-00.txt is used and
            only a link local nexthop has been sent, ,
            bgpM2LinkLocalNextHopPresent will be false
            and bgpM2PathAttrNextHop will contain the link local
            nexthop."
        ::= { bgpM2PathAttrEntry 3 }

    bgpM2PathAttrMedPresent OBJECT-TYPE
        SYNTAX   TruthValue
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
            "Whether or not the MED value is present.
             If it is not present, the bgpM2PathAttrMed
             object has no useful value and should be set to 0."
        ::= { bgpM2PathAttrEntry 4 }

    bgpM2PathAttrMed OBJECT-TYPE
        SYNTAX   Unsigned32
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
            "This metric is used to discriminate
             between multiple exit points to an
             adjacent autonomous system."
        ::= { bgpM2PathAttrEntry 5 }

    bgpM2PathAttrLocalPrefPresent OBJECT-TYPE
        SYNTAX   TruthValue
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
            "Whether or not the LocalPref value is present.
             If it is not present, the bgpM2PathAttrLocalPref
             object has no useful value and should be set to 0."

```
     ::= { bgpM2PathAttrEntry 6 }


bgpM2PathAttrLocalPref OBJECT-TYPE
    SYNTAX     Unsigned32
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
        "The originating BGP4 speakers degree of
         preference for an advertised route."
    ::= { bgpM2PathAttrEntry 7 }


bgpM2PathAttrAtomicAggregate OBJECT-TYPE
    SYNTAX     INTEGER {
        atomicAggregatePresent(1),
        atomicAggregateMissing(2)
        }
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
        "When this object is set to atomicAggregatePresent,
       the ATOMIC_AGGREGATE Path Attribute is present
       and indicates that the NLRI MUST NOT be made
       more specific."
    ::= { bgpM2PathAttrEntry 8 }


bgpM2PathAttrAggregatorAS OBJECT-TYPE
    SYNTAX     InetAutonomousSystemNumber
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
        "The AS number of the last BGP4 speaker that
         performed route aggregation.  A value of
         zero (0) indicates the absence of this
         attribute.

         Note propagation of AS of zero is illegal in
         the Internet."
    ::= { bgpM2PathAttrEntry 9 }


bgpM2PathAttrAggregatorAddr OBJECT-TYPE
    SYNTAX     BgpM2Identifier
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
```

```
            "The IP address of the last BGP4 speaker
             that performed route aggregation.  A
             value of 0.0.0.0 indicates the absence
             of this attribute."
        ::= { bgpM2PathAttrEntry 10 }


    bgpM2AsPathCalcLength OBJECT-TYPE
        SYNTAX     Unsigned32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "This value represents the calculated length of the
             AS Path according to the rules of the BGP specification.
             This value is used in route selection."
        REFERENCE
            "draft-ietf-idr-bgp4-17.txt, Sec. 9.1.2.2.a"
        ::= { bgpM2PathAttrEntry 11 }


    bgpM2AsPathString OBJECT-TYPE
        SYNTAX     SnmpAdminString
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "This is a string depicting the autonomous system
             path to this network which was received from the
             peer which advertised it.  The format of the string
             is implementation-dependent, and should be designed
             for operator readability."
        ::= { bgpM2PathAttrEntry 12 }


    bgpM2AsPathIndex OBJECT-TYPE
        SYNTAX     Unsigned32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "This value is a unique index for the decomposed AS Path
             in the bgpM2AsPathTable.  It is assigned by the
             agent at the point of creation of the bgpM2AsPathTable
             row entry.  While its value is guaranteed to be unique
             at any time, it is otherwise opaque to the management
             application with respect to its value or the contiguity
             of bgpM2AsPathIndex row instance values across rows
             of the bgpM2AsPathTable."
        ::= { bgpM2PathAttrEntry 13 }
```

```
      --
      -- As-4 byte AS_PATH
      --

      bgpM2AsPath4byteTable OBJECT-TYPE
          SYNTAX     SEQUENCE OF BgpM2AsPath4byteEntry
          MAX-ACCESS not-accessible
          STATUS     current
          DESCRIPTION
              "This table is present for BGP speakers that support
               the AS 4byte specification and are functioning as
               a router between 2-byte and 4-byte AS space."
          REFERENCE
              "draft-ietf-idr-as4bytes-04.txt - BGP support for
               four-octet AS number space"
          ::= { bgpM2Rib 5 }


      bgpM2AsPath4byteEntry OBJECT-TYPE
          SYNTAX     BgpM2AsPath4byteEntry
          MAX-ACCESS not-accessible
          STATUS     current
          DESCRIPTION
              "Each row contains the information for the AS 4-byte
               extension's NEW_AS_PATH and NEW_AGGREGATOR attributes."
          AUGMENTS {
              bgpM2PathAttrEntry
          }
          ::= { bgpM2AsPath4byteTable 1 }


      BgpM2AsPath4byteEntry ::= SEQUENCE {
          bgpM2AsPath4bytePathPresent
              TruthValue,
          bgpM2AsPath4byteAggregatorAS
              InetAutonomousSystemNumber,
          bgpM2AsPath4byteCalcLength
              Unsigned32,
          bgpM2AsPath4byteString
              SnmpAdminString,
          bgpM2AsPath4byteIndex
              Unsigned32
      }


      bgpM2AsPath4bytePathPresent OBJECT-TYPE
          SYNTAX     TruthValue
          MAX-ACCESS read-only
```

```
        STATUS      current
        DESCRIPTION
            "This value may only be true if this BGP Speaker
             is functioning as a router between ASs that
             are in 2-byte and 4-byte AS space.  If this
             value is true, then the NEW_AS_PATH attributes
             are present and the 4-byte versions of the
             appropriate path attributes are in this row.

             If this value is false, then the following values
             will be present in the row:

             bgpM2PathAttrAggregatorAS - zero (0).
             bgpM2AsPathCalcLength - zero (0).
             bgpM2AsPathString - zero (0) length string.
             bgpM2AsPathIndex - zero (0)."
        ::= { bgpM2AsPath4byteEntry 1 }


    bgpM2AsPath4byteAggregatorAS OBJECT-TYPE
        SYNTAX      InetAutonomousSystemNumber
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "The NEW_AGGREGATOR AS number of the last BGP4 speaker
             that performed route aggregation.  A value of
             zero (0) indicates the absence of this
             attribute.

             Note propagation of AS of zero is illegal in
             the Internet."
        ::= { bgpM2AsPath4byteEntry 2 }


    bgpM2AsPath4byteCalcLength OBJECT-TYPE
        SYNTAX      Unsigned32
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "This value represents the calculated length of the
             NEW_AS_PATH according to the rules of the BGP specification.
             This value is used in route selection."
        REFERENCE
            "draft-ietf-idr-bgp4-17.txt, Sec. 9.1.2.2.a"
        ::= { bgpM2AsPath4byteEntry 3 }


    bgpM2AsPath4byteString OBJECT-TYPE
```

```
        SYNTAX      SnmpAdminString
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "This is a string depicting the autonomous system
             path to this network which was received from the
             peer which advertised it.  The format of the string
             is implementation-dependent, and should be designed
             for operator readability."
        ::= { bgpM2AsPath4byteEntry 4 }


    bgpM2AsPath4byteIndex OBJECT-TYPE
        SYNTAX      Unsigned32
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "This value is a unique index for the decomposed AS Path
             in the bgpM2AsPathTable.  It is assigned by the
             agent at the point of creation of the bgpM2AsPathTable
             row entry.  While its value is guaranteed to be unique
             at any time, it is otherwise opaque to the management
             application with respect to its value or the contiguity
             of bgpM2AsPathIndex row instance values across rows
             of the bgpM2AsPathTable. "
        ::= { bgpM2AsPath4byteEntry 5 }



    --    BGP 4 Path attribute AS Path Table.  There is one row in
    --    this table for each AS which is advertised for a given
    --    route as provided from a peer.


-- JMH
-- We need one of these for the NewAsPath for the 4byte draft

    bgpM2AsPathTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF BgpM2AsPathEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "The BGP-4 Path Attribute AS Path Table
             contains the per network path (NLRI)
             AS PATH data received from the
             advertising BGP peer."
        ::= { bgpM2Rib 6 }


    bgpM2AsPathTableEntry OBJECT-TYPE
```

```
        SYNTAX     BgpM2AsPathEntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
            "Information about an AS path provided with a path to
             a network."
        INDEX {
            bgpM2PathAttrIndex,
            bgpM2AsPathSegmentIndex,
            bgpM2AsPathElementIndex
        }
        ::= { bgpM2AsPathTable 1 }


    BgpM2AsPathEntry ::= SEQUENCE {
        bgpM2AsPathSegmentIndex
            Unsigned32,
        bgpM2AsPathElementIndex
            Unsigned32,
        bgpM2AsPathType
            INTEGER,
        bgpM2AsPathElementValue
            InetAutonomousSystemNumber
    }


    bgpM2AsPathSegmentIndex OBJECT-TYPE
        SYNTAX     Unsigned32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "A per-AS path segment index.  This will index a set of
             autonomous systems in an AS path which are part
             of the same sequence or set (as determined by
             the row value of bgpM2AsPathType, which
             should be the same value for each bgpM2AsPathTable
             entry indexed by the same (bgpM2PathAttrIndex,
             bgpM2AsPathIndex) pair)."
        ::= { bgpM2AsPathTableEntry 1 }


    bgpM2AsPathElementIndex OBJECT-TYPE
        SYNTAX     Unsigned32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "A per-AS element index.  This will index a particular
             AS within a sequence or set of autonomous systems in
```

```
         an AS path."
    ::= { bgpM2AsPathTableEntry 2 }


bgpM2AsPathType OBJECT-TYPE
    SYNTAX  INTEGER {
        asSet(1),
        asSequence(2),
        confedSequence(3),
        confedSet(4)
      }
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
         "The type of sequence in which this asPath
          was advertised as an attribute.  Note that
          all asPath row instances for a given (bgpM2PathAttrIndex,
          bgpM2AsPathIndex) index pair will have their
          bgpM2AsPathType set to the same value.
          The values for bgpM2AsPathType are
          interpreted as defined in the base BGP document
          and the BGP AS Confederations document."
    REFERENCE
        "draft-ietf-idr-bgp4-16
         RFC 3065 - BGP AS Confederations"
    ::= { bgpM2AsPathTableEntry 3 }


bgpM2AsPathElementValue OBJECT-TYPE
    SYNTAX      InetAutonomousSystemNumber
    MAX-ACCESS read-only
    STATUS      current
    DESCRIPTION
        "An AS value for an AS the related NLRI traversed
         in the propagation of its advertisement.  This
         value is to be interpreted in the context of the
         sequence implied by bgpM2AsPathIndex and
         bgpM2AsPathType (and, in sequence of the
         other table rows with the same value of
         bgpM2PathAttrIndex and bgpM2AsPathIndex)."
    ::= { bgpM2AsPathTableEntry 4 }


--    BGP 4 Path unknown attribute.  There is one row in
--    this table for each attribute not known by this BGP
--    implementation (or agent instrumentation), but provided
--    from a peer.
```

    bgpM2PathAttrUnknownTable OBJECT-TYPE
        SYNTAX   SEQUENCE OF BgpM2PathAttrUnknownEntry
        MAX-ACCESS not-accessible
        STATUS   current
        DESCRIPTION
            "The BGP-4 Path Attribute Unknown Table
             contains the per network path (NLRI)
             data on the path attributes advertised
             with a route but not known to the local BGP implementation
             or not otherwise capable of being returned from this agent.

             The absence of row data for a given index value for
             bgpM2PathAttrIndex indicates a lack of such unknown
             attribute information for the indicated network path
             (as indexed by that bgpM2PathAttrIndex value in the
             bgpM2PathAttrTable)."
        ::= { bgpM2Rib 7 }

    bgpM2PathAttrUnknownEntry OBJECT-TYPE
        SYNTAX   BgpM2PathAttrUnknownEntry
        MAX-ACCESS not-accessible
        STATUS   current
        DESCRIPTION
            "Information about an unknown attribute
             provided with a path to a network."
        INDEX {
            bgpM2PathAttrIndex,
            bgpM2PathAttrUnknownIndex
        }
        ::= { bgpM2PathAttrUnknownTable 1 }

    BgpM2PathAttrUnknownEntry ::= SEQUENCE {
        bgpM2PathAttrUnknownIndex
            Unsigned32,
        bgpM2PathAttrUnknownType
            Unsigned32,
        bgpM2PathAttrUnknownValue
            OCTET STRING
    }

    bgpM2PathAttrUnknownIndex OBJECT-TYPE
        SYNTAX Unsigned32
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION

```
          "An integer index for a row in this table."
     ::= { bgpM2PathAttrUnknownEntry 1 }


 bgpM2PathAttrUnknownType OBJECT-TYPE
     SYNTAX Unsigned32
     MAX-ACCESS read-only
     STATUS      current
     DESCRIPTION
         "The attribute type advertised with this unknown
          attribute by the peer."
     ::= { bgpM2PathAttrUnknownEntry 2 }


 -- Maximum size of the following is derived as
 --     4096   max message size
 --   - 16     BGP message marker bytes
 --   -  2     BGP message size
 --   -  1     BGP message type (UPDATE with unknown attr)
 --   -  2     UPDATE routes length (even assuming no routes)
 --   -  2     UPDATE path attributes length
 --   -  1     path attribute flag octet
 --   -  2     unknown path attr type (in bgpM2PathAttrUnknownType)
 --   ---------
 --    4070 bytes maximum per-message attribute value data


 bgpM2PathAttrUnknownValue OBJECT-TYPE
     SYNTAX     OCTET STRING (SIZE(0..4070))
     MAX-ACCESS read-only
     STATUS     current
     DESCRIPTION
         "Value of path attribute not understood
          by the base BGP-4 document.

          Octets beyond the maximum size, if any,
          are not recorded by this row object. "
     ::= { bgpM2PathAttrUnknownEntry 3 }


 --
 -- Path Attribute Extensions
 --

 bgpM2PathAttrExtensions
     OBJECT IDENTIFIER ::= { bgpM2Rib 8 }
```

```
     bgpM2PathAttrNonCapExts
         OBJECT IDENTIFIER ::= { bgpM2PathAttrExtensions 1 }


     bgpM2PathAttrCapExts
         OBJECT IDENTIFIER ::= { bgpM2PathAttrExtensions 2 }



     --
     -- Path Attribute Route Reflection Extensions
     --


     --
     -- Originator ID Table
     --

     bgpM2PathAttrRouteReflectionExts
         OBJECT IDENTIFIER ::= { bgpM2PathAttrNonCapExts 2796 }


     bgpM2PathAttrOriginatorIdTable OBJECT-TYPE
         SYNTAX      SEQUENCE OF BgpM2PathAttrOriginatorIdEntry
         MAX-ACCESS  not-accessible
         STATUS      current
         DESCRIPTION
             "Per prefix data pertinent to advertisement of a
              network prefix through an originator."
         REFERENCE
             "RFC 2796 - BGP Route Reflection"
         ::= { bgpM2PathAttrRouteReflectionExts 1 }


     bgpM2PathAttrOriginatorIdEntry OBJECT-TYPE
         SYNTAX      BgpM2PathAttrOriginatorIdEntry
         MAX-ACCESS  not-accessible
         STATUS      current
         DESCRIPTION
             "Each entry contains data pertinent to a network
              prefix as received through its originating BGP
              route reflector."
         REFERENCE
             "RFC 2796 - BGP Route Reflection"
         INDEX {
             bgpM2PathAttrIndex
         }
         ::= { bgpM2PathAttrOriginatorIdTable 1 }
```

```
    BgpM2PathAttrOriginatorIdEntry ::= SEQUENCE {
        bgpM2PathAttrOriginatorId
            BgpM2Identifier
    }


    bgpM2PathAttrOriginatorId OBJECT-TYPE
        SYNTAX      BgpM2Identifier
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The Originator-ID identifying the router that initially
             advertised this destination to a Route Reflector.  A
             value of 0.0.0.0 indicates the absence of this attribute."
        REFERENCE
            "This attribute is defined in [RFC2796]."
        ::= { bgpM2PathAttrOriginatorIdEntry 1 }


    --
    -- Cluster table
    --

    bgpM2PathAttrClusterTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF BgpM2PathAttrClusterEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "The BGP-4 Path Attribute Cluster Table
             contains the per network path (NLRI)
             data on the reflection path which a
             route has traversed.  The absence of row
             data for a given index value for bgpM2PathAttrIndex
             indicates a lack of this attribute information
             for the indicated network path (as indexed by
             that bgpM2PathAttrIndex value in the bgpM2PathAttrTable)."
        ::= { bgpM2PathAttrRouteReflectionExts 2 }


    bgpM2PathAttrClusterEntry OBJECT-TYPE
        SYNTAX      BgpM2PathAttrClusterEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "Information about a cluster traversal
             provided with a path to a network."
        INDEX {
            bgpM2PathAttrIndex,
```

```
        bgpM2PathAttrClusterIndex
    }
    ::= { bgpM2PathAttrClusterTable 1 }


BgpM2PathAttrClusterEntry ::= SEQUENCE {
    bgpM2PathAttrClusterIndex
        Unsigned32,
    bgpM2PathAttrClusterValue
        BgpM2Identifier
}


bgpM2PathAttrClusterIndex OBJECT-TYPE
    SYNTAX     Unsigned32
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
        "An integral index for a row in this table."
    ::= { bgpM2PathAttrClusterEntry 1 }


bgpM2PathAttrClusterValue OBJECT-TYPE
    SYNTAX     BgpM2Identifier
    MAX-ACCESS  read-only
    STATUS     current
    DESCRIPTION
        "A four octet long value representing a part of the
        reflection path that the route has passed.  Each such four
        octet long value represents the ID of a cluster that
        the route has traversed.  The sequence of this path as
        received in the route advertisement will be preserved in
        the sequence of bgpM2PathAttrClusterTable rows (and the
        bgpM2PathAttrClusterValues in each row) as returned for
        a given bgpM2PathAttrIndex value, and the monotonically
        increasing sequence of bgpM2PathAttrClusterIndex values
        for that bgpM2PathAttrIndex."
    REFERENCE
        "This attribute is defined in [RFC2796]."
    ::= { bgpM2PathAttrClusterEntry 2 }


--
-- BGP Communities
--

bgpM2PathAttrCommunityExts
    OBJECT IDENTIFIER ::= { bgpM2PathAttrNonCapExts 1997 }
```

```
bgpM2PathAttrCommTable OBJECT-TYPE
    SYNTAX     SEQUENCE OF BgpM2PathAttrCommEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
        "The BGP-4 Path Attribute Community Table
         contains the per network path (NLRI)
         data on the community membership advertised
         with a route.  The absence of row
         data for a given index value for bgpM2PathAttrIndex
         indicates a lack of this attribute information
         for the indicated network path (as indexed by
         that bgpM2PathAttrIndex value in the bgpM2PathAttrTable)."
    ::= { bgpM2PathAttrCommunityExts 1 }


bgpM2PathAttrCommEntry OBJECT-TYPE
    SYNTAX     BgpM2PathAttrCommEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
        "Information about a community association
         provided with a path to a network."
    INDEX {
        bgpM2PathAttrIndex,
        bgpM2PathAttrCommIndex
    }
    ::= { bgpM2PathAttrCommTable 1 }


BgpM2PathAttrCommEntry ::= SEQUENCE {
    bgpM2PathAttrCommIndex
        Unsigned32,
    bgpM2PathAttrCommValue
        BgpM2Community
}


bgpM2PathAttrCommIndex OBJECT-TYPE
    SYNTAX Unsigned32
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
        "An integer index for a row in this table."
    ::= { bgpM2PathAttrCommEntry 1 }


bgpM2PathAttrCommValue  OBJECT-TYPE
```

```
        SYNTAX      BgpM2Community
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "A value representing a community.   There are certain
             4-octet long values which could be returned in this
             columnar row data that carry additional semantics."
        REFERENCE
            "RFC 1997 - BGP Communities Attribute"
        ::= { bgpM2PathAttrCommEntry 2 }


    --
    -- BGP Extended Communities
    --

    bgpM2PathAttrExtCommTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF BgpM2PathAttrExtCommEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "The BGP-4 Path Attribute Community Table
            contains the per network path (NLRI)
            data on the extended community membership advertised
            with a route.  The absence of row
            data for a given index value for bgpM2PathAttrIndex
            indicates a lack of this attribute information
            for the indicated network path (as indexed by
            that bgpM2PathAttrIndex value in the bgpM2PathAttrTable).

            XXX JMH - can not assign the OID until an RFC is published."
        ::= { bgpM2PathAttrNonCapExts XXX }


    bgpM2PathAttrExtCommEntry OBJECT-TYPE
        SYNTAX      BgpM2PathAttrExtCommEntry
        MAX-ACCESS not-accessible
        STATUS      current
        DESCRIPTION
            "Information about an extended community association
             provided with a path to a network."
        INDEX {
            bgpM2PathAttrIndex,
            bgpM2PathAttrExtCommIndex
        }
        ::= { bgpM2PathAttrExtCommTable 1 }
```

```
BgpM2PathAttrExtCommEntry ::= SEQUENCE {
    bgpM2PathAttrExtCommIndex
        Unsigned32,
    bgpM2PathAttrExtCommValue
        BgpM2ExtendedCommunity
}


bgpM2PathAttrExtCommIndex OBJECT-TYPE
    SYNTAX Unsigned32
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
        "An integral index for a row in this table."
    ::= { bgpM2PathAttrExtCommEntry 1 }


bgpM2PathAttrExtCommValue  OBJECT-TYPE
    SYNTAX      BgpM2ExtendedCommunity
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "A value representing an extended community which was
        received with the route implied by the bgpM2PathAttr
        Index value of this row data.   There are certain
        8-octet long values which could be returned in this
        columnar row data that carry additional semantics."
    REFERENCE
        "BGP-EXTCOMM - BGP Extended Communities Attribute"
    ::= { bgpM2PathAttrExtCommEntry 2 }



--
-- RFC 2545 link local nexthop
--

bgpM2LinkLocalNextHopTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF BgpM2LinkLocalNextHopEntry
    MAX-ACCESS not-accessible
    STATUS      current
    DESCRIPTION
        "Table of link local nexthops as sent by RFC 2545
         for IPv6 BGP Speakers."
    REFERENCE
        "RFC 2545 - Use of BGP-4 Multiprotocol Extensions
         for IPv6 Inter-Domain Routing"
    ::= { bgpM2PathAttrNonCapExts 2545 }
```

```
     bgpM2LinkLocalNextHopEntry OBJECT-TYPE
         SYNTAX     BgpM2LinkLocalNextHopEntry
         MAX-ACCESS not-accessible
         STATUS     current
         DESCRIPTION
             "Entry containing the link-local nexthops as sent
              by a BGP speaker running RFC 2545 extensions for
              double-nexthops."
         INDEX {
             bgpM2PathAttrIndex
         }
         ::= { bgpM2LinkLocalNextHopTable 1 }


     BgpM2LinkLocalNextHopEntry ::= SEQUENCE {
         bgpM2LinkLocalNextHopPresent
             TruthValue,
         bgpM2LinkLocalNextHop
             InetAddress
     }


     bgpM2LinkLocalNextHopPresent OBJECT-TYPE
         SYNTAX     TruthValue
         MAX-ACCESS read-only
         STATUS     current
         DESCRIPTION
             "This value is TRUE if and only if the BGP
              speaker is receiving IPv6 NLRI using the
              RFC 2545 double nexthop convention and it
              has received a link local scope nexthop in
              addition to the global scope nexthop."
         ::= { bgpM2LinkLocalNextHopEntry 1 }


     bgpM2LinkLocalNextHop OBJECT-TYPE
         SYNTAX     InetAddress (SIZE(20))
         MAX-ACCESS read-only
         STATUS     current
         DESCRIPTION
             "This value contains an IPv6 link local address of
              InetAddressType of type ipv6z.  This value is only
              present if bgpM2LinkLocalNextHopPresent is true."
         ::= { bgpM2LinkLocalNextHopEntry 2 }


     --
     -- Conformance Information
```

    --

    bgpM2Conformance
        OBJECT IDENTIFIER ::= { bgpM2 4 }

    bgpM2MIBCompliances OBJECT IDENTIFIER ::=
        { bgpM2Conformance 1 }

    bgpM2MIBGroups   OBJECT IDENTIFIER ::=
        { bgpM2Conformance 2 }

    bgpM2MIBCompliance MODULE-COMPLIANCE
        STATUS current
        DESCRIPTION
            "The compliance statement for entities which
            implement the BGP4 mib."
         MODULE -- this module
         MANDATORY-GROUPS {
            bgpM2TimersGroup,
            bgpM2CountersGroup,
            bgpM2AsPathGroup,
            bgpM2As4byteGroup,
            bgpM2BaseGroup,
            bgpM2ErrorsGroup,
            bgpM2PeerGroup,
            bgpM2PathAttributesGroup
            }
        GROUP bgpM2MIBNotificationsGroup
        DESCRIPTION
            "The notifications group is completely optional,
             but highly recommended."
        GROUP bgpM2CommunitiesGroup
        DESCRIPTION
            "The communities group is mandatory only for those
             which support the BGP community attribute."
        GROUP bgpM2ExtCommunitiesGroup
        DESCRIPTION
            "The communities group is mandatory only for those
             which support the BGP extended community attribute."
        GROUP bgpM2RouteReflectionGroup
        DESCRIPTION
            "The communities group is mandatory only for those
             which support the BGP route reflection relationships."
        GROUP bgpM2AsConfederationGroup
        DESCRIPTION

```
            "The communities group is mandatory only for those
             which support the BGP confederation membership."
        GROUP bgpM2TimersGroup
        DESCRIPTION
            "This group is mandatory for all agent implementations."
        GROUP bgpM2CountersGroup
        DESCRIPTION
            "This group is mandatory for all agent implementations."
        GROUP bgpM2CapabilitiesGroup
        DESCRIPTION
            "This group is mandatory for all agent implementations."
        GROUP bgpM2AsPathGroup
        DESCRIPTION
            "This group is mandatory for all agent implementations."
        GROUP bgpM2As4byteGroup
        DESCRIPTION
            "This group is mandatory for all agent implementations."
        GROUP bgpM2BaseGroup
        DESCRIPTION
            "This group is mandatory for all agent implementations."
        GROUP bgpM2ErrorsGroup
        DESCRIPTION
            "This group is mandatory for all agent implementations."
        GROUP bgpM2PeerGroup
        DESCRIPTION
            "This group is mandatory for all agent implementations."
        GROUP bgpM2PathAttributesGroup
        DESCRIPTION
            "This group is mandatory for all agent implementations."
        GROUP bgpM2PeerConfigurationGroup
        DESCRIPTION
            "This group is optional for implementations that wish to
             support configuration via SNMP."
        GROUP bgpM2PeerRouteReflectorCfgGroup
        DESCRIPTION
            "This group is optional for implementations that wish to
             support configuration of route reflection via SNMP.
             Implementation of this feature requires support of the
             bgpM2PeerConfigurationGroup."
        GROUP bgpM2PeerAsConfederationCfgGroup
        DESCRIPTION
            "This group is optional for implementations that wish to
             support configuration of BGP AS Confederations via SNMP.
             Implementation of this feature requires support of the
             bgpM2PeerConfigurationGroup."
        GROUP bgpM2Rfc2545Group
        DESCRIPTION
            "This group is required for peers that support exchanging
```

```
           of IPv6 NLRI per RFC 2545."
        ::= { bgpM2MIBCompliances 1 }



    bgpM2CommunitiesGroup OBJECT-GROUP
        OBJECTS {
            bgpM2PathAttrCommIndex,
            bgpM2PathAttrCommValue
        }
        STATUS current
        DESCRIPTION
            "Objects associated with BGP communities."
        ::= { bgpM2MIBGroups 1 }


    bgpM2ExtCommunitiesGroup OBJECT-GROUP
        OBJECTS {
            bgpM2PathAttrExtCommIndex,
            bgpM2PathAttrExtCommValue
        }
        STATUS current
        DESCRIPTION
            "Objects associated with BGP extended communities."
        ::= { bgpM2MIBGroups 2 }


    bgpM2RouteReflectionGroup OBJECT-GROUP
        OBJECTS {
            bgpM2RouteReflector,
            bgpM2ClusterId,
            bgpM2PeerReflectorClient,
            bgpM2PathAttrOriginatorId,
            bgpM2PathAttrClusterIndex,
            bgpM2PathAttrClusterValue
        }
        STATUS current
        DESCRIPTION
            "Objects associated with BGP route reflection."
        ::= { bgpM2MIBGroups 3 }


    bgpM2AsConfederationGroup OBJECT-GROUP
        OBJECTS {
            bgpM2ConfederationRouter,
            bgpM2ConfederationId,
            bgpM2PeerConfedMember
        }
```

```
             STATUS current
             DESCRIPTION
                 "Objects associated with BGP confederation membership."
             ::= { bgpM2MIBGroups 4 }


      bgpM2TimersGroup OBJECT-GROUP
             OBJECTS {
                 bgpM2PeerFsmEstablishedTime,
                 bgpM2PeerInUpdatesElapsedTime,
                 bgpM2PeerConnectRetryInterval,
                 bgpM2PeerHoldTimeConfigured,
                 bgpM2PeerKeepAliveConfigured,
                 bgpM2PeerMinASOrigInterval,
                 bgpM2PeerMinRouteAdverInterval,
                 bgpM2PeerHoldTime,
                 bgpM2PeerKeepAlive
             }
             STATUS current
             DESCRIPTION
                 "Objects associated with BGP peering timers."
             ::= { bgpM2MIBGroups 5 }


      bgpM2CountersGroup OBJECT-GROUP
             OBJECTS {
                 bgpM2PeerInUpdates,
                 bgpM2PeerOutUpdates,
                 bgpM2PeerInTotalMessages,
                 bgpM2PeerOutTotalMessages,
                 bgpM2PeerFsmEstablishedTrans,
                 bgpM2PrefixCountersAfi,
                 bgpM2PrefixCountersSafi,
                 bgpM2PrefixInPrefixes,
                 bgpM2PrefixInPrefixesAccepted,
                 bgpM2PrefixInPrefixesRejected,
                 bgpM2PrefixOutPrefixes
             }
             STATUS current
             DESCRIPTION
                 "Objects to count discrete events and exchanges on BGP
                  sessions."
              ::= { bgpM2MIBGroups 6 }


      bgpM2CapabilitiesGroup OBJECT-GROUP
             OBJECTS {
                 bgpM2CapabilitySupportAvailable,
```

```
        bgpM2SupportedCapabilityCode,
        bgpM2SupportedCapability,
        bgpM2PeerCapAnnouncedCode,
        bgpM2PeerCapAnnouncedIndex,
        bgpM2PeerCapAnnouncedValue,
        bgpM2PeerCapReceivedCode,
        bgpM2PeerCapReceivedIndex,
        bgpM2PeerCapReceivedValue
    }
    STATUS current
    DESCRIPTION
        "Objects to report capabilities as received on BGP
         sessions."
    ::= { bgpM2MIBGroups 7 }


bgpM2AsPathGroup OBJECT-GROUP
    OBJECTS {
        bgpM2AsPathSegmentIndex,
        bgpM2AsPathElementIndex,
        bgpM2AsPathType,
        bgpM2AsPathElementValue
    }
    STATUS current
    DESCRIPTION
        "Objects to report AS paths received on BGP NLRIs."
    ::= { bgpM2MIBGroups 8 }


bgpM2As4byteGroup OBJECT-GROUP
    OBJECTS {
        bgpM2AsSize,
        bgpM2AsPath4bytePathPresent,
        bgpM2AsPath4byteAggregatorAS,
        bgpM2AsPath4byteCalcLength,
        bgpM2AsPath4byteString,
        bgpM2AsPath4byteIndex
    }
    STATUS current
    DESCRIPTION
        "AS Size objects."
    ::= { bgpM2MIBGroups 9 }


bgpM2BaseGroup OBJECT-GROUP
    OBJECTS {
        bgpM2LocalAs,
        bgpM2LocalIdentifier,
```

```
            bgpM2VersionIndex,
            bgpM2VersionSupported
        }
        STATUS current
        DESCRIPTION
            "Basic objects in local BGP implementation."
        ::= { bgpM2MIBGroups 10 }


    bgpM2ErrorsGroup OBJECT-GROUP
        OBJECTS {
            bgpM2PeerLastErrorReceived,
            bgpM2PeerLastErrorReceivedData,
            bgpM2PeerLastErrorReceivedTime,
            bgpM2PeerLastErrorReceivedText,
            bgpM2PeerLastErrorSent,
            bgpM2PeerLastErrorSentData,
            bgpM2PeerLastErrorSentTime,
            bgpM2PeerLastErrorSentText
        }
        STATUS current
        DESCRIPTION
            "Errors received on BGP peering sessions."
        ::= { bgpM2MIBGroups 11 }


    bgpM2PeerGroup OBJECT-GROUP
        OBJECTS {
            bgpM2PeerInstance,
            bgpM2PeerIdentifier,
            bgpM2PeerState,
            bgpM2PeerStatus,
            bgpM2PeerConfiguredVersion,
            bgpM2PeerNegotiatedVersion,
            bgpM2PeerLocalAddrType,
            bgpM2PeerLocalAddr,
            bgpM2PeerLocalPort,
            bgpM2PeerLocalAs,
            bgpM2PeerRemoteAddrType,
            bgpM2PeerRemoteAddr,
            bgpM2PeerRemotePort,
            bgpM2PeerRemoteAs,
            bgpM2PeerIndex
        }
        STATUS current
        DESCRIPTION
            "Core object types on BGP peering sessions."
        ::= { bgpM2MIBGroups 12 }
```

```
      bgpM2PathAttributesGroup OBJECT-GROUP
          OBJECTS {
              bgpM2PathAttrCount,
              bgpM2AsPathCalcLength,
              bgpM2AsPathElementValue,
              bgpM2AsPathIndex,
              bgpM2AsPathString,
              bgpM2AsPathType,
              bgpM2NlriAfi,
              bgpM2NlriBest,
              bgpM2NlriPrefixType,
              bgpM2NlriPrefix,
              bgpM2NlriPrefixLen,
              bgpM2NlriSafi,
              bgpM2NlriOpaqueType,
              bgpM2NlriOpaquePointer,
              bgpM2NlriIndex,
              bgpM2NlriCalcLocalPref,
              bgpM2AdjRibsOutIndex,
              bgpM2AdjRibsOutRoute,
              bgpM2PathAttrAggregatorAS,
              bgpM2PathAttrAggregatorAddr,
              bgpM2PathAttrAtomicAggregate,
              bgpM2PathAttrIndex,
              bgpM2PathAttrLocalPref,
              bgpM2PathAttrLocalPrefPresent,
              bgpM2PathAttrMed,
              bgpM2PathAttrMedPresent,
              bgpM2PathAttrNextHop,
              bgpM2PathAttrNextHopAddrType,
              bgpM2PathAttrOrigin,
              bgpM2PathAttrUnknownIndex,
              bgpM2PathAttrUnknownType,
              bgpM2PathAttrUnknownValue
          }
          STATUS current
          DESCRIPTION
              "Attributes received on BGP peering sessions."
          ::= { bgpM2MIBGroups 13 }

      bgpM2PeerConfigurationGroup OBJECT-GROUP
          OBJECTS {
              bgpM2CfgBaseScalarStorageType,
              bgpM2CfgLocalAs,
              bgpM2CfgLocalIdentifier,
              bgpM2CfgPeerAdminStatus,
              bgpM2CfgPeerNextIndex,
              bgpM2CfgPeerConfiguredVersion,
```

```
            bgpM2CfgAllowVersionNegotiation,
            bgpM2CfgPeerLocalAddrType,
            bgpM2CfgPeerLocalAddr,
            bgpM2CfgPeerLocalAs,
            bgpM2CfgPeerRemoteAddrType,
            bgpM2CfgPeerRemoteAddr,
            bgpM2CfgPeerRemoteAs,
            bgpM2CfgPeerEntryStorageType,
            bgpM2CfgPeerError,
            bgpM2CfgPeerBgpPeerEntry,
            bgpM2CfgPeerRowEntryStatus,
            bgpM2CfgPeerIndex,
            bgpM2CfgPeerStatus,
            bgpM2CfgPeerConnectRetryInterval,
            bgpM2CfgPeerHoldTimeConfigured,
            bgpM2CfgPeerKeepAliveConfigured,
            bgpM2CfgPeerMinASOrigInterval,
            bgpM2CfgPeerMinRouteAdverInter
        }
        STATUS current
        DESCRIPTION
            "Configuration objects for BGP peers."
        ::= { bgpM2MIBGroups 14 }


    bgpM2PeerRouteReflectorCfgGroup OBJECT-GROUP
        OBJECTS {
            bgpM2CfgRouteReflector,
            bgpM2CfgClusterId,
            bgpM2CfgPeerReflectorClient
        }
        STATUS current
        DESCRIPTION
            "Configuration objects for BGP peers that support route
             reflection."
        ::= { bgpM2MIBGroups 15 }


    bgpM2PeerAsConfederationCfgGroup OBJECT-GROUP
        OBJECTS {
            bgpM2CfgConfederationRouter,
            bgpM2CfgConfederationId,
            bgpM2CfgPeerConfedMember
        }
        STATUS current
        DESCRIPTION
            "Configuration objects for BGP peers that support BGP
             confederations."
```

```
        ::= { bgpM2MIBGroups 16 }


  bgpM2MIBNotificationsGroup NOTIFICATION-GROUP
      NOTIFICATIONS {
          bgpM2Established,
          bgpM2BackwardTransition
      }
      STATUS  current
      DESCRIPTION
          "This group contains objects for notifications
           supported by this mib module."
      ::= { bgpM2MIBGroups 17 }


  bgpM2Rfc2545Group OBJECT-GROUP
      OBJECTS {
          bgpM2LinkLocalNextHopPresent,
          bgpM2LinkLocalNextHop
      }
      STATUS current
      DESCRIPTION
          "This group is required for peers that support exchanging
           of IPv6 NLRI per RFC 2545."
      ::= { bgpM2MIBGroups 18 }

END
```

5. Intellectual Property Rights

   The IETF takes no position regarding the validity or scope of any
   intellectual property or other rights that might be claimed to per-
   tain to the implementation or use of the technology described in this
   document or the extent to which any license under such rights might
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   the IETF Secretariat.

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   copyrights, patents or patent applications, or other proprietary

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   this standard. Please address the information to the IETF Executive
   Director.

6. Security Considerations

   This MIB relates to a system providing inter-domain routing. As
   such, improper manipulation of the objects represented by this MIB
   may result in denial of service to a large number of end-users.

   There are several management objects defined in this MIB that have a
   MAX-ACCESS clause of read-write and/or read-create. Such objects
   should be considered sensitive or vulnerable in most network environ-
   ments. The support for SET operations in a non-secure environment
   without proper protection can have a negative effect on network oper-
   ations. These objects include:

   XXX TODO

   There are a number of managed objects in this MIB that con-
   tain sensitive information regarding the operation of a network. For
   example, a BGP peer's local and remote addresses might be sensitive
   for ISPs who want to keep interface addresses on routers confiden-
   tial to prevent router addresses used for a denial of service attack
   or spoofing.

   Therefore, it is important in most environments to control read
   access to these objects and possibly to even encrypt the values of
   these object when sending them over the network via SNMP.

   SNMPv1 by itself is not a secure environment. Even if the network
   itself is secure (for example by using IPSec), there is still no con-
   trol as to who on the secure network is allowed to access and GET/SET
   (read/change/create/delete) the objects in this MIB.

   It is recommended that the implementers consider the security fea-
   tures as provided by the SNMPv3 framework.[REF] Specifically, the
   implementation and use of the User-based Security Model [REF] and the
   View-based Access Control Model [REF] is recommended to provide
   appropriate security controls.

   It is then an operator/user responsibility to ensure that the SNMP
   entity giving access to an instance of this MIB, is properly config-
   ured to give access to the objects only to those principals (users)
   that have legitimate rights to indeed GET or SET (change/cre-
   ate/delete) them.

7. Acknowledgements

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      others TBD...

8. Changes From Last Version

    This section is used to track changes from version to version of this
    document. This section will be removed from the document prior to
    being issued to IDR working group last call.

      *   Changes from draft-ietf-idr-bgp4-mibv2-03.txt to draft-ietf-
            idr-bgp4-mibv2-04.txt (12 January 2004)

            Remove all objects related to BGP authentication as BGP
            authentication has been officially removed.

            Removed bgpM2AsPathElementValue from bgpM2AsPathTable

            Add current OPS group MIB boilerplate and security boiler-
            plate. Work still needs to be done in the security section.

            Split references into Normative References and Informational
            References. Add IETF Intellectual Property Rights statement.
            Update copyright dates.

            Add new TEXTUAL-CONVENTION, BgpM2Afi to more properly reflect
            BGP Multi-Protocol Extensions.

            Add bgpM2NlriPrefixType to bgpM2NlriTable as an interim mecha-
            nism to support "proper" translation of an AFI to an InetAd-
            dressType. Further thought must be put into this.

            Delete bgpM2CfgPeerRemotePort object. Deployed implementa-
            tions do not seem to allow this to be configured.

            Add bgpM2PeerInstance to permit multiple BGP routing instances
            to be supported.

Renumber numerous OIDs to account for re-organizing objects.
Update conformance statements to match.

* Changes from draft-ietf-idr-bgp4-mibv2-02.txt to draft-ietf-idr-bgp4-mibv2-03.txt (4 November 2002):

Changed the order of the bgpM2NlriPrefixLen and bgpM2NlriPrefix objects and renumbered them. This was to make it consistant with user expectations.

Clarify the peer table description text to specify the remote peer.

Use SnmpAdminString instead of DisplayString.

Correct TEXTUAL CONVENTION for extended communities.

Changed enumerations of bgpM2PathATtrAtomicAggregate.

Added link local table for RFC 2545 nexthops.

* Changes from draft-ietf-idr-bgp4-mibv2-01.txt to draft-ietf-idr-bgp4-mibv2-02.txt (28 February 2002)

Lots of changes in this rewrite, these are the most dramatic:

Configuration objects and tables added.

All references to 'bgp' in object descriptors changed to 'bgpM2' to disambiguate from RFC 1657 and its OBSOLETing MIB.

Community Textual conventions added to beginning of MIB.

bgpM2CalcLength and PathString columns added to bgpM2PathAttr table.

Creation of separate bgpM2AdjRibsOutTable.

Appearance of NLRI table notions such as 'opaque type'.

Overhaul of specification of AS Path types to accommodate easier management at time of route aggregation.

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[12]. Full Copyright Statement

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