



BGP MIB Support Enhancements

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The BGP MIB Support Enhancements feature enhances or introduces the following capabilities for Simple Network Management (SNMP) monitoring of Border Gateway Protocol (BGP) using the CISCO-BGP4-MIB:

- BGP FSM Transition Change Support—Enhances support for notification of BGP Finite State Machine (FSM) transition changes.
- BGP Route Received Route Support—Introduces the capability to query for the total number of routes received by a BGP neighbor.
- BGP Prefix Threshold Notification Support—Introduces the capability to send notifications when the prefix limit for a BGP peer has been reached.
- VPNv4 Unicast Address Family Route Support—Enhances the cbgpRouteTable object to provide support for SNMP GET operations on VPNv4 unicast routes.

Feature History for the BGP MIB Support Enhancements Feature

Release	Modification
12.0(26)S	This feature was introduced.
12.3(7)T	This feature was integrated into Cisco IOS Release 12.3(7)T.
12.2(25)S	This feature was integrated into Cisco IOS Release 12.2(25)S.
12.2(27)SBC	This feature was implemented on the Cisco 7304.
12.2(33)SRA	This feature was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This feature was implemented on the following platforms: Cisco 7301, Cisco 7200 series, and Cisco 10000 series.

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Corporate Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

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Prerequisites for BGP MIB Support Enhancements

- SNMP must be enabled on the router before notifications (traps) can be configured or before SNMP GET operations can be performed.

Restrictions for BGP MIB Support Enhancements

- All enhancements that are introduced by this feature are supported only by the CISCO-BGP4-MIB.

Information About BGP MIB Support Enhancements

To configure the BGP MIB support enhancements, you should understand the following concepts:

- [BGP MIB Support Enhancements, page 2](#)
- [BGP FSM Transition Change Support, page 3](#)
- [BGP Route Received Route Support, page 3](#)
- [BGP Prefix Threshold Notification Support, page 3](#)
- [VPNv4 Unicast Address Family Route Support, page 4](#)
- [cbgpPeerTable Support, page 4](#)

BGP MIB Support Enhancements

The BGP MIB Support Enhancements feature introduces support in the CISCO-BGP4-MIB for new SNMP notifications. To enable BGP support for the enhancement described in this document, use the command in global configuration mode. The following sections describe the objects and notifications (traps) that have been enhanced by this feature:

- [BGP FSM Transition Change Support](#)—Enhances support for notification of BGP Finite State Machine (FSM) transition changes.
- [BGP Route Received Route Support](#)—Introduces the capability to query for the total number of routes received by a BGP neighbor.

- [BGP Prefix Threshold Notification Support](#)—Introduces the capability to send notifications when the prefix limit for a BGP peer has been reached.
- [VPNv4 Unicast Address Family Route Support](#)—Enhances the `cbgpRouteTable` object to provide support for SNMP GET operations on VPNv4 unicast routes.
- [cbgpPeerTable Support](#)—The `cbgpPeerTable` has been modified to support the enhancements in this feature.

BGP FSM Transition Change Support

The `cbgpRouteTable` was enhanced to support BGP Finite State Machine (FSM) transition state changes.

The `cbgpFsmStateChange` object was introduced to allow you to configure SNMP notifications (traps) for all FSM transition state changes. This notification contains the following MIB objects:

- `bgpPeerLastError`
- `bgpPeerState`
- `cbgpPeerLastErrorTxt`
- `cbgpPeerPrevState`

The `cbgpBackwardTransition` object has also been enhanced to support all BGP FSM transition state changes. This object is sent each time the FSM moves to either a higher or lower numbered state. This notification contains the following MIB objects:

- `bgpPeerLastError`
- `bgpPeerState`
- `cbgpPeerLastErrorTxt`
- `cbgpPeerPrevState`

The enhancement to the `snmp-server enable traps bgp` privileged EXEC command allows you to enable the newly introduced traps individually or together with the existing FSM backward transition and established state traps as defined in [RFC 1657](#).

BGP Route Received Route Support

The `cbgpRouteTable` object has been enhanced to support the total number of routes received by a BGP neighbor. The following new MIB object was introduced to support this enhancement:

- `cbgpPeerAddrFamilyPrefixTable`

Routes are indexed by the address-family identifier (AFI) or subaddress-family identifier (SAFI). The prefix information displayed in this table can also be viewed in the output of the `show ip bgp` command.

BGP Prefix Threshold Notification Support

The `cbgpPrefixMaxThresholdExceed` and `cbgpPrfefixMaxThresholdClear` objects were introduced to allow you to poll for the total number of routes received by a BGP peer.

The `cbgpPrefixMaxThresholdExceed` object was introduced to allow you to configure SNMP notifications to be sent when the prefix count for a BGP session has exceeded the configured value. This notification is configured on a per address family basis. The prefix threshold is configured with the `neighbor maximum-prefix` command. This notification contains the following MIB objects:

- *cbgpPeerPrefixAdminLimit*
- *cbgpPeerPrefixThreshold*

The *cbgpPrfefixMaxThresholdClear* object was introduced to allow you to configure SNMP notifications to be sent when the prefix count drops below the clear trap limit. This notification is configured on a per address family basis. This notification contains the following objects:

- *cbgpPeerPrefixAdminLimit*
- *cbgpPeerPrefixClearThreshold*

Notifications are sent when the prefix count drops below the clear trap limit for an address family under a BGP session after the *cbgpPrefixMaxThresholdExceed* notification is generated. The clear trap limit is calculated by subtracting 5 percent from the maximum prefix limit value configured with the **neighbor maximum-prefix** command. This notification will not be generated if the session goes down for any other reason after the *cbgpPrefixMaxThresholdExceed* is generated.

VPNv4 Unicast Address Family Route Support

The *cbgpRouteTable* object was enhanced to allow you to configure SNMP GET operations for VPNv4 unicast address-family routes.

The following MIB object was introduced to allow you to query for multiple BGP capabilities (for example, route refresh, multiprotocol BGP extensions, graceful restart, etc):

- *cbgpPeerCapsTable*

The following new MIB object was introduced to allow you to query for IPv4 and VPNv4 address family routes:

- *cbgpPeerAddrFamilyTable*

Each route is indexed by peer address, prefix, and prefix length. This object indexes BGP routes by the AFI and then by the SAFI. The AFI table is the primary index, and the SAFI table is the secondary index. Each BGP speaker maintains a local Routing Information Base (RIB) for each supported AFI and SAFI combination.

cbgpPeerTable Support

The *cbgpPeerTable* has been modified to support the enhancements described in this document. The following new table objects are supported in the CISCO-BGP-MIB.my:

- *cbgpPeerLastErrorTxt*
- *cbgpPeerPrevState*

The following table objects are not supported. The status of these objects is listed as deprecated. However, these objects are not operational:

- *cbgpPeerPrefixAccepted*
- *cbgpPeerPrefixDenied*
- *cbgpPeerPrefixLimit*
- *cbgpPeerPrefixAdvertised*
- *cbgpPeerPrefixSuppressed*
- *cbgpPeerPrefixWithdrawn*

How to Configure BGP MIB Support Enhancements

This section contains the following task:

- [Enabling BGP MIB Support on a Router, page 5](#)

Enabling BGP MIB Support on a Router

Perform this task to configure BGP support for SNMP notifications on the router. After BGP SNMP support is enabled, GET operations are performed from an external management station only.

SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `snmp-server enable traps bgp [state-changes [all] [backward-trans] [limited]] | [threshold prefix]`
4. `exit`

DETAILED STEPS

	Command or Action	Purpose
Step 1	<code>enable</code> Example: Router> <code>enable</code>	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	<code>configure terminal</code> Example: Router# <code>configure terminal</code>	Enters global configuration mode.

	Command or Action	Purpose
Step 3	<pre>snmp-server enable traps bgp [state-changes [all] [backward-trans] [limited]] [threshold prefix]</pre> <p>Example: Router# snmp-server enable traps bgp</p>	<p>Enables BGP support for SNMP operations. Entering this command with no keywords or arguments enables support for all BGP events.</p> <ul style="list-style-type: none"> The state-changes keyword is used to enable support for FSM transition events. The all keyword enables support for FSM transitions events. The backward-trans keyword enables support only for backward transition state change events. The limited keyword enables support for backward transition state changes and established state events. The threshold and prefix keywords are used to enable notifications when the configured maximum prefix limit is reached on the specified peer.
Step 4	<pre>exit</pre> <p>Example: Router(config)# exit</p>	<p>Exits global configuration mode, and enters privileged EXEC mode.</p>

Configuration Examples for BGP MIB Support Enhancements

The following examples show how to configure and verify the BGP MIB Support Enhancements feature:

- [Configuring BGP MIB Support Enhancements: Example, page 6](#)
- [Verifying BGP MIB Support Enhancements: Example, page 6](#)

Configuring BGP MIB Support Enhancements: Example

The following example enables SNMP support for all BGP FSM transition events:

```
Router(config)# snmp-server enable traps bgp state-changes all
```

Verifying BGP MIB Support Enhancements: Example

The following verification example uses the running-config file to show that the configured SNMP support for BGP is enabled:

```
Router# show run | include snmp-server
snmp-server enable traps bgp
```

Where to Go Next

For more information about SNMP and SNMP operations, refer to the “[Configuring SNMP Support](#)” section of the *Cisco IOS Configuration Fundamentals and Network Management Configuration Guide*, Release 12.3.

Additional References

The following sections provide references related to BGP MIB Support Enhancements.

Related Documents

Related Topic	Document Title
BGP commands	Cisco IOS IP Routing: BGP Command Reference , Release 12.4 Cisco IOS IP Routing: BGP Command Reference , Release 12.2SB
BGP configuration tasks	Cisco IOS IP Configuration Guide , Release 12.3

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIBs	MIBs Link
<ul style="list-style-type: none"> CISCO-BGP4-MIB 	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFCs	Title
RFC 1657	Definitions of Managed Objects for the Fourth Version of the Border Gateway Protocol (BGP-4) using SMIPv2
RFC 1771	A Border Gateway Protocol 4 (BGP-4)
RFC 2547	BGP/MPLS VPNs
RFC 2842	Capabilities Advertisement with BGP-4

RFCs	Title
RFC 2858	<i>Multiprotocol Extensions for BGP-4</i>
RFC 2918	<i>Route Refresh Capability for BGP-4</i>

Technical Assistance

Description	Link
Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/public/support/tac/home.shtml

Command Reference

This section documents a modified command.

- [snmp-server enable traps bgp](#)

snmp-server enable traps bgp

To enable Border Gateway Protocol (BGP) support for Simple Network Management Protocol (SNMP) operations on a router, use the **snmp-server enable traps bgp** command in global configuration mode. To disable BGP support for SNMP operations, use the **no** form of this command.

```
snmp-server enable traps bgp [state-changes [all] [backward-trans] [limited]] | [threshold prefix]
```

```
no snmp-server enable traps bgp [state-changes [all] [backward-trans] [limited]] | [threshold prefix]
```

Syntax Description

state-changes	(Optional) Enables traps for finite state machine (FSM) state changes.
all	(Optional) Enables Cisco specific traps for all FSM state changes
backward-trans	(Optional) Enables Cisco specific traps for backward transition events.
limited	(Optional) Enables traps for standard backward transition and established events.
threshold prefix	(Optional) Enables Cisco-specific trap for prefix threshold events.

Command Default

SNMP notifications are disabled by default.

Command Modes

Global configuration

Command History

Release	Modification
12.1(3)T	This command was introduced for the Cisco AS5300 and Cisco AS5800.
12.0(26)S	The following keywords were added in Cisco IOS Release 12.0(26)S: state-changes , all , backward-trans , limited , and threshold prefix .
12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(27)SBC	This command was implemented on the Cisco 7304.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	This command was implemented on the following platforms: Cisco 7301, Cisco 7200 series, and Cisco 10000 series.

Usage Guidelines

SNMP notifications can be sent as traps or inform requests and this command enables both notification types. If this command is entered with no keywords specified, support for all configurable options is enabled.

Using this command you can enable or disable BGP server state change notifications for the BGP4-MIB (enterprise 1.3.6.1.2.1.15.7). The notifications types are:

- *bgpEstablished*
- *bgpBackwardsTransition*

For a complete description of BGP notifications and additional MIB functions, see the BGP4-MIB.my file, available through the Cisco FTP site at <ftp://www.cisco.com/public/mibs/v2/>.



Note

You may notice incorrect BGP trap object ID (OID) output when using the SNMP version 1 BGP4-MIB that is available for download at <ftp://ftp.cisco.com/pub/mibs/v1/BGP4-MIB-V1SML.my>. When a router sends out BGP traps (notifications) about state changes on an SNMP version 1 monitored BGP peer, the enterprise OID is incorrectly displayed as .1.3.6.1.2.1.15 (bgp) instead of .1.3.6.1.2.1.15.7 (bgpTraps). This problem occurs because the BGP4-MIB does not follow RFC 1908 rules for version 1 and version 2 trap compliance. The problem is not due to an error in Cisco IOS software. This MIB is controlled by IANA under the guidance of the IETF, and work is currently in progress by the IETF to replace this MIB with a new version that represents the current state of the BGP protocol. In the meantime, we recommend that you use the SNMP version 2 BGP4-MIB or the CISCO-BGP4-MIB to avoid an incorrect trap OID.

The **snmp-server enable traps bgp** command also can be enabled to control BGP server state change notifications for the CISCO-BGP4-MIB. This MIB contains support the following SNMP operations:

- Notification for all BGP FSM transition changes.
- Notifications to query for total number of routes received by a BGP peer.
- Notifications for the maximum prefix-limit threshold on a BGP peer.
- GET operations for VPNv4 unicast routes.

For a complete description of BGP notifications and additional MIB functions, see the CISCO-BGP4-MIB.my file, available through the Cisco FTP site at <ftp://www.cisco.com/public/mibs/v2/>.

The **snmp-server enable traps bgp** command is used in conjunction with the **snmp-server host** command. Use the **snmp-server host** command to specify which host or hosts receive SNMP notifications. To send SNMP notifications, you must configure at least one **snmp-server host** command.

Examples

The following example shows how to enable the router to send BGP state change informs to the host at the address myhost.cisco.com using the community string defined as public:

```
Router(config)# snmp-server enable traps bgp
Router(config)# snmp-server host myhost.cisco.com informs version 2c public
```

Related Commands

Command	Description
snmp-server host	Specifies the recipient of an SNMP notification operation.
snmp-server trap-source	Specifies the interface from which an SNMP trap should originate.

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■ snmp-server enable traps bgp