# BGP 4 MIB Support for per-Peer Received Routes

**Feature History**

| Release | Modification |
|---|---|
| 12.0(21)S | The Cisco BGP Version 4 MIB was modified. |
| 12.2(14)S | BGP 4 MIB Support for per-Peer Received Routes was integrated into 12.2(14)S. |

This document describes BGP 4 MIB Support for per-Peer Received Routes in Cisco IOS Release 12.2(14)S. It includes the following sections:



## Feature Overview

BGP 4 MIB Support for per-Peer Received Routes introduces a new table in the CISCO-BGP4-MIB that provides the capability to query (by using Simple Network Management Protocol [SNMP] commands) for routes that are learned from individual Border Gateway Protocol (BGP) peers.

Before this new MIB table was introduced, a network operator could obtain the routes learned by a local BGP-speaking router by querying the local BGP speaker with an SNMP command (for example, the **snmpwalk** command). The network operator used the SNMP command to query the bgp4PathAttrTable of the CISCO-BGP4-MIB. The routes that were returned from a bgp4PathAttrTable query were indexed in the following order:

- Prefix
- Prefix length
- Peer address

Because the bgp4PathAttrTable indexes the prefixes first, obtaining routes learned from individual BGP peers will require the network operator to walk through the complete bgp4PathAttrTable and filter out routes from the interested peer. A BGP RIB could potentially contain 10,000 or more routes, which makes a manual walk operation impossible and automated walk operations very inefficient.

BGP 4 MIB Support for per-Peer Received Routes introduces a Cisco-specific enterprise extension to the CISCO-BGP4-MIB that defines a new table called the cbgpRouterTable. The cbgpRouterTable provides the same information as the bgp4PathAttrTable with the following two differences:

- Routes are indexed in the following order:
  - Peer address
  - Prefix
  - Prefix length

  The search criteria for SNMP queries of local routes is improved because peer addresses are indexed before prefixes. A search for routes that are learned from individual peers is improved with this enhancement because peer addresses are indexed before prefixes. A network operator will no longer need to search through potentially thousands of routes to obtain the learned routes of a local BGP RIB table.
- Support is added for Multiprotocol (mBGP), Address Family Identifier (AFI), and Subsequent Address Family Identifier (SAFI) information. This information is added in the form of indexes to the cbgpRouterTable. The CISCO-BGP4-MIB can be queried for any combination of AFIs and SAFIs that are supported by the local BGP speaker.

**Note** The MIB will be populated only if the router is configured to run a BGP process. The present implementation of BGP 4 MIB Support for per-Peer Received Routes will show only routes contained in IPv4 AFI and unicast SAFI BGP local RIB tables. Support for showing routes contained in other local RIB tables will be added in the future.

# BGP 4 per-Peer Received Routes Table Elements and Objects

The following section describe new table elements, AFI and SAFI tables and objects, and network address prefixes in the Network Layer Reachability Information (NLRI) fields that have been introduced by the BGP 4 MIB Support for per-Peer Received Routes enhancement.

## MIB Tables and Objects

Table 1 describes the MIB indexes of the cbgpRouterTable.

For a complete description of the MIB, see the CISCO-BGP4-MIB file CISCO-BGP4-MIB.my, available through Cisco.com at the following URL:

http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

*Table 1 MIB Indexes of the cbgpRouterTable*

| MIB Indexes | Description |
|---|---|
| cbgpRouteAfi | Represents the AFI of the network layer protocol that is associated with the route. |
| cbgpRouteSafi | Represents the SAFI of the route. It gives additional information about the type of the route. The AFI and SAFI are used together to determine which local RIB (Loc-RIB) contains a particular route. |
| cbgpRoutePeerType | Represents the type of network layer address that is stored in the cbgpRoutePeer object. |
| cbgpRoutePeer | Represents the network layer address of the peer from which the route information has been learned. |
| cbgpRouteAddrPrefix | Represents the network address prefix that is carried in a BGP update message.<br>See Table 2 for information about the types of network layer addresses that can be stored in specific types of AFI and SAFI objects. |
| cbgpRouteAddrPrefixLen | Represents the length in bits of the network address prefix in the NLRI field.<br>See Table 3 for a description of the 13 possible entries. |

## AFIs and SAFIs

Table 2 lists the AFI and SAFI values that can be assigned to or held by the cbgpRouteAfi and cbgpRouteSafi indexes, respectively. Table 2 also displays the network address prefix type that can be held by specific combinations of AFIs and SAFIs. The type of network address prefix that can be carried in a BGP update message depends on the combination of AFIs and SAFIs.

*Table 2 AFIs and SAFIs*

| AFI | SAFI | Type |
|---|---|---|
| ipv4(1) | unicast(1) | IPv4 address |
| ipv4(1) | multicast(2) | IPv4 address |
| ipv4(1) | vpn(128) | VPN-IPv4 address |
| ipv6(2) | unicast(1) | IPv6 address |

**Note** A VPN-IPv4 address is a 12-byte quantity that begins with an 8-byte Route Distinguisher (RD) and ends with a 4-byte IPv4 address. Any bits beyond the length specified by cbgpRouteAddrPrefixLen are represented as zeros.

## Network Address Prefix Descriptions for the NLRI Field

Table 3 describes the length in bits of the network address prefix in the NLRI field of the cbgpRouteTable. Each entry in the table provides the following information about the route that is selected by any of the six indexes in Table 1.

*Table 3 Network Address Prefix Descriptions for the NLRI Field*

| Table or Object (or index) | Description |
|---|---|
| cbgpRouteOrigin | The ultimate origin of the route information. |
| cbgpRouteASPathSegment | The sequence of autonomous system path segments. |
| cbgpRouteNextHop | The network layer address of the autonomous system border router that traffic should pass through to get to the destination network. |
| cbgpRouteMedPresent | Indicates that the MULTI_EXIT_DISC attribute for the route is either present or absent. |
| cbgpRouteMultiExitDisc | Metric that is used to discriminate between multiple exit points to an adjacent autonomous system. The value of this object is irrelevant if the value of the cbgpRouteMedPresent object is “false(2).” |
| cbgpRouteLocalPrefPresent | Indicates that the LOCAL_PREF attribute for the route is either present or absent. |
| cbgpRouteLocalPref | Determines the degree of preference for an advertised route by an originating BGP speaker. The value of this object is irrelevant if the value of the cbgRouteLocalPrefPresent object is “false(2).” |
| cbgpRouteAtomicAggregate | Determines if the system has selected a less specific route without selecting a more specific route. |
| cbgpRouteAggregatorAS | The autonomous system number of the last BGP speaker that performed route aggregation. A value of 0 indicates the absence of this attribute. |
| cbgpRouteAggregatorAddrType | Represents the type of Network Layer address that is stored in the cbgpRouteAggregatorAddr object. |
| cbgpRouteAggregatorAddr | The network layer address of the last BGP 4 speaker that performed route aggregation. A value of all zeros indicates the absence of this attribute. |
| cbgpRouteBest | An indication of whether this route was chosen as the best BGP 4 route. |
| cbgpRouteUnknownAttr | One or more path attributes not understood by the local BGP speaker. A size of 0 indicates that this attribute is absent. |

# Benefits

### Improved SNMP Query Capabilities

The search criteria for SNMP queries for routes that are advertised by individual peers is improved because the peer address is indexed before the prefix. A network operator will no longer need to search through potentially thousands of routes to obtain the learned routes of a local BGP RIB table.

### Improved AFI and SAFI Support

Support is added for mBGP. AFI and SAFI are added as indexes to the table. The CISCO-BGP4-MIB can be queried for any combination of AFIs and SAFIs that are supported by the local BGP speaker.

# Restrictions

BGP 4 MIB Support for per-Peer Received Routes supports only routes that are contained in IPv4 AFIs and unicast SAFIs in the local BGP RIB. The BGP 4 MIB Support for per-Peer Received Routes enhancement is supported only by BGP Version 4.

# Related Features and Technologies

BGP 4 MIB Support for per-Peer Received Routes is an extension of the BGP routing protocol. For more information about configuring BGP, refer to the "Configuring BGP" chapter of the Release 12.0 *Cisco IOS Network Protocols Configuration Guide* and the *Network Protocols, Part 1*.

# Related Documents

For information about configuring SNMP, refer to the following documents:

- The "Configuring SNMP Support" chapter of *Cisco IOS Configuration Fundamentals Configuration Guide,* Release 12.2
- The "SNMP Commands" chapter of *Cisco IOS Configuration Fundamentals Command Reference,* Release 12.2

# Supported Platforms

BGP 4 MIB Support for per-Peer Received Routes is supported by the following platforms in Cisco IOS Release 12.2(14)S that support BGP:

- Cisco 7200 series
- Cisco 7400 series
- Cisco 7500 series

### Determining Platform Support Through Cisco Feature Navigator

Cisco IOS software is packaged in feature sets that support specific platforms. To get updated information regarding platform support for this feature, access Cisco Feature Navigator. Cisco Feature Navigator dynamically updates the list of supported platforms as new platform support is added for the feature.

Cisco Feature Navigator is a web-based tool that enables you to determine which Cisco IOS software images support a specific set of features and which features are supported in a specific Cisco IOS image. You can search by feature or release. Under the release section, you can compare releases side by side to display both the features unique to each software release and the features in common.

To access Cisco Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions at http://www.cisco.com/register.

Cisco Feature Navigator is updated regularly when major Cisco IOS software releases and technology releases occur. For the most current information, go to the Cisco Feature Navigator home page at the following URL:

http://www.cisco.com/go/fn

### Availability of Cisco IOS Software Images

Platform support for particular Cisco IOS software releases is dependent on the availability of the software images for those platforms. Software images for some platforms may be deferred, delayed, or changed without prior notice. For updated information about platform support and availability of software images for each Cisco IOS software release, refer to the online release notes or, if supported, Cisco Feature Navigator.

# Supported Standards, MIBs, and RFCs

### Standards

No new or modified standards are supported by this MIB.

### MIBs

- CISCO-BGP4-MIB.my

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at the following URL:

http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

### RFCs

- RFC-1657, *BGP-4 MIB*
- RFC-1771, *A Border Gateway Protocol 4 (BGP-4)*
- RFC-2547, *BGP/MPLS VPNs*
- RFC-2858, *Multiprotocol Extensions for BGP-4*

# Configuration Tasks

None

# Configuration Examples

None

# Command Reference

None

# Glossary

**AFI**—Address Family Identifier. Carries the identity of the network layer protocol that is associated with the network address.

**BGP**—Border Gateway Protocol. An interdomain routing protocol that exchanges reachability information with other BGP systems. It is defined by RFC 1163, *A Border Gateway Protocol (BGP)*. The current implementation of BGP is BGP Version 4 (BGP4). BGP4 is the predominant interdomain routing protocol that is used on the Internet. It supports CIDR and uses route aggregation mechanisms to reduce the size of routing tables.

**MBGP**—multiprotocol BGP. An enhanced version of BGP that carries routing information for multiple network layer protocols and IP multicast routes. It is defined in RFC 2858, *Multiprotocol Extensions for BGP-4*.

**MIB**—Management Information Base. A group of managed objects that are contained within a virtual information store or database. MIB objects are stored so that values can be assigned to object identifiers and to assist managed agents by defining which MIB objects should be implemented. The value of a MIB object can be changed or retrieved using SNMP or CMIP commands, usually through a GUI network management system. MIB objects are organized in a tree structure that includes public (standard) and private (proprietary) branches.

**NLRI**—Network Layer Reachability Information. Carries route attributes that describe a route and how to connect to a destination. This information is carried in BGP update messages. A BGP update message can carry one or more NLRI prefixes.

**RIB**— A Routing Information Base (RIB). A central repository of routes that contains Layer 3 reachability information and destination IP addresses or prefixes. The RIB is also known as the routing table.

**SNMP**—Simple Network Management Protocol. A network management protocol used almost exclusively in TCP/IP networks. SNMP provides a means to monitor and control network devices and to manage configurations, statistics collection, performance, and security.

**snmpwalk**—The **snmpwalk** command is a Simple Network Management Protocol (SNMP) application that is used to communicate with a network entity MIB using SNMP.

**SAFI**— Subsequent Address Family Identifier. Provides additional information about the type of the Network Layer Reachability Information that is carried in the attribute.

**VPN**—Virtual Private Network. Enables IP traffic to travel securely over a public TCP/IP network by encrypting all traffic from one network to another. A VPN uses a tunnel to encrypt all information at the IP level.