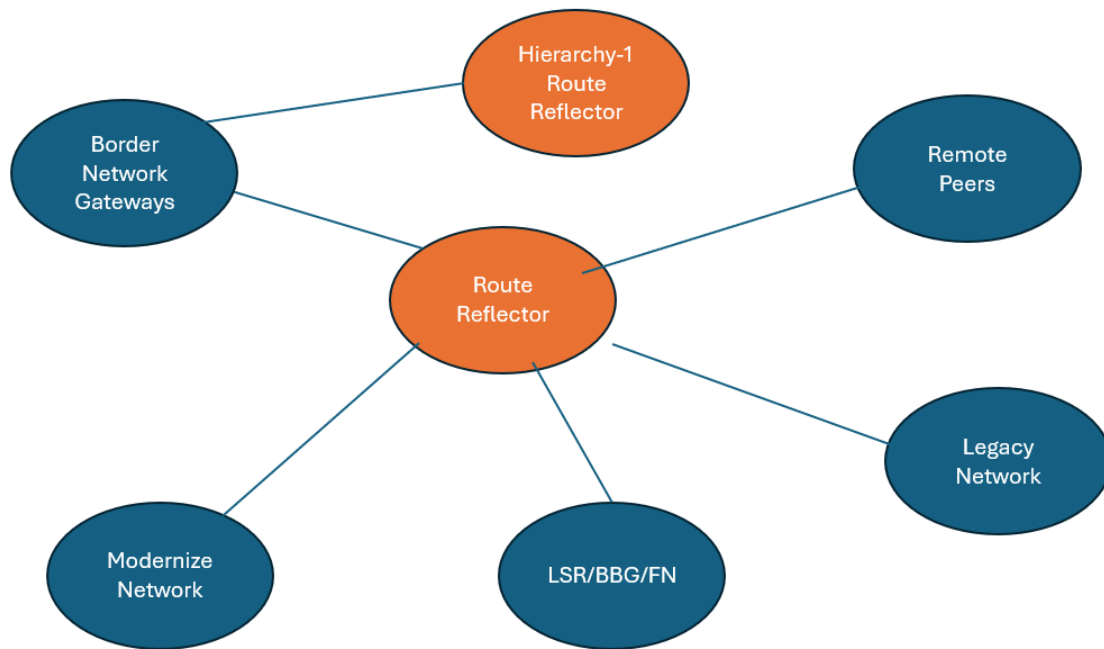## Deep Dive Segment Routing Indexing and Segment Routing Global Block.

Adnan Pervaiz (Network and Cloud Architect)

LAB Diagram

Testing Performed on Cisco Devices.

```
RP/0/RP0/CPU0:SR-Testing-Adn-PE#show bgp ipv4 labeled-unicast community 65004:7895 |
b Netw
Sun Jan 22 18:58:01.641 GST
   Network              Next Hop            Metric LocPrf Weight Path
*>i112.123.118.23/32   112.123.118.23           0    100      0 i
* i112.123.118.2325/32 112.123.118.23          44    100      0 i
*>i                    134.132.116.2           34    100      0 i
* i112.123.118.2326/32 112.123.118.23          20    100      0 i
*>i                    134.132.116.2           10    100      0 i
*>i112.123.118.2327/32 112.123.118.23          10    100      0 i
* i                    134.132.116.2           18    100      0 i
* i112.123.118.2328/32 112.123.118.23          18    100      0 i
*>i                    134.132.116.2           10    100      0 i
* i112.123.118.2329/32 112.123.118.23          34    100      0 i
*>i                    134.132.116.2           24    100      0 i
* i112.123.118.2330/32 112.123.118.23          30    100      0 i
*>i                    134.132.116.2           20    100      0 i
*>i134.132.116.2/32    134.132.116.2            0    100      0 i
*>i144.133.160.12/32   112.123.118.23         101    100      0 i
* i                    134.132.116.2          101    100      0 i

Processed 9 prefixes, 16 paths
RP/0/RP0/CPU0:SR-Testing-Adn-PE#

RP/0/RP0/CPU0:SR-Testing-Adn-PE#sh bgp ipv4 labeled-unicast 112.123.118.2330/32
        <= BGP-LU route of Legacy PE FAB-03
Sun Jan 22 19:00:07.837 GST
BGP routing table entry for 112.123.118.2330/32
Versions:
  Process            bRIB/RIB   SendTblVer
  Speaker             3102743      3102743
    Local Label: 513177                                <= BGP-LU LL is assigned
from SR Index attribute in the route and offset by this index # in the local Core
router SRGB.
Last Modified: Jan 22 11:56:11.126 for 07:03:56
Paths: (2 available, best #2)
  Advertised IPv4 Labeled-unicast paths to peers (in unique update groups):
    112.123.118.232  144.133.128.5
  Path #1: Received by speaker 0
  Not advertised to any peer
  Local, (Received from a RR-client)
    112.123.118.23 (metric 16) from 112.123.118.23 (112.123.118.23)
      Received Label 603286
      Origin IGP, metric 30, localpref 100, valid, internal, backup, add-path,
labeled-unicast
      Received Path ID 0, Local Path ID 3, version 3102743
```

```
      Community: 65004:7895
      Label-Index: 3286
  Path #2: Received by speaker 0
  Advertised IPv4 Labeled-unicast paths to peers (in unique update groups):
    112.123.118.232  144.133.128.5
  Local, (Received from a RR-client)
    134.132.116.2 (metric 16) from 134.132.116.2 (134.132.116.2)
      Received Label 603286
      Origin IGP, metric 20, localpref 100, valid, internal, best, group-best,
labeled-unicast
      Received Path ID 0, Local Path ID 1, version 3102743
      Community: 65004:7895
      Label-Index: 3286


RP/0/RP0/CPU0:SR-Testing-Adn-PE#sh bgp ipv4 labeled-unicast 112.123.118.23/32
            <= BGP-LU route of Linkwood core router itself (rvc5-r-001)
Sun Jan 22 19:02:09.907 GST
BGP routing table entry for 112.123.118.23/32
Versions:
  Process           bRIB/RIB  SendTblVer
  Speaker            3102586     3102586
    Local Label: 510001
      <= Local label is SR Index (received) offset in local SRGB.
Last Modified: Jan 22 22:03:45.126 for 20:58:24
Paths: (1 available, best #1)
  Advertised IPv4 Labeled-unicast paths to peers (in unique update groups):
    112.123.118.232  144.133.128.5
  Path #1: Received by speaker 0
  Advertised IPv4 Labeled-unicast paths to peers (in unique update groups):
    112.123.118.232  144.133.128.5
  Local, (Received from a RR-client)
    112.123.118.23 (metric 16) from 112.123.118.23 (112.123.118.23)
      Received Label 3
      <= NLRI label value is Impl-Null
      IGP, metric 0, localpref 100, aigp metric 0, valid, internal, best, group-best,
labeled-unicast
      Received Path ID 0, Local Path ID 1, version 3102586
      Community: Origin 65004:7895
      Total AIGP metric 16
      Label-Index: 1
      <= SR Index value is 1



RP/0/RP0/CPU0:SR-Testing-Adn-PE#
```

It is important to note that the BGP route for 112.123.118.23/32 can never become active on the ASBR SR-Testing-Adn-PE because the Next-Hop is identical to the NLRI Prefix.

As a result, the IGP administrative distance of the Legacy core router's BGP-LU routes must be more favorable than that of the BGP-LU routes from the Legacy core routers in the same environment. Additionally, the Legacy Core routers will not operate ISIS as their routing protocol.

```
RP/0/RP0/CPU0:SR-Testing-Adn-PE#sh route 112.123.118.23/32
Sun Jan 22 19:08:13.089 GST

Routing entry for 112.123.118.23/32
  Known via "ospf 101", distance 110, metric 16, labeled SR, type intra area
  Installed Jan 22 11:27:10.777 for 07:41:02
  Routing Descriptor Blocks
    144.133.190.198, from 112.123.118.23, via Bundle-Ether201, Backup (Local-LFA)
      Route metric is 24
    144.133.190.213, from 112.123.118.23, via Bundle-Ether111, Protected
      Route metric is 16
  No advertising protos.
```

Otherwise route will be flagged as invalid and will produce recursive lookup error log events.

```
RP/0/RP0/CPU0:Jan 22 19:19:08.529 GST : ipv4_rib[1169]: %ROUTING-RIB-7-
SERVER_ROUTING_DEPTH : Recursion loop looking up prefix 144.133.128.42 in Vrf:
"default" Tbl: "default" Safi: "Unicast" added by bgp
RP/0/RP0/CPU0:SR-Testing-Adn-PE#sh route 144.133.128.42/32
Sun Jan 22 19:20:22.706 GST

Routing entry for 144.133.128.42/32
  Known via "ospf 101", distance 110, metric 41, labeled SR, type intra area
  Installed Jan 22 19:19:27.958 for 00:00:54
  Routing Descriptor Blocks
    172.17.2.9, from 144.133.128.42, via Bundle-Ether111.302, Backup (Local-LFA)
      Route metric is 45
    172.17.2.11, from 144.133.128.42, via Bundle-Ether333.302, Protected
      Route metric is 41
  No advertising protos.
RP/0/RP0/CPU0:SR-Testing-Adn-PE#sh isis instance test-isis   route 144.133.128.42/32
Sun Jan 22 19:20:34.908 GST

The requested route 144.133.128.42/32 was not found in the IS-IS test-isis   IPv4
Unicast Route Table

RP/0/RP0/CPU0:SR-Testing-Adn-PE#sh bgp ipv4 labeled-unicast 144.133.128.42
Sun Jan 22 19:20:45.099 GST
BGP routing table entry for 144.133.128.42/32
Versions:
  Process           bRIB/RIB  SendTblVer
  Speaker           3105075       3105075
    Local Label: 527034
Last Modified: Jan 22 19:19:29.126 for 00:01:16
Paths: (1 available, best #1)
  Advertised IPv4 Labeled-unicast paths to update-groups (with more than one peer):
    0.2
  Path #1: Received by speaker 0
  Advertised IPv4 Labeled-unicast paths to update-groups (with more than one peer):
    0.2
  Local, (Received from a RR-client)
```

```
        144.133.128.42 (metric 41) from 144.133.128.5 (144.133.128.42)
                <= An active BGP route cannot have the NLRI next-hop address the same as
the prefix being advertised.
        Received Label 3
          This
        Origin IGP, metric 0, localpref 100, aigp metric 0, valid, internal, best,
group-best, labeled-unicast
        Received Path ID 1, Local Path ID 1, version 3105075
        Community: 65003:1195
                <= Community sows the route is from a SEP PE in the same state (VIC) as
the ASBRs. Therefore this node must also have ISIS enabled (whic hit does not at this
stage).
        Originator: 144.133.128.42, Cluster list: 144.133.128.5
        Total AIGP metric 41
        Label-Index: 6042
RP/0/RP0/CPU0:SR-Testing-Adn-PE#
```

As a result, the Next-Generation Core ASBRs in a given state must configure a specific OSPF administrative distance for the loopback addresses of Legacy Core routers, ensuring they are not assigned a value of "210" by the ospf 101 distance 210 command. This applies to any OSPF node originating a BGP-LU route where the Next-Hop is the same as the advertised prefix, and the node is not running ISIS as the routing protocol.

```
RP/0/RP0/CPU0:SR-Testing-Adn-PE#sh run router ospf 101 | i distance
Sun Jan 22 19:14:37.230 GST
 distance 255 131.144.0.1 0.0.0.0
 distance 255 131.144.0.2 0.0.0.0
 distance 255 131.144.0.3 0.0.0.0
 distance 255 131.144.0.4 0.0.0.0
 distance 255 131.144.0.5 0.0.0.0
 distance 255 131.144.0.6 0.0.0.0
 distance 255 131.144.0.7 0.0.0.0
 distance 255 131.144.0.8 0.0.0.0
 distance 255 131.144.0.9 0.0.0.0
 distance 255 131.144.0.10 0.0.0.0
 distance 255 111.133.0.0.11 0.0.0.0
 distance 255 111.133.0.0.12 0.0.0.0
 distance 255 111.133.0.0.13 0.0.0.0
 distance 255 111.133.0.0.14 0.0.0.0
 distance 255 111.133.0.0.15 0.0.0.0
 distance 255 111.133.0.0.16 0.0.0.0
 distance 255 111.133.0.0.17 0.0.0.0
 distance 110 112.123.118.23 0.0.0.0
 distance 110 134.132.116.2 0.0.0.0
RP/0/RP0/CPU0:SR-Testing-Adn-PE#
```

Singapore ASBR receives BGP-LU route for legacy Core CRS router in Singapore

```
RP/0/RP1/CPU0:SR-Test-Adn-PE-2#sh route 144.133.128.4/32
```

```
Sun Jan 22 20:52:14.719 GST

Routing entry for 144.133.128.4/32
  Known via "ospf 101", distance 110, metric 25, labeled SR, type intra area
  Installed Jan 22 20:52:04.570 for 00:00:10
  Routing Descriptor Blocks
    144.133.190.204, from 144.133.128.4, via Bundle-Ether222, Backup (Local-LFA)
      Route metric is 33
    144.133.190.225, from 144.133.128.4, via Bundle-Ether333, Protected
      Route metric is 25


RP/0/RP1/CPU0:SR-Test-Adn-PE-2#show bgp ipv4 labeled-unicast 144.133.128.4/32
Sun Jan 22 20:52:23.863 GST
BGP routing table entry for 144.133.128.4/32
Versions:
  Process           bRIB/RIB  SendTblVer
  Speaker           31184582     31184582
    Local Label: 520107
Last Modified: Jan 22 20:47:37.616 for 00:04:46
Paths: (1 available, best #1)
  Advertised IPv4 Labeled-unicast paths to update-groups (with more than one peer):
    0.2 0.4
  Path #1: Received by speaker 0
  Advertised IPv4 Labeled-unicast paths to update-groups (with more than one peer):
    0.2 0.4
  Local, (Received from a RR-client)
    144.133.128.4 (metric 25) from 144.133.128.4 (144.133.128.4)
      Received Label 3
      Origin IGP, metric 0, localpref 100, valid, internal, best, group-best,
labeled-unicast
      Received Path ID 1, Local Path ID 1, version 31184582
      Community: 65002:8669
      Label-Index: 6
RP/0/RP1/CPU0:SR-Test-Adn-PE-2#sh isis instance test-isis   route 144.133.128.4/32
                                  <= No ISIS route, OSPF admin-distance for this
prefix must remain 110 not 210.
Sun Jan 22 20:56:10.558 GST

The requested route 144.133.128.4/32 was not found in the IS-IS test-isis   IPv4
Unicast Route Table


RP/0/RP1/CPU0:SR-Test-Adn-PE-2#show bgp ipv4 labeled-unicast community 65002:8669 | b
Netw
Sun Jan 22 21:00:45.374 GST
   Network           Next Hop        Metric LocPrf Weight Path
*>i144.133.128.3/32   144.133.128.3        0    100      0 i
      <= SR-Test-Core (CRS)
*>i144.133.128.4/32   144.133.128.4        0    100      0 i
      <= SR-Core-002 (CRS)
*>i144.133.128.139/32 144.133.128.3      101    100      0 i
* i                   144.133.128.4      101    100      0 i

Processed 3 prefixes, 4 paths
```

```
RP/0/RP1/CPU0:SR-Test-Adn-PE-2#sh bgp ipv4 labeled-unicast labels wide | i
"Label|144.133.128.[34]/32|144.133.128.139/32"
Sun Jan 22 20:59:28.803 GST
   Network                                   Next Hop
Rcvd Label      Local Label
*>i144.133.128.3/32                          144.133.128.3
3               600005
*>i144.133.128.4/32                          144.133.128.4
3               600006
*>i144.133.128.139/32                        144.133.128.3
603211          603211
RP/0/RP1/CPU0:SR-Test-Adn-PE-2#




RP/0/RP0/CPU0:SR-Test-Core#sh run router bgp 65530 address-family ipv4 unicast
Sun Jan 22 21:07:47.550 GST
router bgp 65530
 address-family ipv4 unicast
  additional-paths receive
  maximum-paths ibgp 4
  additional-paths selection route-policy BGP-LU_PATH_SELECTION
  network 144.133.128.3/32 route-policy SET_SR_INDEX                <= Set the SR
Index and aigp-cost for the core router's own loopback interface.
  network 144.133.128.139/32
  allocate-label all
 !
!




RP/0/RP0/CPU0:SR-Test-Core#sh run route-policy SET_SR_INDEX
Sun Jan 22 21:07:57.841 GST
route-policy SET_SR_INDEX
  set label-index 5
  set aigp-metric igp-cost
  set origin igp
  done
end-policy
!

RP/0/RP0/CPU0:SR-Test-Core#
```

VIC ASBR receives reflected routes from local State RR (vm-test-12) for Singapore Legacy Core router loopback (144.133.128.3/32)

```
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh bgp ipv4 labeled-unicast 144.133.128.3/32
Sun Jan 22 21:27:47.454 GST
BGP routing table entry for 144.133.128.3/32
Versions:
  Process            bRIB/RIB  SendTblVer
  Speaker               289135      289135
    Local Label: 502036
Last Modified: Jan 22 20:45:36.230 for 00:42:11
Paths: (3 available, best #1)
  Advertised IPv4 Labeled-unicast paths to update-groups (with more than one peer):
    0.2
  Advertised IPv4 Labeled-unicast paths to peers (in unique update groups):
    112.123.118.232
  Path #1: Received by speaker 0
  Advertised IPv4 Labeled-unicast paths to update-groups (with more than one peer):
    0.2
  Advertised IPv4 Labeled-unicast paths to peers (in unique update groups):
    112.123.118.232
  Local, (Received from a RR-client)
    144.133.128.15 (metric 51) from 144.133.128.5 (144.133.128.3)
      Received Label 600005
      Origin IGP, metric 0, localpref 100, aigp metric 16, valid, internal, best,
group-best, labeled-unicast
      Received Path ID 1, Local Path ID 1, version 289153
      Community: 65002:8669
      Originator: 144.133.128.3, Cluster list: 144.133.128.5, 144.133.128.6,
144.133.128.15
      Total AIGP metric 67
      Label-Index: 5
  Path #2: Received by speaker 0
  Not advertised to any peer
  Local, (Received from a RR-client)
    144.133.128.16 (metric 59) from 144.133.128.5 (144.133.128.3)
      Received Label 600005
      Origin IGP, metric 0, localpref 100, aigp metric 16, valid, internal, labeled-
unicast
      Received Path ID 2, Local Path ID 0, version 0
      Community: 65002:8669
      Originator: 144.133.128.3, Cluster list: 144.133.128.5, 144.133.128.6,
144.133.128.16
      Total AIGP metric 75
      Label-Index: 5
  Path #3: Received by speaker 0
  Not advertised to any peer
  Local, (Received from a RR-client)
    144.133.128.17 (metric 59) from 144.133.128.5 (144.133.128.3)
      Received Label 600005
      Origin IGP, metric 0, localpref 100, aigp metric 16, valid, internal, backup,
add-path, labeled-unicast
      Received Path ID 3, Local Path ID 2, version 289153
      Community: 65002:8669
      Originator: 144.133.128.3, Cluster list: 144.133.128.5, 144.133.128.6,
144.133.128.17
      Total AIGP metric 75
      Label-Index: 5
```

```
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh route 144.133.128.3/32
Sun Jan 22 21:32:19.320 GST

Routing entry for 144.133.128.3/32
  Known via "ospf 101", distance 110, metric 66, labeled SR, type intra area
  Installed Jan 22 19:29:34.761 for 02:02:44
  Routing Descriptor Blocks
    144.133.190.191, from 144.133.128.3, via Bundle-Ether111, Backup (Local-LFA)
      Route metric is 74
    144.133.190.201, from 144.133.128.3, via Bundle-Ether114, Protected
      Route metric is 66
  No advertising protos.
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh run route-policy BGP-LU_ADMINDIST
Sun Jan 22 21:32:21.668 GST
route-policy BGP-LU_ADMINDIST
  if community matches-any (65007:10589, 65002:10589, 65530:14116) then
    set administrative-distance 105
  endif
  done
end-policy
!

RP/0/RP0/CPU0:SR-Test-Adn-PE-3(config)#route-policy BGP-LU_ADMINDIST
Sun Jan 22 21:32:28.663 GST

RP/0/RP0/CPU0:SR-Test-Adn-PE-3(config-rpl)#if community matches-any (65007:10589,
65002:10589, 65530:14116, 65002:8669) then
RP/0/RP0/CPU0:SR-Test-Adn-PE-3(config-rpl-if)#    set administrative-distance 105
RP/0/RP0/CPU0:SR-Test-Adn-PE-3(config-rpl-if)#  endif
RP/0/RP0/CPU0:SR-Test-Adn-PE-3(config-rpl)#  done
RP/0/RP0/CPU0:SR-Test-Adn-PE-3(config-rpl)#end-policy
RP/0/RP0/CPU0:SR-Test-Adn-PE-3(config)#commit


^ZRP/0/RP0/CPU0: Sun Jan 22 21:32:56.059 GST : config[66089]: %MGBL-CONFIG-6-
DB_COMMIT : Configuration committed by user 'adnan-per'. Use 'show configuration
commit changes 1000001090' to view the changes.
RP/0/RP0/CPU0:SR-Test-Adn-PE-3(config)#
RP/0/RP0/CPU0: Sun Jan 22 21:32:56.121 GST : config[66089]: %MGBL-SYS-5-CONFIG_I :
Configured from console by adnan-per on vty0 (141.168.206.238)
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh route 144.133.128.3/32
Sun Jan 22 21:33:02.739 GST

Routing entry for 144.133.128.3/32
  Known via "bgp 65530", distance 105, metric 67, [ei]-bgp (AIGP metric), labeled SR,
type internal
  Installed Sun Jan 22 :32:56.108 for 00:00:06
  Routing Descriptor Blocks
    144.133.128.15, from 144.133.128.5
```

```
      Route metric is 67
  No advertising protos.
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh route 144.133.128.4/32
Sun Jan 22 21:33:12.015 GST

Routing entry for 144.133.128.4/32
  Known via "bgp 65530", distance 105, metric 76, [ei]-bgp (AIGP metric), labeled SR,
type internal
  Installed Sun Jan 22 :32:56.109 for 00:00:15
  Routing Descriptor Blocks
    144.133.128.15, from 144.133.128.5
      Route metric is 76
  No advertising protos.
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh route 144.133.128.139/32
Sun Jan 22 21:33:16.036 GST

Routing entry for 144.133.128.139/32
  Known via "bgp 65530", distance 105, metric 101, [ei]-bgp, labeled SR, type
internal
  Installed Sun Jan 22 :32:56.111 for 00:00:19
  Routing Descriptor Blocks
    144.133.128.15, from 144.133.128.5
      Route metric is 101
  No advertising protos.



RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh mpls for pref 144.133.128.3/32
Sun Jan 22 21:33:56.097 GST
Local  Outgoing    Prefix            Outgoing     Next Hop        Bytes
Label  Label       or ID             Interface                    Switched
------ ----------- ----------------- ------------ --------------- ------------
600005 600005      SR Pfx (idx 5)                 144.133.128.15  0
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh mpls for pref 144.133.128.4/32
Sun Jan 22 21:33:59.609 GST
Local  Outgoing    Prefix            Outgoing     Next Hop        Bytes
Label  Label       or ID             Interface                    Switched
------ ----------- ----------------- ------------ --------------- ------------
600006 600006      SR Pfx (idx 6)                 144.133.128.15  0
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh mpls for pref 144.133.128.139/32
Sun Jan 22 21:34:02.259 GST
Local  Outgoing    Prefix            Outgoing     Next Hop        Bytes
Label  Label       or ID             Interface                    Switched
------ ----------- ----------------- ------------ --------------- ------------
603211 603211      SR Pfx (idx 3211)              144.133.128.15  0
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#


RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh cef mpls local-label 603211 EOS

Sun Jan 22 21:34:32.049 GST
Label/EOS 603211/1, Label-type BGP, version 14617801, labeled SR, internal 0x5000001
0x8040 (ptr 0x9161d448) [1], 0x600 (0xada9a2b8), 0xa08 (0xad9873c8)
 Updated Sun Jan 22 :32:56.182
 Prefix Len 21, traffic index 0, precedence n/a, priority 4
```

```
   gateway array (0xa97f37d8) reference count 618, flags 0x78, source rib (7), 0
backups
                 [207 type 5 flags 0x8441 (0x93a4eda8) ext 0x0 (0x0)]
  LW-LDI[type=5, refc=3, ptr=0xada9a2b8, sh-ldi=0x93a4eda8]
  gateway array update type-time 1 Feb 26 16:18:43.475
 LDI Update time Feb 26 16:18:43.475
 LW-LDI-TS Sun Jan 22 :32:56.182
   via 144.133.128.15/32, 3 dependencies, recursive [flags 0x6000]
    path-idx 0 NHID 0x0 [0xa7cb88c0 0x0]
    recursion-via-/32
    next hop 144.133.128.15/32 via 600054/0/21
     local label 603211
     next hop 144.133.190.201/32 BE204      labels imposed {ImplNull 603211}

    Load distribution: 0 (refcount 207)

    Hash  OK  Interface                 Address
    0     Y   recursive                 600054/0
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh cef mpls local-label 600005 EOS
Sun Jan 22 21:34:45.858 GST
Label/EOS 600005/1, Label-type BGP, version 14617795, labeled SR, internal 0x5000001
0x8040 (ptr 0xab9a0198) [1], 0x600 (0xada72010), 0xa08 (0xad9736e8)
 Updated Sun Jan 22 :32:56.183
 Prefix Len 21, traffic index 0, precedence n/a, priority 4
  gateway array (0xa97f37d8) reference count 618, flags 0x78, source rib (7), 0
backups
                 [207 type 5 flags 0x8441 (0x93a4eda8) ext 0x0 (0x0)]
  LW-LDI[type=5, refc=3, ptr=0xada72010, sh-ldi=0x93a4eda8]
  gateway array update type-time 1 Feb 26 16:18:43.476
 LDI Update time Feb 26 16:18:43.476
 LW-LDI-TS Sun Jan 22 :32:56.183
   via 144.133.128.15/32, 3 dependencies, recursive [flags 0x6000]
    path-idx 0 NHID 0x0 [0xa7cb88c0 0x0]
    recursion-via-/32
    next hop 144.133.128.15/32 via 600054/0/21
     local label 600005
     next hop 144.133.190.201/32 BE204      labels imposed {ImplNull 600005}

    Load distribution: 0 (refcount 207)

    Hash  OK  Interface                 Address
    0     Y   recursive                 600054/0
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh cef mpls local-label 600006 EOS
Sun Jan 22 21:34:49.759 GST
Label/EOS 600006/1, Label-type BGP, version 14617797, labeled SR, internal 0x5000001
0x8040 (ptr 0xab9b0978) [1], 0x600 (0xada77548), 0xa08 (0xad98c5e8)
 Updated Sun Jan 22 :32:56.182
 Prefix Len 21, traffic index 0, precedence n/a, priority 4
  gateway array (0xa97f37d8) reference count 618, flags 0x78, source rib (7), 0
backups
                 [207 type 5 flags 0x8441 (0x93a4eda8) ext 0x0 (0x0)]
  LW-LDI[type=5, refc=3, ptr=0xada77548, sh-ldi=0x93a4eda8]
  gateway array update type-time 1 Feb 26 16:18:43.475
 LDI Update time Feb 26 16:18:43.475
 LW-LDI-TS Sun Jan 22 :32:56.182
```

```
   via 144.133.128.15/32, 3 dependencies, recursive [flags 0x6000]
    path-idx 0 NHID 0x0 [0xa7cb88c0 0x0]
    recursion-via-/32
    next hop 144.133.128.15/32 via 600054/0/21
     local label 600006
     next hop 144.133.190.201/32 BE204       labels imposed {ImplNull 600006}

    Load distribution: 0 (refcount 207)

    Hash  OK  Interface                 Address
    0     Y   recursive                 600054/0
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#




RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh route 144.133.160.35/32
Sun Jan 22 21:35:28.929 GST

Routing entry for 144.133.160.35/32
  Known via "bgp 65530", distance 105, metric 131, [ei]-bgp (AIGP metric), labeled
SR, type internal
  Installed Sun Jan 22 :32:56.111 for 00:02:32
  Routing Descriptor Blocks
    144.133.160.3, from 144.133.128.5, BGP multi path
      Route metric is 131
    144.133.160.4, from 144.133.128.5, BGP multi path
      Route metric is 131
  No advertising protos.
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh mpls for pref 144.133.160.35/32
Sun Jan 22 21:35:57.240 GST
Local  Outgoing    Prefix             Outgoing     Next Hop        Bytes
Label  Label       or ID              Interface                    Switched
------ ----------- ------------------ ------------ --------------- ------------
608227 608227      SR Pfx (idx 8227)               144.133.160.3   0
       608227      SR Pfx (idx 8227)               144.133.160.4   286720
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh cef mpls local-label 608227 EoS
Sun Jan 22 21:36:06.155 GST
Label/EOS 608227/1, Label-type BGP, version 14617808, labeled SR, internal 0x5000001
0x8040 (ptr 0xa7caafa8) [1], 0x600 (0xa7ff4440), 0xa08 (0xa7ec5180)
 Updated Sun Jan 22 :32:56.179
 Prefix Len 21, traffic index 0, precedence n/a, priority 4
  gateway array (0xa97f49f8) reference count 3, flags 0x78, source rib (7), 0 backups
              [2 type 5 flags 0x8441 (0x93a3b488) ext 0x0 (0x0)]
  LW-LDI[type=5, refc=3, ptr=0xa7ff4440, sh-ldi=0x93a3b488]
  gateway array update type-time 1 Feb 26 16:18:43.329
 LDI Update time Feb 26 16:18:43.329
 LW-LDI-TS Feb 26 16:18:43.329
   via 144.133.160.3/32, 3 dependencies, recursive, bgp-multipath [flags 0x6080]
    path-idx 0 NHID 0x0 [0xa7cb65a8 0x0]
    recursion-via-/32
    next hop 144.133.160.3/32 via 600007/0/21
     local label 608227
     next hop 144.133.190.201/32 BE204       labels imposed {600007 608227}
```

```
    via 144.133.160.4/32, 3 dependencies, recursive, bgp-multipath [flags 0x6080]
     path-idx 1 NHID 0x0 [0xa7cb63f8 0x0]
     recursion-via-/32
     next hop 144.133.160.4/32 via 600008/0/21
      local label 608227
      next hop 144.133.190.201/32 BE204        labels imposed {600008 608227}

     Load distribution: 0 1 (refcount 2)

     Hash  OK  Interface                 Address
     0     Y   recursive                 600007/0
     1     Y   recursive                 600008/0
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#
```

It is essential that the BGP-LU CMN OSS routes are made active in the IP Routing Information Base (RIB) on the Next-Generation Core routers. This prevents inband management traffic from non-OSPF routers, such as SPEs configured with BGP-LU/ISIS, from being blackholed when sent to the OSS networks.

```
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh run route-policy BGP-LU_ADMINDIST
Sun Jan 22 21:40:54.784 GST
route-policy BGP-LU_ADMINDIST
  if community matches-any (65007:10589, 65002:10589, 65530:14116, 65002:8669) then
    set administrative-distance 105
  endif
  done
end-policy
!

RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh run router bgp 65530 address-family ipv4 unicast
table-policy BGP-LU_ADMINDIST
Sun Jan 22 21:41:18.638 GST
router bgp 65530
 address-family ipv4 unicast
  table-policy BGP-LU_ADMINDIST
 !
!

RP/0/RP0/CPU0:SR-Test-Adn-PE-3#
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh route 141.168.206.0/24
Sun Jan 22 21:40:40.264 GST

Routing entry for 141.168.206.0/24
  Known via "bgp 65530", distance 105, metric 125, [ei]-bgp (AIGP metric)
  Tag 65529, type internal
  Installed Sun Jan 22 :32:56.112 for 00:07:44
  Routing Descriptor Blocks
    134.132.116.25, from 144.133.128.5
      Route metric is 125
  No advertising protos.


RP/0/RP0/CPU0:SR-Test-Adn-PE-3#
```

```
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh bgp ipv4 labeled-unicast 141.168.206.0/24 neighbor
112.123.118.232 detail
Sun Jan 22 21:50:58.336 GST
BGP routing table entry for 141.168.206.0/24
Versions:
  Process              bRIB/RIB   SendTblVer
  Speaker                 15793          15793
    Local Label: 44621 (no rewrite);
    Flags: 0x010030a2+0x20020000; backup available;
Last Modified: Feb 27 21:24:45.230 for 6d00h
Paths: (0 available)
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh mpls for labels 25530
Sun Jan 22 21:51:09.916 GST
Local   Outgoing    Prefix             Outgoing     Next Hop        Bytes
Label   Label       or ID              Interface                    Switched
------  ----------- ------------------ ------------ --------------- ------------
25530   463306      141.168.206.0/24                134.132.116.25  61200
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#sh cef mpls local-label 25530 EoS
Sun Jan 22 21:51:18.284 GST
Label/EOS 25530/1, Label-type BGP, version 14617783, internal 0x5000001 0x40 (ptr
0xada29558) [1], 0x600 (0xaba2f108), 0xa08 (0xa88a1168)
 Updated Sun Jan 22 :32:56.183
 Prefix Len 21, traffic index 0, precedence n/a, priority 4
  gateway array (0xa97f2788) reference count 234, flags 0x78, source rib (7), 0
backups
               [79 type 5 flags 0x8441 (0x93a4ece8) ext 0x0 (0x0)]
  LW-LDI[type=5, refc=3, ptr=0xaba2f108, sh-ldi=0x93a4ece8]
  gateway array update type-time 1 Feb 26 16:18:43.333
 LDI Update time Feb 26 16:18:43.333
 LW-LDI-TS Feb 27 21:24:45.637
   via 134.132.116.25/32, 3 dependencies, recursive [flags 0x6000]
    path-idx 0 NHID 0x0 [0xa7cb8a68 0x0]
    recursion-via-/32
    next hop 134.132.116.25/32 via 608217/0/21
     local label 25530
     next hop 144.133.190.201/32 BE204      labels imposed {608217 463306}

    Load distribution: 0 (refcount 79)

    Hash  OK  Interface              Address
    0     Y   recursive              608217/0
RP/0/RP0/CPU0:SR-Test-Adn-PE-3#
```

Conclusion:

When a BGP-LU route is originated by a PE/Core router for its own loopback address, it advertises the Segment Routing (SR) Index and a label of Implicit-Null. The ASBR propagates the BGP-LU route while preserving the received SR Index. It then calculates a new label from its own SRGB based on the received