



## Labeled BGP Support

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This feature module describes how to add label mapping information to the Border Gateway Protocol (BGP) message that is used to distribute the route on the router.

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## Restrictions for Labeled BGP Support

- The router supports only the client functionality of RFC 3107 and not its area border router (ABR) functionality.
- The router does not support two label-pop (Label pop is the process of removing label header).

## Overview of Labeled BGP Support

The Labeled BGP Support feature provides the option to use the BGP update message (that is used to distribute the route) to re-distribute Multiprotocol Label Switching (MPLS) label mapped to that route. The label mapping information is added (using send-label option of RFC 3107) to the same BGP message that is used to distribute the route. This process is useful in inter-domain routing, and the message that is used to distribute the route. This process is useful in inter-domain routing, and the router supports this functionality as well as the virtual private network (VPN) and virtual routing and forwarding (VRF) over Labeled BGP functionality.

### **VPN/VRF over RFC 3107**

The VPN/VRF over Labeled BGP is a 3-label imposition process (VRF Label, BGP label, interior gateway protocols [IGP] label). The innermost label is VRF, followed by BGP (for RFC 3107), and IGP. This functionality allows the router to support a VRF over labeled BGP session with an ABR.

# Configuring Labeled BGP Support

## Procedure

	Command or Action	Purpose
<b>Step 1</b>	enable <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"><li>• Enter your password if prompted.</li></ul>
<b>Step 2</b>	configure terminal <b>Example:</b> Router# configure terminal	Enters global configuration mode.
<b>Step 3</b>	router bgp <i>as-number</i> <b>Example:</b> Router(config)# router bgp 100	Enters router configuration mode. <ul style="list-style-type: none"><li>• <i>as-number</i>—Number of an autonomous system that identifies the router to other BGP routers and tags the routing information that is passed along. The valid values range from 1 to 65535.</li></ul>
<b>Step 4</b>	address family ipv4 <b>Example:</b> Router(config-router)# address family ipv4	Configures the address family as IPv4 using standard IPv4 address prefixes.
<b>Step 5</b>	neighbor peer-group-name send-community <b>Example:</b> Router(config-router)# neighbor 172.16.70.23 send-community	Specifies that the communities attribute be sent to the neighbor at this IP address. <ul style="list-style-type: none"><li>• <i>peer-group-name</i>—Name of a BGP peer group.</li></ul>
<b>Step 6</b>	neighbor peer-group-name next-hop-self <b>Example:</b> Router(config-router)# neighbor 172.16.70.23 next-hop-self	Configures the router as the next hop for a BGP-speaking neighbor or peer group.
<b>Step 7</b>	neighbor peer-group-name activate <b>Example:</b> Router(config-router)# neighbor 172.16.70.23 activate	Enables the exchange of information with a neighboring BGP router.

## Configuration Example for Labeled BGP Support

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The following is a sample configuration of the Labeled BGP Support feature.

```
!  
router bgp 1000  
  bgp router-id 100.111.13.23  
  neighbor pan peer-group  
  neighbor pan remote-as 1000  
  neighbor pan update-source Loopback0  
  neighbor 100.111.14.3 peer-group pan  
!  
address-family ipv4  
  neighbor pan send-community  
  neighbor pan next-hop-self  
  neighbor pan send-label  
!  
!The send-label option is used to associate a BGP label to the prefix.  
  neighbor 100.111.14.3 activate  
exit-address-family  
!  
address-family vpnv4  
  neighbor pan send-community extended  
  neighbor 100.111.14.3 activate  
exit-address-family  
!  
address-family ipv4 vrf LTE12  
  redistribute connected  
exit-address-family  
!
```

## Verifying Labeled BGP Support

To verify the Labeled BGP Support, use the **show** commands given below:

```
Router# show bgp ipv4 unicast labels
```

Network	Next Hop	In label/Out label
1.0.0.0	0.0.0.0	imp-null/nolabel

```

10.13.22.2/31 0.0.0.0 imp-null/nolabel
10.13.23.0/31 0.0.0.0 imp-null/nolabel
10.70.1.0/30 0.0.0.0 imp-null/nolabel
100.100.10.1/32 100.111.14.4 nolabel/558
                  100.111.14.3 nolabel/560
100.100.13.23/32 0.0.0.0 imp-null/nolabel
100.101.13.23/32 0.0.0.0 imp-null/nolabel
100.111.13.23/32 0.0.0.0 imp-null/nolabel
100.111.13.26/32 100.111.14.3 nolabel/534
                  100.111.14.4 nolabel/68
100.111.15.1/32 100.111.14.3 nolabel/25

```

```
Router# show ip bgp labels
```

```

Network      Next Hop      In label/Out label
1.0.0.0      0.0.0.0      imp-null/nolabel
10.13.22.2/31 0.0.0.0      imp-null/nolabel
10.13.23.0/31 0.0.0.0      imp-null/nolabel
10.70.1.0/30 0.0.0.0      imp-null/nolabel
100.100.10.1/32 100.111.14.4 nolabel/563
                  100.111.14.3 nolabel/556
100.100.13.23/32 0.0.0.0      imp-null/nolabel
100.101.13.23/32 0.0.0.0      imp-null/nolabel
100.111.13.23/32 0.0.0.0      imp-null/nolabel
100.111.13.26/32 100.111.14.4 nolabel/561
                  100.111.14.3 nolabel/559
100.111.15.1/32 100.111.14.4 nolabel/59
                  100.111.14.3 nolabel/57
100.111.15.2/32 100.111.14.4 nolabel/62
                  100.111.14.3 nolabel/52
100.112.1.1/32 100.111.14.4 nolabel/nolabel
                  100.111.14.3 nolabel/nolabel
100.112.1.2/32 100.111.14.4 nolabel/nolabel
                  100.111.14.3 nolabel/nolabel

```

```

100.112.1.3/32 100.111.14.4 nolabel/nolabel
                100.111.14.3 nolabel/nolabel

```

```
Router# show ip bgp vpnv4 all label
```

```

Network          Next Hop      In label/Out label
Route Distinguisher: 236:236

154.154.236.4/30 100.154.1.1  nolabel/14002
                  100.154.1.1  nolabel/14002
154.154.236.8/30 100.154.1.1  nolabel/14002
                  100.154.1.1  nolabel/14002
154.154.236.12/30
                  100.154.1.1  nolabel/14002
                  100.154.1.1  nolabel/14002
154.154.236.16/30
                  100.154.1.1  nolabel/14002
                  100.154.1.1  nolabel/14002
154.154.236.20/30
                  100.154.1.1  nolabel/14002
                  100.154.1.1  nolabel/14002
154.154.236.24/30
                  100.154.1.1  nolabel/14002
                  100.154.1.1  nolabel/14002

```

```
Router# show ip vrf interface
```

```

Interface          IP-Address      VRF              Protocol
Vl100              113.23.12.1    LTE12

```

```
Router# show ip bgp vpnv4 vrf LTE12 label
```

```

Network          Next Hop      In label/Out label
Route Distinguisher: 6666:6666 (LTE12)

113.22.12.0/24  100.111.13.22 nolabel/51
                  100.111.13.22 nolabel/51
113.23.12.0/24  0.0.0.0       50/nolabel (LTE12)
113.24.12.0/24  100.111.13.24 nolabel/32
                  100.111.13.24 nolabel/32

```

```

115.1.12.0/24    100.111.15.1    nolabel/16024
                 100.111.15.1    nolabel/16024
154.154.236.4/30 100.154.1.1     nolabel/14002
154.154.236.8/30 100.154.1.1     nolabel/14002
154.154.236.12/30
                 100.154.1.1     nolabel/14002
154.154.236.16/30
                 100.154.1.1     nolabel/14002
154.154.236.20/30
                 100.154.1.1     nolabel/14002
154.154.236.24/30
                 100.154.1.1     nolabel/14002

```

To verify three Label Support, use the **show ip cef vrf** command as shown in the following example.

```

Router# show ip cef vrf LTE12 113.22.12.0 internal

113.22.12.0/24, epoch 0, flags rib defined all labels, RIB[B], refcount 5, per-destination
sharing

sources: RIB

feature space:

IPRM: 0x00018000

LFD: 113.22.12.0/24  0 local labels

    contains path extension list

ifnums: (none)

path 13E8A064, path list 13F49DC8, share 1/1, type recursive, for IPv4, flags
must-be-labelled, recursive-via-host

    MPLS short path extensions: MOI flags = 0x0 label 51

recursive via 100.111.13.22[IPv4:Default] label 51, fib 141253D8, 1 terminal fib,
v4:Default:100.111.13.22/32

path 12520C8C, path list 13F49C38, share 1/1, type attached nexthop, for IPv4

    MPLS short path extensions: MOI flags = 0x0 label 17

    nexthop 100.111.14.4 Vlan10 label 17, adjacency IP adj out of Vlan10, addr 10.13.23.1
13734C80

output chain: label 22 label 51 label 17 TAG adj out of Vlan10, addr 10.13.23.1 143EDCA0

!You can see three labels in the output chain; of which 22 is VRF label, 51 is BGP label
!and 17 is LDP label

```

# Additional References

## Related Documents

Related Topic	Document Title
Cisco IOS XE Command Reference	<a href="#">Cisco IOS IP Routing: BGP Command Reference</a>

## Standards and RFCs

Standard/RFC	Title
RFC-3107	Carrying Label Information in BGP-4

## MIBs

MB	MIBs Link
NA	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:  <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

## Technical Assistance

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	<a href="http://www.cisco.com/support">http://www.cisco.com/support</a>

