Configuring BGP Large Community

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Restrictions for the BGP Large Community

When large communities are specified in commands, they are specified as three non-negative decimal integers separated by colons. For example as 1:2:3. Each integer is stored in 32 bits. The possible range for each integer is four octet decimal which can be from 0 to 4294967295.

Information About the BGP Large Community Feature

The BGP large communities attribute provides the capability for tagging routes and modifying BGP routing policy on routers. BGP large communities can be appended or removed selectively on the large community attribute as the route travels from router to router. The BGP large communities are similar attributes to BGP communities, but with a twelve octet size. However, there are no well-known large communities as in communities. The BGP large communities are also split logically into a 4 octet Global Administrator field and a 8 octet Local Administrator field. A 4 octet Autonomous System can fit into the Global Administrator field.

For more information on BGP large community, see the rfc8092 document.

Large Community Lists

A BGP large community list is used to create groups of large communities which can be used in a match clause of a route map. You can use the large communities to control the routing policy. Routing policy allows you to filter the routes you receive or advertise, or modify the attributes of the routes you receive or advertise. You can also use a large community list to set or delete the large communities selectively.

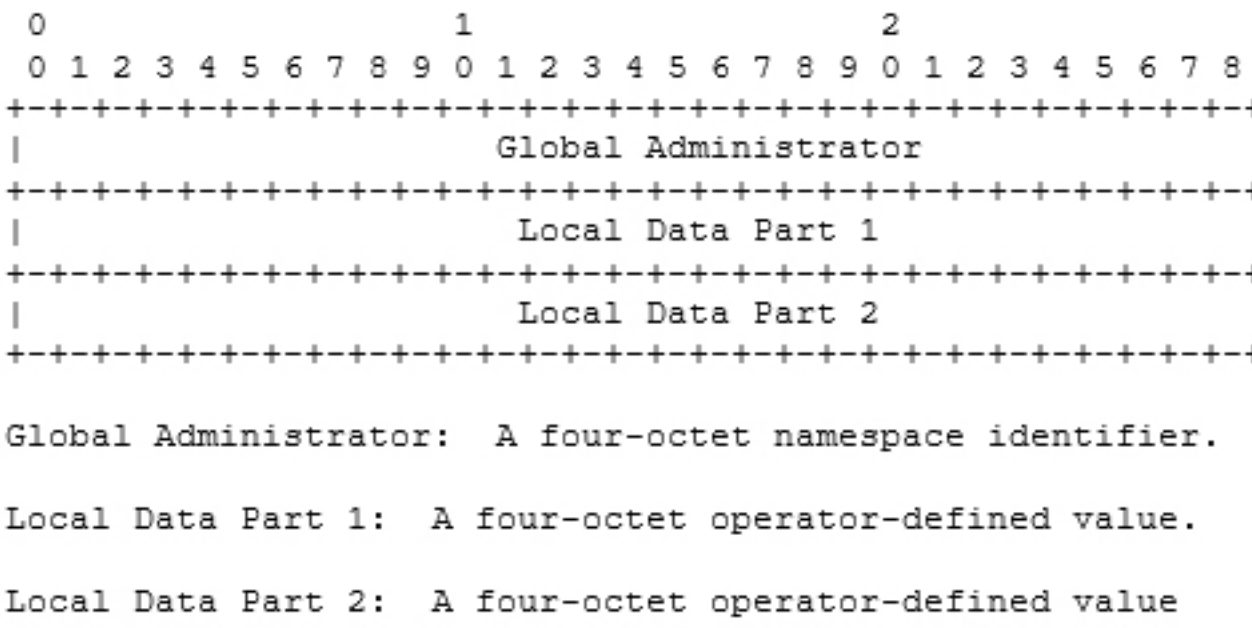
- Standard large community lists are used to specify large communities.
- Expanded large community lists are used to specify large communities using a regular expression.

A large community list can be either named or numbered and standard or expanded. All the rules of numbered large community lists apply to named large community lists, except that there is no limit on the number of named community lists that can be configured.

Note A maximum of 100 numbered standard large community lists and 100 numbered expanded large community lists can be configured. A named large community list does not have this limitation.

BGP Large Community Attribute

In a BGP large community, the community value is encoded as a 12 octet number. The following image displays the syntax of the large community attribute.



How to Configure BGP Large Community

The following sections provide configuration information about BGP large community.

Enabling BGP Large Community

To enable the large-communities, perform the following steps.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 2	**router bgp** *autonomous-system-number* **Example:** `Device(config)# router bgp 64496`	Enables BGP and assigns the AS number to the local BGP speaker. The AS number can be a 16-bit integer or a 32-bit integer in the form of a higher 16-bit decimal number and a lower 16-bit decimal number.
Step 3	**neighbor** *IP address* **remote-as** *autonomous-system-number* **Example:** `Device(config-router)# neighbor 209.165.201.1 remote-as 100`	Enters global address family configuration mode. This command triggers an automatic notification and session reset for all BGP neighbors.
Step 4	**address-family** { **ipv4 | ipv6 | l2vpn | nsap** {**unicast |multicast** }} **Example:** `Device(config-router-neighbor)# address-family ipv4 multicast`	Enters global address family configuration mode. This command triggers an automatic notification and session reset for all BGP neighbors. **Note** It also supports other available address families.
Step 5	**neighbor** *IP address* **activate** **Example:** `Device(config-router)# neighbor 209.165.201.1 activate`	Enters global address family configuration mode and activates the BGP neighbor.
Step 6	**neighbor** *IP address* **send-community** {**both | extended | standard**} **Example:** `Device(config-router-neighbor-af)# neighbor 209.165.201.1 send-community standard`	Configures the router to send the large-community attribute to the neighbor 209.165.201.1. • Both—Sends both the extended large community and standard large community attributes to the neighbor. • Extended—Sends the extended community attribute to the neighbor.

	Command or Action	Purpose
		• Standard—Sends large community and also (regular) community attribute to the neighbor.
Step 7	**exit** **Example:** `Device(config-router)# exit` `Device(config-router)# exit`	Exits address-family mode and router configuration mode and enters global configuration mode.
Step 8	**end** **Example:** `Device(config)# end`	Exits configuration mode and enters privileged EXEC mode.

Configuring Route-map with Large Community Lists and Matching a Large Community

To match a BGP large community, perform the following steps.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 2	**route-map** *map-tag* **[permit | deny]** *[sequence number]* **Example:** `Device(config)# route-map test permit 10`	Enters the route-map configuration mode and defines the conditions for routes from one routing protocol into another.
Step 3	**match large-community** {*name* | *numbered* } **Example:** `Device(config-route-map)# match large-community 1`	Matches a large-community list. Defines the rules for an entry in the large-community lists and ensures that all the large communties match the large communities in the routes.
Step 4	**exit** **Example:** `Device(config-router)# exit`	Exits router configuration mode and enters global configuration mode.

	Command or Action	Purpose
Step 5	**route-map** *map-tag* **[permit | deny]** *[sequence number]* **Example:** `Device(config)# route-map test permit 10`	Enters the route-map configuration mode and defines the conditions for routes from one routing protocol into another.
Step 6	**match large-community** {*name* | *numbered* } **exact match** **Example:** `Device(config-route-map)# match large-community 1 exact-match`	Matches a large-community list. Defines the rules for an entry in the large-community lists and ensures that all the large communties match the large communities in the routes. The key word exact-match indicates that an exact match is required to match a BGP large community.
Step 7	**end** **Example:** `Device(config-route-map)# end`	Exits route map configuration mode and enters privileged EXEC mode.

Defining BGP Large Community List

To define the BGP large community list, perform the following steps. BGP large community supports named and numbered community lists.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables higher privilege levels, such as privileged EXEC mode. Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**ip large-community-list** {*standard-list-number* | **standard** *standard-list-name* } {**deny | permit**} *community-number large-community* **Example:** **Numbered Large-community List** `ip large-community-list 1 permit 1:2:3 5:6:7`	Defining the large community based on the standard list number. If you attempt to configure more than 6 communities, the trailing communities that exceed the limit are not processed or saved to the running configuration file.

	Command or Action	Purpose

	`ip large-community-list 1 permit 4123456789:4123456780:4123456788`
	Named Large-community List
	`ip large-community-list standard LG_ST permit 1:2:3 5:6:7`
	`ip large-community-list standard LG_ST permit 4123456789:4123456780:4123456788`	

Step 4	**ip large-community-list** {*expanded-list number* | **expanded** *expanded-list-name*} {**deny** | **permit**} *regexp*
	Example:
	Numbered Extended Large-community List
	`ip large-community-list 100 permit ^5:.*:7$`
	`ip large-community-list 100 permit ^5:.*:8$`
	Named Extended Large-community List
	`ip large-community-list expanded LG_EX permit ^5:.*:7$`
	`ip large-community-list expanded LG_EX permit ^5:.*:8$`
		Defines the large communities based on regular expression and matches according to Cisco's regular expression implementation.

Step 5	**exit** **Example:** `Device(config-router)# exit`	Exits router configuration mode and enters global configuration mode.
Step 6	**end** **Example:** `Device(config)# end`	Exits route map configuration mode and enters privileged EXEC mode.

Configuring the Route-Map to Set BGP Large Communities

To set the large-communities, perform the following steps.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 2	**route-map** *map-tag* **[permit | deny]** *[sequence number]* **Example:** `Device(config)# route-map foo permit 10`	Enters the route-map configuration mode and specifies a set of large communities to a route.
Step 3	**set large-community** {**none** | {**xx:yy:zz** }} **Example:** `Device(config-route-map)# set large-community 1:2:3 5:6:7`	A route-map set statement is used to set large communities in a route. It can specify a set of large communities to a route.
Step 4	**exit** **Example:** `Device(config-router)# exit`	Exits router configuration mode and enters global configuration mode.
Step 5	**route-map** *map-tag* **[permit | deny]** *[sequence number]* **Example:** `Device(config)# route-map foo permit 10`	Enters the route-map configuration mode and specifies a set of large communities to a route.
Step 6	**set large-community** {**none** | {**xx:yy:zz** | **additive** }} **Example:** `Device(config-route-map)# set large-community 1:2:3 5:6:7 additive`	A route-map set statement is used to set large communities in a route. It can specify a set of large communities to a route. Also, the keyword additive adds the large communities without removing the existing large communities.
Step 7	**end** **Example:** `Device(config-route-map)# end`	Exits route map configuration mode and enters privileged EXEC mode.

Deleting Large Communities

To delete BGP large communities, perform the following steps.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:**	Enters global configuration mode.

	Command or Action	Purpose
	`Device# configure terminal`	
Step 2	**route-map** *map-tag* **[permit | deny]** *[sequence number]* **Example:** `Device(config)# route-map test permit 10`	Enters the route-map configuration mode and defines the conditions for redistributing routes from one routing protocol into another.

Step 3	**set large-comm-list** *community-list-name* **delete**
	Example:
	`Device(config-route-map)# set large-comm-list 1 delete`
	`Device(config-route-map)#`
		Deletes the large-communities based on large-community-list matches.

Step 4	**exit** **Example:** `Device(config-router)# exit`	Exits router configuration mode and enters global configuration mode.
Step 5	**end** **Example:** `Device(config-route-map)# end`	Exits route map configuration mode and enters privileged EXEC mode.

Verifying the Configuration of the BGP Large Community

To verify the BGP large community, use the following command. This example shows a list of routes that contain all of the large communities that are given in the command. The listed routes may contain additional large communities.

```
Device# show bgp large-community 1:2:3 5:6:7
BGP table version is 17, local router ID is 1.1.1.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
              x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

     Network          Next Hop            Metric LocPrf Weight Path
 *>i 5.5.5.5/32       1.1.1.2                  0    100      0 ?
 *>i 5.5.5.6/32       1.1.1.2                  0    100      0 ?
```

This example displays the listed routes that contain only the given large communities when you add the keyword exact-match in configuration.

```
Device#show bgp large-community 1:2:3 5:6:7 exact-match
BGP table version is 17, local router ID is 1.1.1.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
```

```
              r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
              x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

     Network          Next Hop            Metric LocPrf Weight Path
 *>i 5.5.5.5/32       1.1.1.2                  0    100      0 ?
```

In these examples, the routes 5.5.5.5/32 and 5.5.5.6/32 contain both the large communities 1:2:3 and 5:6:7. The route 5.5.5.6/32 contains some additional large communities.

This example displays a large-community list.

```
Device#show ip largecommunity-list 20
Large Community standard list 20
     permit 1:1:2
```

```
Device#show bgp large-community-list 20
Large Community standard list 20
     permit 1:1:2
```

Troubleshooting Large Communities

To debug the large communities, use **debug ip bgp update** command.

```
Device#debug ip bgp update

*Mar 10 23:25:01.194: BGP(0): 192.0.0.1 rcvd UPDATE w/ attr: nexthop 192.0.0.1, origin ?,
metric 0, merged path 1, AS_PATH , community 0:44 1:1 2:3, large-community 3:1:244 3:1:245
*Mar 10 23:25:01.194: BGP(0): 192.0.0.1 rcvd 5.5.5.1/32
*Mar 10 23:25:01.194: BGP(0): Revise route installing 1 of 1 routes for 5.5.5.1/32 ->
192.0.0.1(global) to main IP table
```

Memory Display

The **show ip bgp summary** command displays large-community memory information.

```
Device #show ip bgp summary
BGP router identifier 1.1.1.1, local AS number 1
BGP table version is 3, main routing table version 3
2 network entries using 496 bytes of memory
2 path entries using 272 bytes of memory
1/1 BGP path/bestpath attribute entries using 288 bytes of memory
1 BGP community entries using 40 bytes of memory
2 BGP large-community entries using 96 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
BGP using 1096 total bytes of memory
BGP activity 3/1 prefixes, 3/1 paths, scan interval 60 secs
2 networks peaked at 13:04:52 Mar 11 2020 EST (00:07:25.579 ago)

Neighbor        V           AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
192.0.0.2       4            2    1245    1245        3    0    0 18:47:56        0
```

Configuration Example for BGP Large Community

The following example shows how to configure route-maps using large-communities.

A route-map set statement is used to set the large communities in a route. It can specify a set of large communities to a route.

The *additive* keyword adds the large communities without removing the existing large communities (for standard large community-lists only).

Setting Large Communities

This example shows how to set large communities.

```
route-map foo permit 10
 set large-community 1:2:3 5:6:7

route-map foo2 permit 10
 set large-community 1:2:3 5:6:7 additive
```

Matching Large Communities

This example shows how to match large communities.

```
route-map foo permit 10
 match large-community 1

route-map foo2 permit 10
 match large-community 1 exact-match
```

Deleting Large Communities

This example shows how to delete a large community.

```
route-map foo
 set large-comm-list 1 delete
```

Numbered Standard Large Community List

This example shows how to configure a numbered large community list.

```
ip large-community-list 1 permit 1:2:3 5:6:7
ip large-community-list 1 permit 4123456789:4123456780:4123456788
```

Named Standard Large Community List

This example shows how to configure a named standard large community list.

```
ip large-community-list standard LG_ST permit 1:2:3 5:6:7
ip large-community-list standard LG_ST permit 4123456789:4123456780:4123456788
```

Numbered Expanded Large Community List

This example shows how to configure a numbered expanded large community list.

```
ip large-community-list 100 permit ^5:.*:7$
ip large-community-list 100 permit ^5:.*:8$
```

Named Expanded Large Community List

This example shows how to configure a named expanded large community list.

```
ip large-community-list expanded LG_EX permit ^5:.*:7$
ip large-community-list expanded LG_EX permit ^5:.*:8$
```

Feature History for BGP Large Community

This table provides release and related information for the features explained in this module.

These features are available on all the releases subsequent to the one they were introduced in, unless noted otherwise.

Release	Feature	Feature Information
Cisco IOS XE Bengaluru 17.4.1	BGP Large Community	The BGP large communities attribute provides the capability for tagging routes and modifying BGP routing policy on routers. They are similar attributes to BGP communities, but with a twelve octet size.
Cisco IOS XE Cupertino 17.7.1	BGP Large Community	This feature was implemented on the Cisco Catalyst 9600 Series Supervisor 2 Module (C9600X-SUP-2).

Use the Cisco Feature Navigator to find information about platform and software image support. To access Cisco Feature Navigator, go to https://cfnng.cisco.com/.