

# Troubleshoot why EIGRP External Route Is Preferred Over BGP

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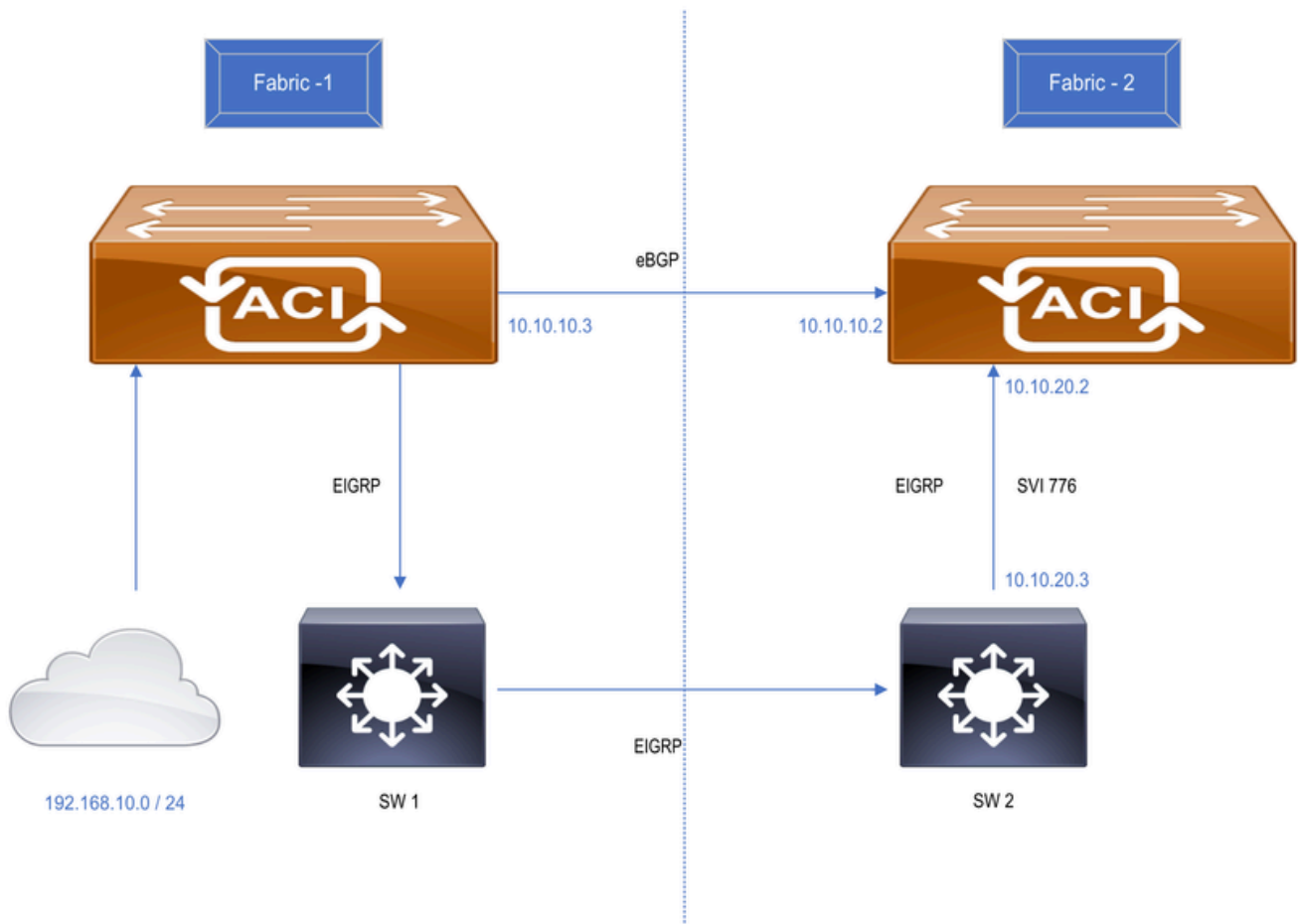
## Introduction

This document describes the routing behaviour in ACI leaf switch when it receives same route via EIGRP and eBGP.

## Prerequisites

The reader must have good understanding of the ACI components, terminologies & operations along with the routing protocols (EIGRP & BGP).

## Setup and Topology



**Figure : Two different ACI fabric connected over a WAN network**

1. This set up has been done using 2 different ACI fabrics connected as:

- Direct link between both DC Border Leaf switches (BGP).
- Extended via WAN network (EIGRP). SW1 & SW2 are WAN switches.

2. 192.168.10.0/24 is internal ACI subnet connected at Fabric-1 & advertised to Fabric-2 via eBGP as well as EIGRP.

## Problem Statement

Fabric-2 Border Leaf switch is receiving the same route via EIGRP and eBGP where eBGP route gets installed in routing table of the switch as expected. When the eBGP session goes down, EIGRP routes gets installed in routing table of the switch. Switch retains EIGRP route even when eBGP comes up. Expectations here is that the eBGP route must get installed in routing table as soon as the eBGP session comes up since eBGP has lesser AD value [ 20 ] than EIGRP [ 90 ].

## Issue Summary

- Fabric-1 & Fabric-2 data centres are connected via WAN network (EIGRP) and direct link between both sites BL switches running eBGP.
- Fabric-1 Border Leaf switch is advertising subnet 192.168.10.0/24 to Fabric-2 via eBGP and EIGRP.
- Both the L3Out are in same VRF.
- BGP route gets installed in the routing table of Fabric-2 Border Leaf switch on the basis of AD value.
- When eBGP session between both Fabric-1 & Fabric-2 goes down, EIGRP route gets installed in the

routing table of Fabric-2\_BL switch which is expected.

- When eBGP comes up, the expectation is that eBGP route must get re-installed & EIGRP route is to be removed from routing table which is not happening.
- Fabric-2 Border Leaf switch is retaining the EIGRP route in its routing table instead.

## Troubleshooting and Verification

- Verify the eBGP neighborhood between Fabric-1 & Fabric-2 Border Leaf switches.

```
Fabric-2_BL# show bgp sessions vrf snTn:snTn_VRF
Total peers 3, established peers 3
ASN 100
VRF snTn:snTn_VRF, local ASN 100
peers 1, established peers 1, local router-id 172.16.2.100
State: I-Idle, A-Active, O-Open, E-Established, C-Closing, S-Shutdown
```

Neighbor	ASN	Flaps	LastUpDn	LastRead	LastWrit	St	Port(L/R)	Notif(S/R)
10.10.10.3	65001	2	1d23h	never	never	E	179/26051	45/6

- Verify EIGRP neighborhood at Fabric-2.

```
Fabric-2_BL# show ip eigrp neighbors vrf snTn:snTn_VRF
EIGRP neighbors for process 500 VRF snTn:snTn_VRF
H Address Interface Hold Uptime SRTT RTO Q Seq
0 10.10.20.3 vlan7 13 2d00h 1 50 0 8
```

```
SW-2# show ip eigrp neighbors VRF default
IP-EIGRP neighbors for process 500 VRF default
H Address Interface Hold Uptime SRTT RTO Q Seq
0 10.10.20.2 Vlan776 14 2d00h 6 50 0 9
```

- Initially, BGP route gets installed in the routing table and same route is present in EIGRP topology table of Fabric-2 Border Leaf switch.

```
Fabric-2_BL# show ip route 192.168.10.0/24 vrf snTn:snTn_VRF
IP Route Table for VRF "snTn:snTn_VRF"
'*' denotes best ucast next-hop
'**' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%<string>' in via output denotes VRF <string>

192.168.10.0/24, ubest/mbest: 1/0
```

```
*via 10.10.10.3%snTn:snTn_VRF, [20/0], 00:00:17, bgp-100, external, tag 65005
```

```
recursive next hop: 10.10.10.3/32%snTn:snTn_VRF
```

```
Fabric-2_BL# show ip eigrp topology 192.168.10.0/24 vrf snTn:snTn_VRF
```

```
EIGRP (AS 500): VRF: snTn:snTn_VRF , Topology entry for 192.168.10.0/24  
State is Passive, Query origin: Local origin, 0 Successor(s), FD is Infinity  
Routing Descriptor Blocks:
```

```
10.10.20.3(vlan7), from 10.10.20.3  
Urib State: in-rib,up-to-date  
Composite metric is (128576/128320), Route is Internal  
Vector metric:  
Minimum bandwidth is 8000000 Kbit  
Total delay is 5010 microseconds  
Reliability is 255/255  
Load is 1/255  
Minimum MTU is 1500  
Hop count is 1  
Internal tag is 0
```

- EIGRP route gets installed in routing table of Fabric-2 Border Leaf switch when eBGP session goes down between Fabric-1 & Fabric-2 Border Leaf switches and retains the EIGRP route even when the eBGP comes up.

```
Fabric-2_BL# show ip route 192.168.10.0/24 vrf snTn:snTn_VRF
```

```
IP Route Table for VRF "snTn:snTn_VRF"  
'*' denotes best ucast next-hop  
'**' denotes best mcast next-hop  
'[x/y]' denotes [preference/metric]  
'%<string>' in via output denotes VRF <string>
```

```
192.168.10.0/24, ubest/mbest: 1/0  
*via 10.10.20.3, vlan7, [90/128576], 2d00h, eigrp-default, internal
```

- The expectation here is that, eBGP route must get re-installed in routing table as soon as eBGP session comes up. But Fabric-2\_BL switch keeps EIGRP route only.

## Why EIGRP route is preferred over eBGP route?

- When eBGP session goes down, Fabric-2\_BL switch installs EIGRP route in routing table and same gets redistributed into MP-BGP to forward it to other service Leaf switches in the Fabric-2.
- Since Fabric-2\_BL switch is redistributing it, becomes an origin for that route with default weight value 32768. Whereas, route coming from eBGP holds weight 0.
- Since higher weight is the preferred one, Fabric-2\_BL switch considers redistributed route as best route and does not install eBGP route.
- The output shown beneath is when the eBGP session came back up.

```
Fabric-2_BL# show ip bgp 192.168.10.0/24 vrf snTn:snTn_VRF
BGP routing table information for VRF snTn:snTn_VRF, address family IPv4 Unicast
BGP routing table entry for 192.168.10.0/24, version 28 dest ptr 0xa0fe0328
Paths: (2 available, best #1)
Flags: (0x80c0002 00000000) on xmit-list, is not in urib, exported
  vpn: version 371, (0x100002) on xmit-list
Multipath: eBGP iBGP
```

```
Advertised path-id 1, VPN AF advertised path-id 1
Path type (0xa961d880): redist 0x408 0x1 ref 0 adv path ref 2, path is valid, is best path
AS-Path: NONE, path locally originated
Tx Domain path attribute Flag 0xc0, Code 36, Length 8, segment length 1
domain path: { <1:5345:128>}
```

```
0.0.0.0 (metric 0) from 0.0.0.0 (172.16.0.10)
Origin incomplete, MED 128576, localpref 100, weight 32768 tag 0, propagate 0
Extcommunity:
  RT:100:2129921
  VNID:2129921
  COST:pre-bestpath:128:128576
  COST:pre-bestpath:162:90
  0x8800:32768:0 (Flags = 32768, Tag = 0)
  0x8801:500:128256 (ASN = 500, Delay = 128256)
  0x8802:65281:320 (Reliability = 255, Hop = 1, Bandwidth = 320)
  0x8803:1:1500 (Reserve = 0, Load = 1, MTU = 1500)
  0x8804:0:0 (Remote ASN = 0, Remote ID = 0)
  0x8805:0:0 (Remote Prot = 0, Remote Metric = 0)
```

```
VPN AF advertised path-id 2
Path type (0xa961e0bc): external 0x28 0x0 ref 0 adv path ref 1, path is valid, not best reason: Weight
AS-Path: 65001, path sourced external to AS
Source Domain: <1:16:128>
Tx Domain path attribute Flag 0xc0, Code 36, Length 15, segment length 2
domain path: { <1:5345:128>, <1:16:128>}
```

```
10.10.10.3 (metric 0) from 10.10.10.3 (172.16.1.100)
Origin IGP, MED not set, localpref 100, weight 0 tag 0, propagate 0
Extcommunity:
  RT:100:2129921
  VNID:2129921
```

```
VRF advertise information:
Path-id 1 not advertised to any peer
VPN AF advertise information:
Path-id 1 advertised to peers:
  10.0.152.65      10.0.152.66
Path-id 2 not advertised to any peer
```

## Solution

There are 2-ways to fix this issue:

- LPM is one of the solution:
  1. Advertise the same subnet with /23 mask under EIGRP & /24 mask via eBGP so that both routes are present in routing table of Fabric-2\_BL switch.

<#root>

```
SW-2# show run interface vlan 776
```

```
!Command: show running-config interface Vlan776  
!Time: Sun Jun 23 06:30:43 2024
```

```
version 7.0(3)I7(5) Bios:version 07.66
```

```
interface Vlan776  
  no shutdown  
  ip address 10.10.20.3/24  
  ip router eigrp 500  
  ip summary-address eigrp 500 192.168.10.0/23
```

```
>>>>> Advertised /23 via EIGRP
```

```
<#root>
```

```
Fabric-2_BL# show ip route vrf snTn:snTn_VRF
```

```
IP Route Table for VRF "snTn:snTn_VRF"
```

```
'*' denotes best ucast next-hop  
'**' denotes best mcast next-hop  
'[x/y]' denotes [preference/metric]  
'%<string>' in via output denotes VRF <string>
```

```
192.168.10.0/23, ubest/mbest: 1/0  
  *via 10.10.20.3, vlan20, [90/128576], 00:24:11, eigrp-default, internal
```

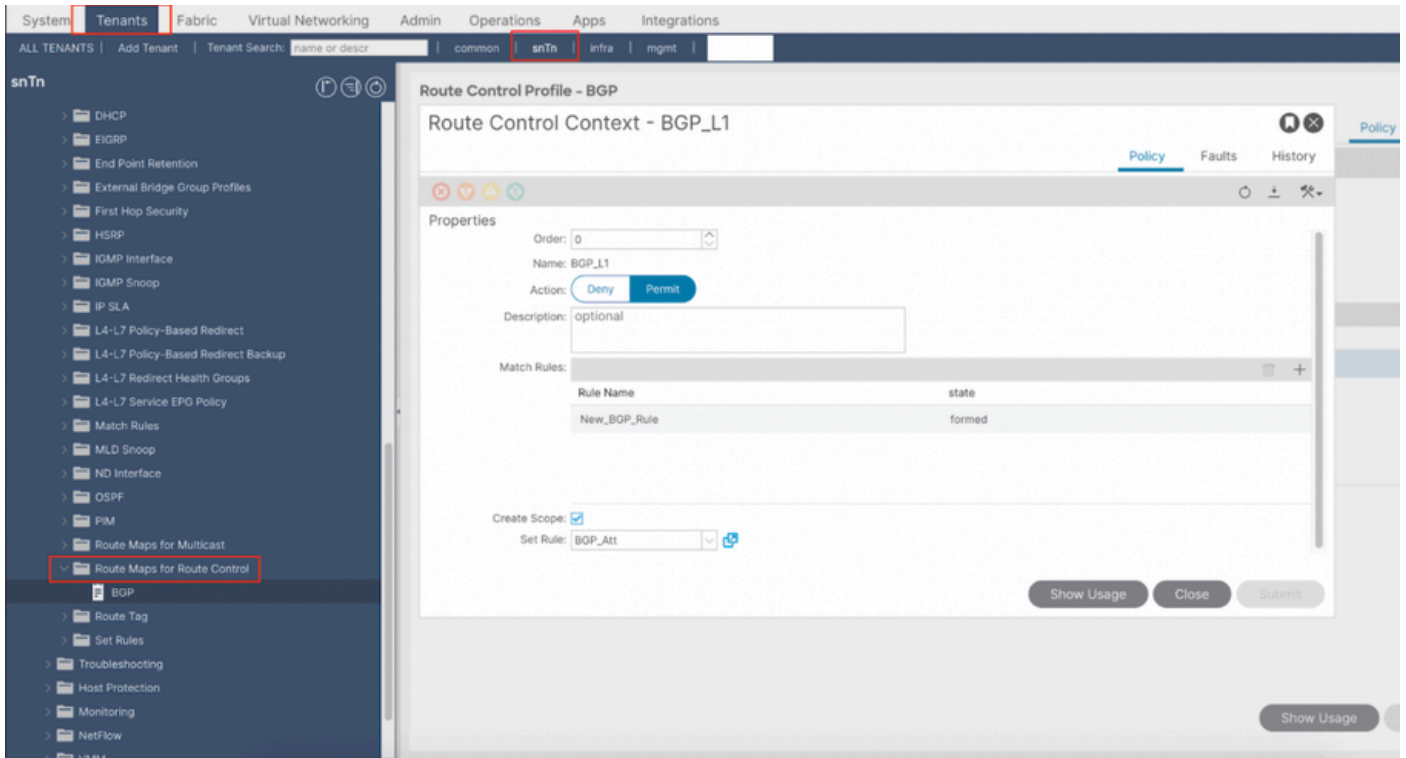
```
>>>>>>> EIGRP Route
```

```
192.168.10.0/24, ubest/mbest: 1/0  
  *via 10.10.10.3%snTn:snTn_VRF, [20/0], 00:04:12, bgp-100, external, tag 65005
```

```
>>>>>>> BGP Route
```

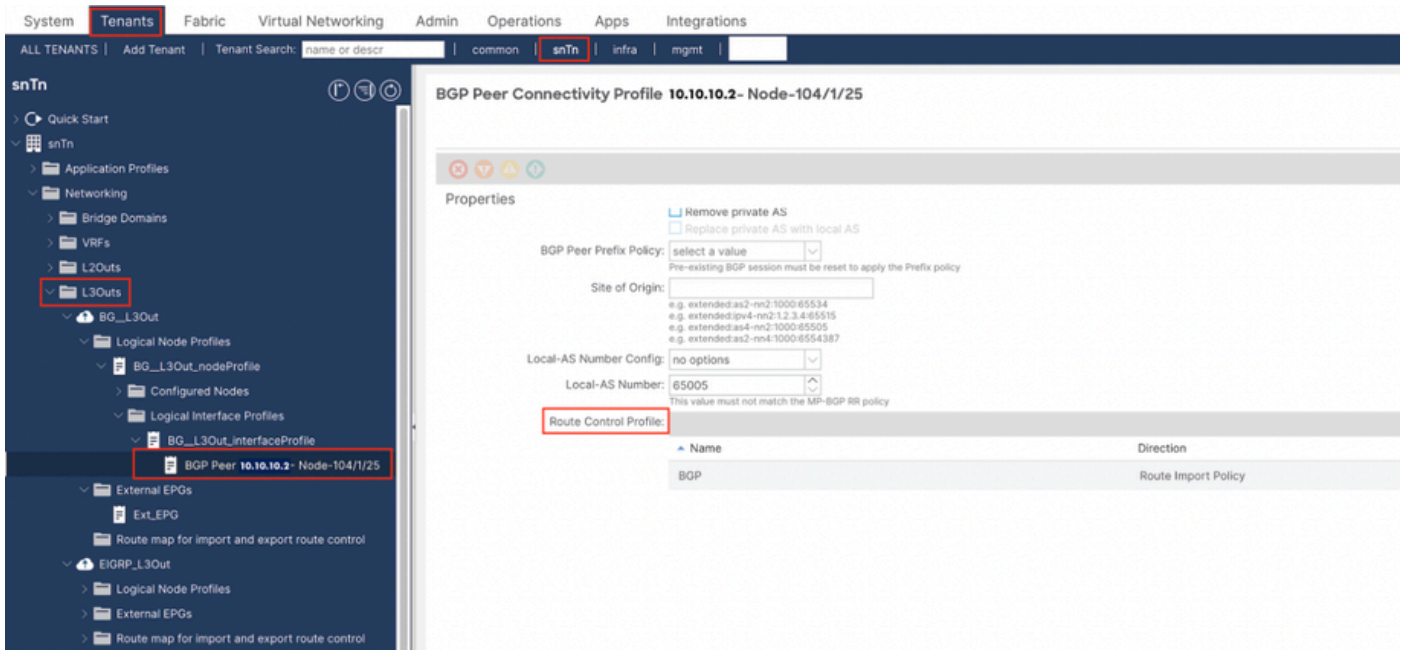
- b. When, eBGP session goes down, EIGRP route is still present in routing table for redundancy.
- c. As soon as BGP session comes up, BGP route gets re-installed in routing table and preferred for traffic forwarding.
  - Applying Weight on eBGP route:
    1. If you need to advertise the subnet with same subnet mask via both EIGRP & BGP, higher weight (than 32768) can be applied on eBGP route to be the preferred route always.
    2. How to apply weight on ACI:
      1. Create Route-map policy.

Tenant ----> Policies ----> Route Maps for Route Control (Right click and create new policy, fill all the required details)-> Create "Set Rule" policy ---> Select "Weight" attribute policy and enter value



ii. Apply Route Map to L3Out:

Tenant ---> Networking ---> L3Out ----> Logical Node Profiles ---> Node Profile ----> Logical Interface Profile ---> Interface Profile ---> Peer Profile ---> Click on "+" under "Route Control Profile" and select created new Route Map



<#root>

```
Fabric-2_BL# show ip bgp 192.168.10.0/24 vrf snTn:snTn_VRF
```

BGP routing table information for VRF snTn:snTn\_VRF, address family IPv4 Unicast  
 BGP routing table entry for 192.168.10.0/24, version 61 dest ptr 0xa0fa3f70

Paths: (1 available, best #1)  
Flags: (0x80c001a 00000000) on xmit-list, is in urib, is best urib route, is in HW, exported  
vpn: version 79, (0x100002) on xmit-list  
Multipath: eBGP iBGP

Advertised path-id 1, VPN AF advertised path-id 1  
Path type (0xa95a2d5c): external 0x28 0x0 ref 0 adv path ref 2, path is valid, is best path  
AS-Path: 65005 65001 , path sourced external to AS  
Source Domain: <1:16:128>  
Tx Domain path attribute Flag 0xc0, Code 36, Length 15, segment length 2  
domain path: { <1:5345:128>, <1:16:128> }  
10.10.10.3 (metric 0) from 10.10.10.3 (172.16.0.10)  
Origin IGP, MED not set, localpref 100, weight 32769 tag 0, propagate 0  
Extcommunity:  
RT:100:2129921  
VNID:2129921

VRF advertise information:  
Path-id 1 not advertised to any peer

VPN AF advertise information:  
Path-id 1 advertised to peers:  
10.0.152.65 10.0.152.66

c. The catch here is, you do not see redistributed EIGRP route in BGP table when BGP session is up.  
Reason is FD is set to Infinity for EIGRP external route.

<#root>

**Fabric-2\_BL# show ip eigrp topology vrf snTn:snTn\_VRF**

EIGRP Topology Table for AS(500)/ID(172.16.2.100) VRF snTn:snTn\_VRF  
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,  
r - reply Status, s - sia Status

P 192.168.10.0/24, 0 Successors, FD is Infinity  
via 10.10.20.3(128576/128320), vlan20

d. The "FD is Infinity" message is actually an indicator within EIGRP that the RIB rejected the route due to a lower admin distance route already being present.

e. EIGRP route only gets redistributed into MP-BGP and installed in routing table of fabric-2\_BL switch when BGP session goes down.

<#root>

**Fabric-2\_BL# show ip bgp summary vrf snTn:snTn\_VRF**

BGP summary information for VRF snTn:snTn\_VRF, address family IPv4 Unicast  
BGP router identifier 172.16.2.100, local AS number 100  
BGP table version is 65, IPv4 Unicast config peers 1, capable peers 0  
6 network entries and 6 paths using 1248 bytes of memory



BGP attribute entries [4/704], BGP AS path entries [0/0]  
BGP community entries [0/0], BGP clusterlist entries [2/8]

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
10.10.10.3	4	65001	18530	18554	0	0	0	00:04:25	Idle

<#root>

Fabric-2\_BL# show ip eigrp topology vrf snTn:snTn\_VRF

IP-EIGRP Topology Table for AS(500)/ID(172.16.2.100) VRF snTn:snTn\_VRF  
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,  
r - reply Status, s - sia Status

P 192.168.10.0/24, 1 successors, FD is 128576  
via 10.10.20.3 (128576/128320), Vlan20

<#root>

Fabric-2\_BL# show ip route vrf snTn:snTn\_VRF

IP Route Table for VRF "snTn:snTn\_VRF"

'\*' denotes best ucast next-hop  
'\*\*' denotes best mcast next-hop  
'[x/y]' denotes [preference/metric]  
'%<string>' in via output denotes VRF <string>

192.168.10.0/24, ubest/mbest: 1/0  
\*via 10.10.20.3, Vlan20, [90/128576], 02:31:52, eigrp-default, internal >>>>>> EIGRP Route

<#root>

Fabric-2\_BL# show ip bgp 192.168.10.0/24 vrf snTn:snTn\_VRF

BGP routing table information for VRF snTn:snTn\_VRF, address family IPv4 Unicast  
BGP routing table entry for 192.168.10.0/24, version 65 dest ptr 0xa0fa3f70  
Paths: (1 available, best #1)  
Flags: (0x80c0002 00000000) on xmit-list, is not in urib, exported  
vpn: version 83, (0x100002) on xmit-list  
Multipath: eBGP iBGP

Advertised path-id 1, VPN AF advertised path-id 1  
Path type (0xa95a2c64): redist 0x408 0x1 ref 0 adv path ref 2, path is valid, is best path  
AS-Path: NONE, path locally originated  
Tx Domain path attribute Flag 0xc0, Code 36, Length 8, segment length 1  
domain path: { <1:5345:128>}  
0.0.0.0 (metric 0) from 0.0.0.0 (172.16.0.10)

Origin incomplete, MED 128576, localpref 100, weight 32768 tag 0, propagate 0  
Extcommunity:

RT:100:2129921

VNID:2129921

COST:pre-bestpath:128:128576

COST:pre-bestpath:162:90

0x8800:32768:0 (Flags = 32768, Tag = 0)

0x8801:500:128256 (ASN = 500, Delay = 128256)

0x8802:65281:320 (Reliability = 255, Hop = 1, Bandwidth = 320)

0x8803:1:1500 (Reserve = 0, Load = 1, MTU = 1500)

0x8804:0:0 (Remote ASN = 0, Remote ID = 0)

0x8805:0:0 (Remote Prot = 0, Remote Metric = 0)

VRF advertise information:

Path-id 1 not advertised to any peer

VPN AF advertise information:

Path-id 1 advertised to peers:

10.0.152.65            10.0.152.66