Configuring BGP EVPN Filtering

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- Configuring BGP EVPN Filtering, on page 2
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About BGP EVPN Filtering

This feature describes the requirements for route filtering and attributes handling, arising from the implementation of BGP NLRIs of address family L2VPN EVPN.

EVPN routes are quite different from regular IPv4 and IPv6 routes in NLRI format. They contain many fields and carry attributes specific to EVPN. Using route maps, we can filter routes on the basis of these attributes. The following route-filtering options are available for the routes belonging to the EVPN address family:

- Matching based on the EVPN route type: Six types of NLRIs are available in EVPN. Matching is based on the type specified in the route-map match statement.
- Matching based on the IP address in the NLRI: This option can be used to filter based on IP address information in type-2 and type-5 NLRIs.
- Matching based on the MAC address in the NLRI: This option is similar to matching based on the IP address embedded in the NLRI. EVPN type-2 routes contain a MAC address along with an IP address. This option can be used to filter such routes.
- Matching based on the RMAC extended community: EVPN type-2 and type-5 routes carry the router MAC (RMAC) extended community, which carries a MAC address. The RMAC is advertised as part of the update message to the neighbor along with other extended community information. It specifies the MAC address of the remote next hop of a route. This option allows matching against this RMAC extended community.
- Setting the RMAC extended community: This option allows you to change the RMAC extended community value of an EVPN NLRI.
- Setting the EVPN next-hop IP address: This option sets the next-hop IP address of the EVPN route once the match condition has been met. Setting the next-hop IP address for EVPN routes should be accompanied by setting the RMAC extended community to ensure correctness in forwarding.

- Setting the gateway IP address for route type-5: The gateway IP address encodes an overlay IP index for the IP prefixes that form the type-5 EVPN routes. It gets advertised as part of the EVPN NLRI in the update message. The default value is 0.0.0.0. When it's set to any other value, the next hop on the route in the VRF context changes to the gateway IP address specified.
- Using table maps: You can configure table maps to filter MAC routes downloaded to the Layer 2 Routing Information Base (L2RIB).

The rest of this chapter provides information on configuring and applying these options.

Guidelines and Limitations for BGP EVPN Filtering

The following are the guidelines and limitations for BGP EVPN filtering:

Cisco Nexus 9000 Series switches support BGP EVPN filtering.

The following match and set options are available for filtering an EVPN address family of routes:

- Matching based on the route type
- Matching based on the MAC address in the NLRI
- Matching based on the RMAC extended community
- Setting the RMAC extended community
- Setting the EVPN next-hop IP address—If more than one next-hop IP address is configured, only the first one is used and processed if using for EVPN. IPv4 and IPv6 can be used as next-hop addresses.
- Setting the gateway IP address for a route type-5—You can set an IPv4 gateway IP address using the **route-map** command.
- Using table maps—A table map for filtering MAC routes is downloaded to the Layer 2 Routing Information Base (L2RIB).

Configuring BGP EVPN Filtering

To perform route filtering for the EVPN address-family routes, you can perform the following tasks:

- Configuring the Route Map with Match and Set Clauses, on page 2
- Applying the Route Map at the Inbound or Outbound Level, on page 7

To configure the table map, you can perform the following tasks:

- Configuring a MAC List and a Route Map that Matches the MAC List, on page 16
- Applying the Table Map, on page 17

Configuring the Route Map with Match and Set Clauses

You can use the existing route-map configuration along with the match and set clauses to decide the kind of filtering that you need.

• Matching Based on EVPN Route Type, on page 3
• Matching Based on MAC Address in the NLRI, on page 3
• Matching Based on RMAC Extended Community, on page 4
• Setting the RMAC Extended Community, on page 5
• Setting the EVPN Next-Hop IP Address, on page 5
• Setting the Gateway IP Address for Route Type-5, on page 6

Matching Based on EVPN Route Type

SUMMARY STEPS

1. **configure terminal**
2. **route-map** *route-map-name*
3. **match evpn route-type {1 | 2 | 2-mac-ip | 2-mac-only | 3 | 4 | 5 | 6}**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal`	Enter global configuration mode.
Step 2	**route-map** *route-map-name* **Example:** `switch(config)# route-map ROUTE_MAP_1`	Create a route map.
Step 3	**match evpn route-type {1 | 2 | 2-mac-ip | 2-mac-only | 3 | 4 | 5 | 6}** **Example:** `switch(config-route-map)# match evpn route-type 6`	Match BGP EVPN routes.

Matching Based on MAC Address in the NLRI

SUMMARY STEPS

1. **configure terminal**
2. **mac-list** *list-name* **[seq** *seq-number***] {deny | permit}** *mac-address* **[mac-mask]**
3. **route-map** *route-map-name*
4. **match mac-list** *mac-list-name*

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal`	Enter global configuration mode.
Step 2	**mac-list** *list-name* **[seq** *seq-number***] {deny | permit}** *mac-address* **[mac-mask]** **Example:** `switch(config)# mac-list MAC_LIST_1 permit E:E:E`	Build a MAC list.
Step 3	**route-map** *route-map-name* **Example:** `switch(config)# route-map ROUTE_MAP_1`	Create a route map.
Step 4	**match mac-list** *mac-list-name* **Example:** `switch(config-route-map)# match mac-list MAC_LIST_1`	Match entries of MAC lists. The maximum length is 63 characters.

Matching Based on RMAC Extended Community

SUMMARY STEPS

1. **configure terminal**
2. **ip extcommunity-list standard** *list-name* **{deny | permit} rmac** *mac-addr*
3. **route-map** *route-map-name*
4. **match extcommunity** *list-name*

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal`	Enter global configuration mode.
Step 2	**ip extcommunity-list standard** *list-name* **{deny | permit} rmac** *mac-addr* **Example:** `switch(config)# ip extcommunity-list standard EXTCOMM_LIST_RMAC permit rmac a8b4.56e4.7edf`	Add an extcommunity list entry. The *list-name* argument must not exceed 63 characters.

	Command or Action	Purpose
Step 3	**route-map** *route-map-name* **Example:** `switch(config)# route-map ROUTE_MAP_1`	Create a route map.
Step 4	**match extcommunity** *list-name* **Example:** `switch(config-route-map)# match extcommunity EXTCOMM_LIST_RMAC`	Match the extended community list name.

Setting the RMAC Extended Community

SUMMARY STEPS

1. **configure terminal**
2. **route-map** *route-map-name*
3. **set extcommunity evpn rmac** *mac-address*

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal`	Enter global configuration mode.
Step 2	**route-map** *route-map-name* **Example:** `switch(config)# route-map ROUTE_MAP_1`	Create a route map.
Step 3	**set extcommunity evpn rmac** *mac-address* **Example:** `switch(config-route-map)# set extcommunity evpn rmac EEEE.EEEE.EEEE`	Set the BGP RMAC extcommunity attribute.

Setting the EVPN Next-Hop IP Address

SUMMARY STEPS

1. **configure terminal**
2. **route-map** *route-map-name*
3. **set ip next-hop** *next-hop*
4. **set ipv6 next-hop** *next-hop*

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal`	Enter global configuration mode.
Step 2	**route-map** *route-map-name* **Example:** `switch(config)# route-map ROUTE_MAP_1`	Create a route map.
Step 3	**set ip next-hop** *next-hop* **Example:** `switch(config-route-map)# set ip next-hop 209.165.200.226`	Set the IP address of the EVPN IP next hop.
Step 4	**set ipv6 next-hop** *next-hop* **Example:** `switch(config-route-map)# set ipv6 next-hop 2001:0DB8::1`	Set the IPv6 next-hop address.

Setting the Gateway IP Address for Route Type-5

SUMMARY STEPS

1. **configure terminal**
2. **route-map** *route-map-name*
3. **set evpn gateway-ip** *gw-ip-address*

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal`	Enter global configuration mode.
Step 2	**route-map** *route-map-name* **Example:** `switch(config)# route-map ROUTE_MAP_1`	Create a route map.

	Command or Action	Purpose
Step 3	**set evpn gateway-ip** *gw-ip-address* **Example:** `switch(config-route-map)# set evpn gateway-ip 209.165.200.227`	Set the gateway IP address.

Applying the Route Map at the Inbound or Outbound Level

Once you've configured the route map with match and set clauses based on your requirements, use this procedure to apply the route map at the inbound or outbound level.

SUMMARY STEPS

1. **configure terminal**
2. **router bgp** *as-num*
3. **neighbor** *address*
4. **address-family l2vpn evpn**
5. **route-map** *route-map* **{in | out}**

DETAILED STEPS

Procedure

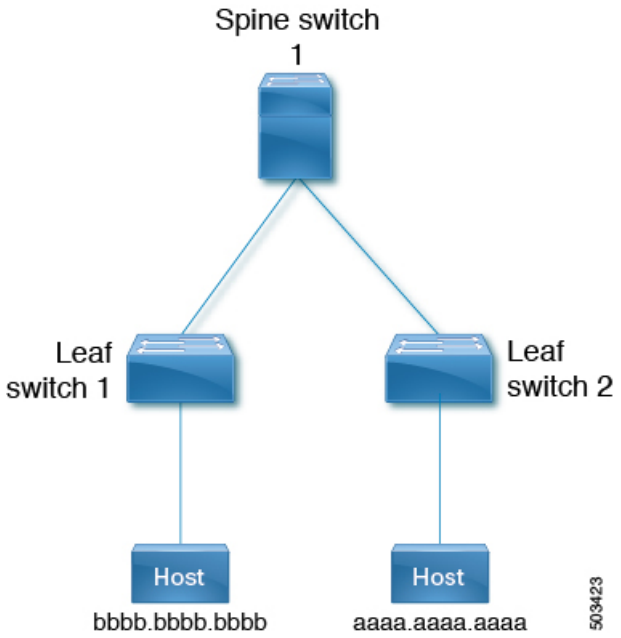
	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal`	Enter global configuration mode.
Step 2	**router bgp** *as-num* **Example:** `switch(config)# router bgp 100`	Enables a routing process. The range of *as-num* is from 1 to 65535.
Step 3	**neighbor** *address* **Example:** `switch(config-router)# neighbor 1.1.1.1`	Configure a BGP neighbor.
Step 4	**address-family l2vpn evpn** **Example:** `switch(config-router-neighbor)# address-family l2vpn evpn`	Configure the L2VPN address family.
Step 5	**route-map** *route-map* **{in | out}** **Example:** `switch(config-router-neighbor-af)# route-map ROUTE_MAP_1 in`	Apply the route map to the neighbor.

BGP EVPN Filtering Configuration Examples

This section provides example configurations for filtering EVPN routes.

Example 1

The following example shows how to filter EVPN type-2 routes and set the RMAC extended community as 52fc.c310.2e80.



1. The following output shows the routes in the EVPN table and a type-2 EVPN MAC route before the route map is applied.

```
leaf1(config)# show bgp l2vpn evpn
BGP routing table information for VRF default, address family L2VPN EVPN
BGP table version is 12, Local Router ID is 1.1.1.1
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-injected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup, 2 - best2

Network            Next Hop            Metric     LocPrf     Weight Path
Route Distinguisher: 1.1.1.1:32868    (L2VNI 101)
*>i[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/272
33.33.33.33                         100          0 i

Route Distinguisher: 3.3.3.3:3
*>i[2]:[0]:[0]:[48]:[52fc.d83a.1b08]:[0]:[0.0.0.0]/216
33.33.33.33                         100          0 i
*>i[5]:[0]:[0]:[24]:[101.0.0.0]/224
3.3.3.3                  0          100          0 ?

Route Distinguisher: 3.3.3.3:32868
*>i[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/272
33.33.33.33                         100          0 i

Route Distinguisher: 1.1.1.1:3    (L3VNI 100)
*>i[2]:[0]:[0]:[48]:[52fc.d83a.1b08]:[0]:[0.0.0.0]/216
33.33.33.33                         100          0 i
```

```
*>i[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/272
33.33.33.33                      100          0 i
*>l[5]:[0]:[0]:[24]:[10.0.0.0]/224
1.1.1.1                  0        100      32768 ?
*>l[5]:[0]:[0]:[24]:[100.0.0.0]/224
1.1.1.1                  0        100      32768 ?
*>i[5]:[0]:[0]:[24]:[101.0.0.0]/224
3.3.3.3                  0        100          0 ?

leaf1(config)# show bgp l2vpn evpn aaaa.aaaa.aaaa
BGP routing table information for VRF default, address family L2VPN EVPN
Route Distinguisher: 1.1.1.1:32868    (L2VNI 101)
BGP routing table entry for [2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/2
72, version 12
Paths: (1 available, best #1)
Flags: (0x000212) (high32 00000000) on xmit-list, is in l2rib/evpn, is not in HW

Advertised path-id 1
Path type: internal, path is valid, is best path, no labeled nexthop, in rib
Imported from 3.3.3.3:32868:[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:
[101.0.0.3]/272
AS-Path: NONE, path sourced internal to AS
33.33.33.33 (metric 81) from 101.101.101.101 (101.101.101.101)
Origin IGP, MED not set, localpref 100, weight 0
Received label 101 100
Extcommunity: RT:100:100 RT:100:101 SOO:33.33.33.33:0 ENCAP:8
Router MAC:52fc.d83a.1b08
Originator: 3.3.3.3 Cluster list: 101.101.101.101

Path-id 1 not advertised to any peer

Route Distinguisher: 3.3.3.3:32868
BGP routing table entry for [2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/2
72, version 8
Paths: (1 available, best #1)
Flags: (0x000202) (high32 00000000) on xmit-list, is not in l2rib/evpn, is not in HW

Advertised path-id 1
Path type: internal, path is valid, is best path, no labeled nexthop
Imported to 3 destination(s)
Imported paths list: vni100 default default
AS-Path: NONE, path sourced internal to AS
33.33.33.33 (metric 81) from 101.101.101.101 (101.101.101.101)
Origin IGP, MED not set, localpref 100, weight 0
Received label 101 100
Extcommunity: RT:100:100 RT:100:101 SOO:33.33.33.33:0 ENCAP:8
Router MAC:52fc.d83a.1b08
Originator: 3.3.3.3 Cluster list: 101.101.101.101

Path-id 1 not advertised to any peer

Route Distinguisher: 1.1.1.1:3    (L3VNI 100)
BGP routing table entry for [2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/2
72, version 11
Paths: (1 available, best #1)
Flags: (0x000202) (high32 00000000) on xmit-list, is not in l2rib/evpn, is not in HW

Advertised path-id 1
Path type: internal, path is valid, is best path, no labeled nexthop
Imported from 3.3.3.3:32868:[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:
[101.0.0.3]/272
AS-Path: NONE, path sourced internal to AS
33.33.33.33 (metric 81) from 101.101.101.101 (101.101.101.101)
Origin IGP, MED not set, localpref 100, weight 0
```

```
Received label 101 100
Extcommunity: RT:100:100 RT:100:101 SOO:33.33.33.33:0 ENCAP:8
Router MAC:52fc.d83a.1b08
Originator: 3.3.3.3 Cluster list: 101.101.101.101

Path-id 1 not advertised to any peer
```

2. The following example shows the route-map configuration.

```
leaf1(config)# show run rpm

!Command: show running-config rpm
!Running configuration last done at: Thu Sep  3 22:32:23 2020
!Time: Thu Sep  3 22:32:31 2020

version 9.3(5) Bios:version
route-map FILTER_EVPN_TYPE2 permit 10
    match evpn route-type 2
    set extcommunity evpn rmac 52fc.c310.2e80
route-map allow permit 10
```

3. The following example shows how to apply the route map to the EVPN peer as an inbound route map.

```
leaf1(config-router-neighbor-af)# show run bgp

!Command: show running-config bgp
!Running configuration last done at: Mon Aug  3 18:08:24 2020
!Time: Mon Aug  3 18:08:28 2020

version 9.3(5) Bios:version
feature bgp

router bgp 100
  event-history detail size large
  neighbor 101.101.101.101
    remote-as 100
    update-source loopback0
    address-family l2vpn evpn
      send-community extended
      route-map FILTER_EVPN_TYPE2 in
  vrf vni100
    address-family ipv4 unicast
      advertise l2vpn evpn
      redistribute direct route-map allow
```

4. The following output shows the routes in the EVPN table and a type-2 EVPN MAC route after the route map is applied.

```
leaf1(config)# show bgp l2vpn evpn
BGP routing table information for VRF default, address family L2VPN EVPN
BGP table version is 19, Local Router ID is 1.1.1.1
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-injected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup, 2 - best2

Network            Next Hop            Metric     LocPrf     Weight Path
Route Distinguisher: 1.1.1.1:32868    (L2VNI 101)
*>i[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/272
                      33.33.33.33                       100          0 i

Route Distinguisher: 3.3.3.3:3
*>i[2]:[0]:[0]:[48]:[52fc.d83a.1b08]:[0]:[0.0.0.0]/216
```

```
                      33.33.33.33                          100          0 i

Route Distinguisher: 3.3.3.3:32868
*>i[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/272
                      33.33.33.33                          100          0 i

Route Distinguisher: 1.1.1.1:3    (L3VNI 100)
*>i[2]:[0]:[0]:[48]:[52fc.d83a.1b08]:[0]:[0.0.0.0]/216
                      33.33.33.33                          100          0 i
*>i[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/272
                      33.33.33.33                          100          0 i
*>l[5]:[0]:[0]:[24]:[10.0.0.0]/224
                      1.1.1.1                  0           100      32768 ?
*>l[5]:[0]:[0]:[24]:[100.0.0.0]/224
                      1.1.1.1                  0           100      32768 ?

leaf1(config)# show bgp l2vpn evpn aaaa.aaaa.aaaa
BGP routing table information for VRF default, address family L2VPN EVPN
Route Distinguisher: 1.1.1.1:32868    (L2VNI 101)
BGP routing table entry for [2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/2
72, version 19
Paths: (1 available, best #1)
Flags: (0x000212) (high32 00000000) on xmit-list, is in l2rib/evpn, is not in HW

Advertised path-id 1
Path type: internal, path is valid, is best path, no labeled nexthop, in rib
Imported from 3.3.3.3:32868:[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:
[101.0.0.3]/272
AS-Path: NONE, path sourced internal to AS
33.33.33.33 (metric 81) from 101.101.101.101 (101.101.101.101)
Origin IGP, MED not set, localpref 100, weight 0
Received label 101 100
Extcommunity: RT:100:100 RT:100:101 SOO:33.33.33.33:0 ENCAP:8
Router MAC:52fc.c310.2e80
Originator: 3.3.3.3 Cluster list: 101.101.101.101
Path-id 1 not advertised to any peer

Route Distinguisher: 3.3.3.3:32868
BGP routing table entry for [2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/2
72, version 15
Paths: (1 available, best #1)
Flags: (0x000202) (high32 00000000) on xmit-list, is not in l2rib/evpn, is not in HW

Advertised path-id 1
Path type: internal, path is valid, is best path, no labeled nexthop
Imported to 3 destination(s)
Imported paths list: vni100 default default
AS-Path: NONE, path sourced internal to AS
33.33.33.33 (metric 81) from 101.101.101.101 (101.101.101.101)
Origin IGP, MED not set, localpref 100, weight 0
Received label 101 100
Extcommunity: RT:100:100 RT:100:101 SOO:33.33.33.33:0 ENCAP:8
Router MAC:52fc.c310.2e80
Originator: 3.3.3.3 Cluster list: 101.101.101.101

Path-id 1 not advertised to any peer

Route Distinguisher: 1.1.1.1:3    (L3VNI 100)
BGP routing table entry for [2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/2
72, version 18
Paths: (1 available, best #1)
Flags: (0x000202) (high32 00000000) on xmit-list, is not in l2rib/evpn, is not in HW

Advertised path-id 1
```

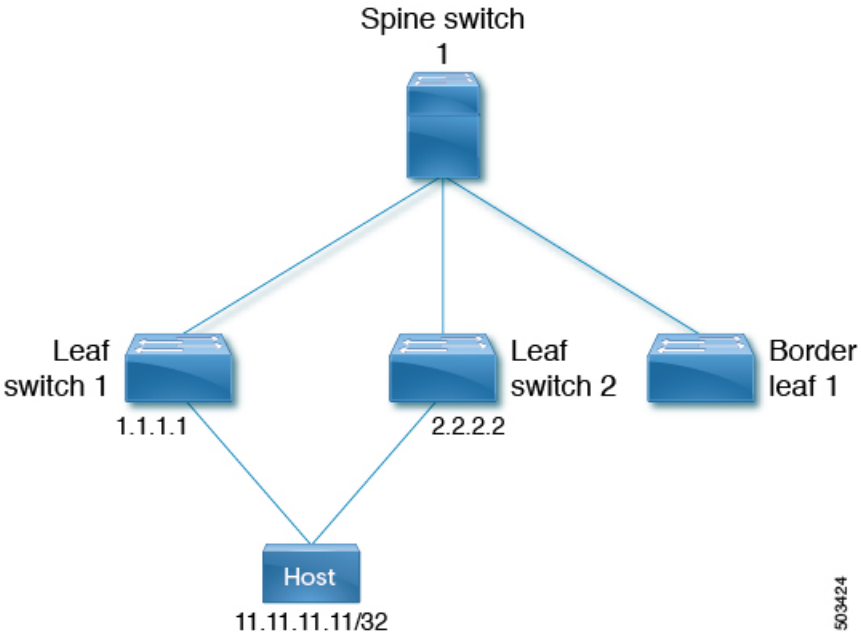
```
Path type: internal, path is valid, is best path, no labeled nexthop
Imported from 3.3.3.3:32868:[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:
[101.0.0.3]/272
AS-Path: NONE, path sourced internal to AS
33.33.33.33 (metric 81) from 101.101.101.101 (101.101.101.101)
Origin IGP, MED not set, localpref 100, weight 0
Received label 101 100
Extcommunity: RT:100:100 RT:100:101 SOO:33.33.33.33:0 ENCAP:8
Router MAC:52fc.c310.2e80
Originator: 3.3.3.3 Cluster list: 101.101.101.101

Path-id 1 not advertised to any peer
```

In a similar manner, you can use the other EVPN-specific match and set clauses with existing route-map options to filter EVPN routes as required.

Example 2

The following example shows how EVPN route filtering can be used to redirect traffic to a different VTEP than the one from which the EVPN route was learned. It involves setting the next-hop IP address and the RMAC of the route to the one corresponding to the other VTEP.



This example demonstrates the following:

- Host 1 belongs to VRF evpn-tenant-0002 and VLAN 3002, and is connected to Leaf 1 and Leaf 2.
- Reachability to Host1 is advertised by Leaf 1 and Leaf 2 to BL1.

At BL1, both routes to 11.11.11.11/32 are received as follows:

- One from 1.1.1.1, which is Leaf 1
- One from 2.2.2.2, which is Leaf 2

1. Initially the best path to reach 11.11.11.11 is through 1.1.1.1:

```
bl1(config)# show bgp l2 e 11.11.11.11
BGP routing table information for VRF default, address family L2VPN EVPN
Route Distinguisher: 1.1.1.1:3
BGP routing table entry for [5]:[0]:[0]:[32]:[11.11.11.11]/224, version 15
Paths: (1 available, best #1)
Flags: (0x000002) (high32 00000000) on xmit-list, is not in l2rib/evpn, is not in HW

Advertised path-id 1
Path type: internal, path is valid, is best path, no labeled nexthop
    Imported to 2 destination(s)
    Imported paths list: evpn-tenant-0002 default
Gateway IP: 0.0.0.0
AS-Path: 150 , path sourced external to AS
  1.1.1.1 (metric 81) from 101.101.101.101 (101.101.101.101)
    Origin incomplete, MED 0, localpref 100, weight 0
    Received label 3003002
    Extcommunity: RT:1:3003002 ENCAP:8 Router MAC:5254.0074.caf5
    Originator: 1.1.1.1 Cluster list: 101.101.101.101

Path-id 1 not advertised to any peer

Route Distinguisher: 2.2.2.2:4
BGP routing table entry for [5]:[0]:[0]:[32]:[11.11.11.11]/224, version 79
Paths: (1 available, best #1)
Flags: (0x000002) (high32 00000000) on xmit-list, is not in l2rib/evpn, is not in HW

Advertised path-id 1
Path type: internal, path is valid, is best path, no labeled nexthop
    Imported to 2 destination(s)
    Imported paths list: evpn-tenant-0002 default
Gateway IP: 0.0.0.0
AS-Path: 150 , path sourced external to AS
  2.2.2.2 (metric 81) from 101.101.101.101 (101.101.101.101)
    Origin incomplete, MED 0, localpref 100, weight 0
    Received label 3003002
    Extcommunity: RT:1:3003002 ENCAP:8 Router MAC:5254.0090.433e
    Originator: 2.2.2.2 Cluster list: 101.101.101.101

Path-id 1 not advertised to any peer

Route Distinguisher: 3.3.3.3:3    (L3VNI 3003002)
BGP routing table entry for [5]:[0]:[0]:[32]:[11.11.11.11]/224, version 80
Paths: (2 available, best #2)Flags: (0x000002) (high32 00000000) on xmit-list, is not
in l2rib/evpn, is not in HW

Path type: internal, path is valid, not best reason: Router Id, no labeled nexthop
    Imported from 2.2.2.2:4:[5]:[0]:[0]:[32]:[11.11.11.11]/224
Gateway IP: 0.0.0.0
AS-Path: 150 , path sourced external to AS
  2.2.2.2 (metric 81) from 101.101.101.101 (101.101.101.101)
    Origin incomplete, MED 0, localpref 100, weight 0
    Received label 3003002
    Extcommunity: RT:1:3003002 ENCAP:8 Router MAC:5254.0090.433e
    Originator: 2.2.2.2 Cluster list: 101.101.101.101

Advertised path-id 1
Path type: internal, path is valid, is best path, no labeled nexthop
    Imported from 1.1.1.1:3:[5]:[0]:[0]:[32]:[11.11.11.11]/224
Gateway IP: 0.0.0.0
AS-Path: 150 , path sourced external to AS
  1.1.1.1 (metric 81) from 101.101.101.101 (101.101.101.101)
    Origin incomplete, MED 0, localpref 100, weight 0
    Received label 3003002
    Extcommunity: RT:1:3003002 ENCAP:8 Router MAC:5254.0074.caf5
```

```
    Originator: 1.1.1.1 Cluster list: 101.101.101.101

Path-id 1 not advertised to any peer

Route Distinguisher: 3.3.3.3:4    (L3VNI 3003003)
BGP routing table entry for [5]:[0]:[0]:[32]:[11.11.11.11]/224, version 24
Paths: (1 available, best #1)
Flags: (0x000002) (high32 00000000) on xmit-list, is not in l2rib/evpn

Advertised path-id 1
Path type: local, path is valid, is best path, no labeled nexthop
Gateway IP: 0.0.0.0
AS-Path: 150 , path sourced external to AS
  3.3.3.3 (metric 0) from 0.0.0.0 (3.3.3.3)
    Origin incomplete, MED 0, localpref 100, weight 0
    Received label 3003003
    Extcommunity: RT:1:3003003 ENCAP:8 Router MAC:5254.006a.435b
    Originator: 1.1.1.1 Cluster list: 101.101.101.101

Path-id 1 advertised to peers:
101.101.101.101

bl1(config)# show ip route 11.11.11.11
IP Route Table for VRF "default"
'*' denotes best ucast next-hop
'**' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%<string>' in via output denotes VRF <string>

11.11.11.11/32, ubest/mbest: 1/0
*via 1.1.1.1, [200/0], 00:02:51, bgp-1, internal, tag 150 (evpn) segid: 3003
002 tunnelid: 0x1010101 encap: VXLAN
```

2. To redirect traffic to the other VTEP leaf-2, you can set the next hop and RMAC on the 11.11.11.11/32 route with a route-map configuration.

```
bl1(config-route-map)# show run rpm

Command: show running-config rpm
!Running configuration last done at: Wed Mar 27 00:12:14 2019
!Time: Wed Mar 27 00:12:17 2019

version 9.2(3) Bios:version
ip prefix-list PFX_LIST1_1 seq 5 permit 11.11.11.11/32
route-map TEST_SET_IP_NEXTHOP permit 10
    match ip address prefix-list PFX_LIST1_1
    set ip next-hop 2.2.2.2
    set extcommunity evpn rmac 5254.0090.433e
```

3. After applying the route map at the inbound level at BL1, the following are the route outputs for route 11.11.11.11/32.

```
bl1(config-router-neighbor-af)# show bgp l2 e 11.11.11.11
BGP routing table information for VRF default, address family L2VPN EVPN
Route Distinguisher: 1.1.1.1:3
BGP routing table entry for [5]:[0]:[0]:[32]:[11.11.11.11]/224, version 81
Paths: (1 available, best #1)
Flags: (0x000002) (high32 00000000) on xmit-list, is not in l2rib/evpn, is not in HW

Advertised path-id 1
Path type: internal, path is valid, is best path, no labeled nexthop
    Imported to 2 destination(s)
```

```
    Imported paths list: evpn-tenant-0002 default
Gateway IP: 0.0.0.0
AS-Path: 150 , path sourced external to AS
  2.2.2.2 (metric 81) from 101.101.101.101 (101.101.101.101)
    Origin incomplete, MED 0, localpref 100, weight 0
    Received label 3003002
    Extcommunity: RT:1:3003002 ENCAP:8 Router MAC:5254.0090.433e
    Originator: 1.1.1.1 Cluster list: 101.101.101.101

Path-id 1 not advertised to any peer

Route Distinguisher: 2.2.2.2:4
BGP routing table entry for [5]:[0]:[0]:[32]:[11.11.11.11]/224, version 79
Paths: (1 available, best #1)
Flags: (0x000002) (high32 00000000) on xmit-list, is not in l2rib/evpn, is not in HW

Advertised path-id 1
Path type: internal, path is valid, is best path, no labeled nexthop
    Imported to 2 destination(s)
    Imported paths list: evpn-tenant-0002 default
Gateway IP: 0.0.0.0
AS-Path: 150 , path sourced external to AS
  2.2.2.2 (metric 81) from 101.101.101.101 (101.101.101.101)
    Origin incomplete, MED 0, localpref 100, weight 0
    Received label 3003002
    Extcommunity: RT:1:3003002 ENCAP:8 Router MAC:5254.0090.433e
    Originator: 2.2.2.2 Cluster list: 101.101.101.101

Path-id 1 not advertised to any peer

Route Distinguisher: 3.3.3.3:3    (L3VNI 3003002)
BGP routing table entry for [5]:[0]:[0]:[32]:[11.11.11.11]/224, version 82
Paths: (2 available, best #2)
Flags: (0x000002) (high32 00000000) on xmit-list, is not in l2rib/evpn, is not in HW

Path type: internal, path is valid, not best reason: Router Id, no labeled nexthop
    Imported from 2.2.2.2:4:[5]:[0]:[0]:[32]:[11.11.11.11]/224
Gateway IP: 0.0.0.0
AS-Path: 150 , path sourced external to AS
  2.2.2.2 (metric 81) from 101.101.101.101 (101.101.101.101)
    Origin incomplete, MED 0, localpref 100, weight 0
    Received label 3003002
    Extcommunity: RT:1:3003002 ENCAP:8 Router MAC:5254.0090.433e
    Originator: 2.2.2.2 Cluster list: 101.101.101.101

Advertised path-id 1
Path type: internal, path is valid, is best path, no labeled nexthop
    Imported from 1.1.1.1:3:[5]:[0]:[0]:[32]:[11.11.11.11]/224
Gateway IP: 0.0.0.0
AS-Path: 150 , path sourced external to AS
  2.2.2.2 (metric 81) from 101.101.101.101 (101.101.101.101)
    Origin incomplete, MED 0, localpref 100, weight 0
    Received label 3003002
    Extcommunity: RT:1:3003002 ENCAP:8 Router MAC:5254.0090.433e
    Originator: 1.1.1.1 Cluster list: 101.101.101.101

Path-id 1 not advertised to any peer

Route Distinguisher: 3.3.3.3:4    (L3VNI 3003003)
BGP routing table entry for [5]:[0]:[0]:[32]:[11.11.11.11]/224, version 24
Paths: (1 available, best #1)
Flags: (0x000002) (high32 00000000) on xmit-list, is not in l2rib/evpn

Advertised path-id 1
```

```
Path type: local, path is valid, is best path, no labeled nexthop
Gateway IP: 0.0.0.0
AS-Path: 150 , path sourced external to AS
  3.3.3.3 (metric 0) from 0.0.0.0 (3.3.3.3)
    Origin incomplete, MED 0, localpref 100, weight 0
    Received label 3003003
    Extcommunity: RT:1:3003003 ENCAP:8 Router MAC:5254.006a.435b
    Originator: 1.1.1.1 Cluster list: 101.101.101.101

Path-id 1 advertised to peers:
101.101.101.101


bl1(config-router-neighbor-af)# show ip route 11.11.11.11
IP Route Table for VRF "default"
'*' denotes best ucast next-hop
'**' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%<string>' in via output denotes VRF <string>

11.11.11.11/32, ubest/mbest: 1/0
*via 2.2.2.2, [200/0], 00:02:37, bgp-1, internal, tag 150 (evpn) segid: 3003
002 tunnelid: 0x2020202 encap: VXLAN
```

After the next hop and RMAC value are set using the route map, the traffic that was earlier directed through 1.1.1.1 is now directed through 2.2.2.2.

Configuring a Table Map

Perform these tasks to configure and apply a table map:

- Configuring a MAC List and a Route Map that Matches the MAC List, on page 16
- Applying the Table Map, on page 17

Configuring a MAC List and a Route Map that Matches the MAC List

SUMMARY STEPS

1. **configure terminal**
2. **mac-list** *list-name* **[seq** *seq-number***] {deny | permit}** *mac-address* **[mac-mask]**
3. **route-map** *route-map-name*
4. **match mac-list** *mac-list-name*

DETAILED STEPS

Procedure

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

	Command or Action	Purpose
Step 2	**mac-list** *list-name* **[seq** *seq-number***] {deny | permit}** *mac-address* **[mac-mask]** **Example:** `switch(config)# mac-list MAC_LIST_1 permit E:E:E`	Build a MAC list.
Step 3	**route-map** *route-map-name* **Example:** `switch(config)# route-map ROUTE_MAP_1`	Create a route map.
Step 4	**match mac-list** *mac-list-name* **Example:** `switch(config-route-map)# match mac-list MAC_LIST_1`	Match entries of MAC lists. The maximum length is 63 characters.

Applying the Table Map

SUMMARY STEPS

1. **configure terminal**
2. **evpn**
3. **vni** *vni-id* **l2**
4. **table-map** *route-map-name* **[filter]**

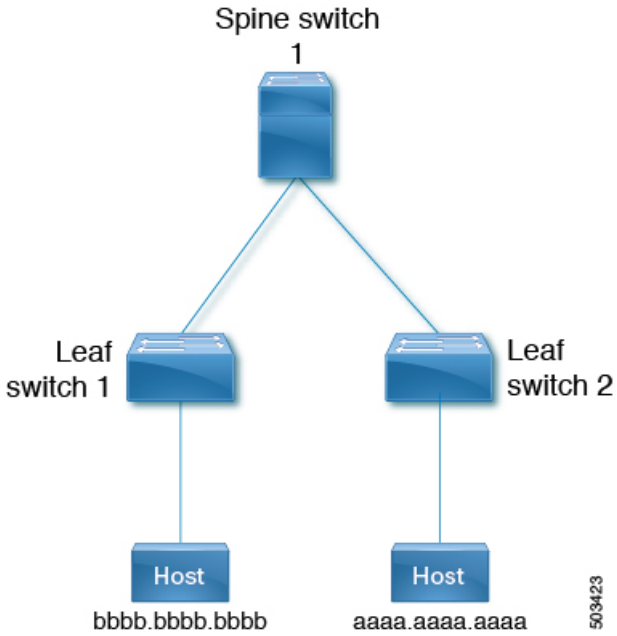
DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal`	Enter global configuration mode.
Step 2	**evpn** **Example:** `switch(config)# evpn`	Enter EVPN configuration mode.
Step 3	**vni** *vni-id* **l2** **Example:** `switch(config-evpn)# vni 101 l2`	Configure the Ethernet VPN ID. The range of *vni-id* is from 1 to 16777214.
Step 4	**table-map** *route-map-name* **[filter]** **Example:** `switch(config-evpn-evi)# table-map ROUTE_MAP_1 filter`	Apply table maps at the EVPN VNI configuration level. If the **filter** option is specified, any route that gets denied by the route-map validation isn't downloaded into the L2RIB.

Table Map Configuration Example

The following table-map configuration example shows how to filter MAC route aaaa.aaaa.aaaa from being downloaded into the L2RIB.



1. The following example shows the output for routes in the EVPN table and MAC routes in the L2RIB before the route map is applied.

```
leaf1(config)# show bgp l2vpn evpn
BGP routing table information for VRF default, address family L2VPN EVPN
BGP table version is 25, Local Router ID is 1.1.1.1
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-injected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup, 2 - best2

Network            Next Hop            Metric     LocPrf     Weight Path
Route Distinguisher: 1.1.1.1:32868    (L2VNI 101)
*>i[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/272
33.33.33.33                          100          0 i

Route Distinguisher: 3.3.3.3:3
*>i[2]:[0]:[0]:[48]:[52fc.d83a.1b08]:[0]:[0.0.0.0]/216
33.33.33.33                          100          0 i

Route Distinguisher: 3.3.3.3:32868
*>i[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/272
33.33.33.33                          100          0 i

Route Distinguisher: 1.1.1.1:3    (L3VNI 100)
*>i[2]:[0]:[0]:[48]:[52fc.d83a.1b08]:[0]:[0.0.0.0]/216
33.33.33.33                          100          0 i
*>i[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/272
33.33.33.33                          100          0 i
*>l[5]:[0]:[0]:[24]:[10.0.0.0]/224
1.1.1.1                  0           100      32768 ?
*>l[5]:[0]:[0]:[24]:[100.0.0.0]/224
1.1.1.1                  0           100      32768 ?
```

```
leaf1(config)# show l2route evpn mac all

Flags -(Rmac):Router MAC (Stt):Static (L):Local (R):Remote (V):vPC link
(Dup):Duplicate (Spl):Split (Rcv):Recv (AD):Auto-Delete (D):Del Pending
(S):Stale (C):Clear, (Ps):Peer Sync (O):Re-Originated (Nho):NH-Override
(Pf):Permanently-Frozen, (Orp): Orphan

Topology  Mac Address     Prod  Flags  Seq No  Next-Hops
--------- -----------     ----  -----  ------- ----------
100       52fc.d83a.1b08  VXLAN  Rmac  0       33.33.33.33
101       aaaa.aaaa.aaaa  BGP    Spl   0       33.33.33.33 (Label: 101)

leaf1(config-evpn-evi)# show mac address-table vlan 101
Legend: * - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
age - seconds since last seen,+ - primary entry using vPC Peer-Link,
(T) - True, (F) - False, C - ControlPlane MAC, ~ - vsanVLAN     MAC Address
Type      age     Secure NTFY Ports
---------+-----------------+--------+---------+------+----+------------------
C  101     aaaa.aaaa.aaaa   dynamic  0         F      F    nve1(33.33.33.33)
G  101     521d.7cef.1b08   static   -         F      F    sup-eth1(R)
```

2. The following example shows how to configure the route map to filter MAC route aaaa.aaaa.aaaa.

```
leaf1(config)# show run rpm

!Command: show running-config rpm
!Running configuration last done at: Thu Sep  3 21:47:48 2020
!Time: Thu Sep  3 22:27:57 2020

version 9.4(1) Bios:version
mac-list FILTER_MAC_AAA seq 5 deny aaaa.aaaa.aaaa ffff.ffff.ffff
route-map TABLE_MAP_FILTER permit 10
  match mac-list FILTER_MAC_AAA
```

3. The following example shows how to apply the route map at the BGP EVPN level.

```
leaf1(config-evpn-evi)# show run bgp | section evpn
evpn
    vni 101 l2
      table-map TABLE_MAP_FILTER filter
      rd auto
      route-target import auto
      route-target export auto
      route-target both auto evpn
```

4. The following example shows the output for routes in the EVPN table and MAC routes in the L2RIB after the table map is configured.

```
leaf1(config-evpn-evi)# show bgp l2vpn evpn
BGP routing table information for VRF default, address family L2VPN EVPN
BGP table version is 26, Local Router ID is 1.1.1.1
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-injected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup, 2 - best2
Network            Next Hop            Metric     LocPrf     Weight Path
Route Distinguisher: 1.1.1.1:32868    (L2VNI 101)
*>i[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/272
33.33.33.33                       100          0 i

Route Distinguisher: 3.3.3.3:3
*>i[2]:[0]:[0]:[48]:[52fc.d83a.1b08]:[0]:[0.0.0.0]/216
```

```
33.33.33.33                       100          0 i

Route Distinguisher: 3.3.3.3:32868
*>i[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/272
33.33.33.33                       100          0 i

Route Distinguisher: 1.1.1.1:3    (L3VNI 100)
*>i[2]:[0]:[0]:[48]:[52fc.d83a.1b08]:[0]:[0.0.0.0]/216
33.33.33.33                       100          0 i
*>i[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/272
33.33.33.33                       100          0 i
*>l[5]:[0]:[0]:[24]:[10.0.0.0]/224
1.1.1.1                  0        100      32768 ?
*>l[5]:[0]:[0]:[24]:[100.0.0.0]/224
1.1.1.1                  0        100      32768 ?

leaf1(config-evpn-evi)# show l2route evpn mac all

Flags -(Rmac):Router MAC (Stt):Static (L):Local (R):Remote (V):vPC link
(Dup):Duplicate (Spl):Split (Rcv):Recv (AD):Auto-Delete (D):Del Pending
(S):Stale (C):Clear, (Ps):Peer Sync (O):Re-Originated (Nho):NH-Override
(Pf):Permanently-Frozen, (Orp): Orphan

Topology    Mac Address    Prod   Flags  Seq No  Next-Hops
----------- -------------- ------ ------ ------- ------------
100         52fc.d83a.1b08 VXLAN  Rmac   0       33.33.33.33

leaf1(config-evpn-evi)# show mac address-table vlan 101
Legend:
* - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
age - seconds since last seen,+ - primary entry using vPC Peer-Link,
(T) - True, (F) - False, C - ControlPlane MAC, ~ - vsan
VLAN     MAC Address      Type      age     Secure NTFY Ports
---------+-----------------+--------+---------+------+----+------------------
G  101     521d.7cef.1b08   static   -         F      F    sup-eth1(R)
```

Verifying BGP EVPN Filtering

To display the status of the BGP EVPN Filtering configuration, enter the following command:

Table 1: Display BGP EVPN Filtering

Command	Purpose
show mac-list	Displays MAC Lists.
show route-map *name*	Displays information about a route map.
show running-config bgp	Displays the BGP configuration.
show running-config rpm	Displays all Route Policy Manager (RPM) information.
show bgp l2vpn evpn	Displays routes in BRIB.

Example of the **show mac-list** command:

```
switch(config)# show mac-list
mac-list list1: 5 entries
   seq 5 deny 0000.836d.f8b7 ffff.ffff.ffff
   seq 6 deny 0000.836d.f8b5 ffff.ffff.ffff
   seq 7 permit 0000.0422.6811 ffff.ffff.ffff
   seq 8 deny 0000.836d.f8b1 ffff.ffff.ffff
   seq 10 permit 0000.0000.0000 0000.0000.0000
mac-list list2: 3 entries
   seq 5 deny 0000.836e.f8b6 ffff.ffff.ffff
   seq 8 deny 0000.0421.6818 ffff.ffff.ffff
   seq 10 permit 0000.0000.0000 0000.0000.0000
mac-list list3: 2 entries
   seq 5 deny 0000.836d.f8b6 ffff.ffff.ffff
   seq 10 permit 0000.836d.f8b7 ffff.ffff.ffff
```

Example of the **show route-map** command:

```
switch# show route-map pol10
route-map pol10, permit, sequence 10
  Match clauses:
    mac-list: list2
  Set clauses:
    ip next-hop 6.6.6.1 3.3.3.10
    ipv6 next-hop 303:304::1
```

Example of the **show running-config bgp** command:

```
switch# show running-config bgp | beg "5000"
vni 5000 l2
table-map pol1 filter
rd auto
route-target import auto
route-target export auto
vni 5001 l2
rd auto
route-target import auto
route-target export auto
```

Example of the **show running-config rpm** command:

```
switch# show running-config rpm
!Running configuration last done at: Thu May 23 13:58:31 2019
!Time: Thu May 23 13:58:47 2019

version 9.3(1) Bios:version 07.65
feature pbr

mac-list list1 seq 5 permit 0001.0001.0001 ffff.ffff.ffff
mac-list mclist seq 5 permit 0001.0001.0001 ffff.ffff.ffff
route-map test permit 10
match evpn route-type 5
set evpn gateway-ip 1.1.1.2
```

Example of the **show bgp l2vpn evpn aaaa.aaaa.aaaa** command to view detailed information about EVPN route aaaa.aaaa.aaaa:

```
switch(config-evpn-evi)# show bgp l2 e aaaa.aaaa.aaaa

BGP routing table information for VRF default, address family L2VPN EVPN
Route Distinguisher: 1.1.1.1:32868 (L2VNI 101)
BGP routing table entry for [2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:[101.0.0.3]/2
72, version 11
```

```
Paths: (1 available, best #1)
Flags: (0x000202) (high32 00000000) on xmit-list, is not in l2rib/evpn, table-ma
p filtered, is not in HW

Advertised path-id 1
Path type: internal, path is valid, is best path, remote nh not installed, no
labeled nexthop
Imported from 3.3.3.3:32868:[2]:[0]:[0]:[48]:[aaaa.aaaa.aaaa]:[32]:
[101.0.0.3]/272
AS-Path: NONE, path sourced internal to AS
33.33.33.33 (metric 81) from 101.101.101.101 (101.101.101.101)
Origin IGP, MED not set, localpref 100, weight 0
Received label 101 100
Extcommunity: RT:100:100 RT:100:101 SOO:33.33.33.33:0 ENCAP:8
Router MAC:5254.009b.4275
Originator: 3.3.3.3 Cluster list: 101.101.101.101

Path-id 1 not advertised to any peer
```