



## 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

## SUMMARY STEPS

1. enable
2. configure terminal
3. router bgp *as-number*
4. address family ipv4
5. neighbor peer-group-name send-community
6. neighbor peer-group-name next-hop-self
7. neighbor peer-group-name activate

## DETAILED STEPS

	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.

	Command or Action	Purpose
<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
```

