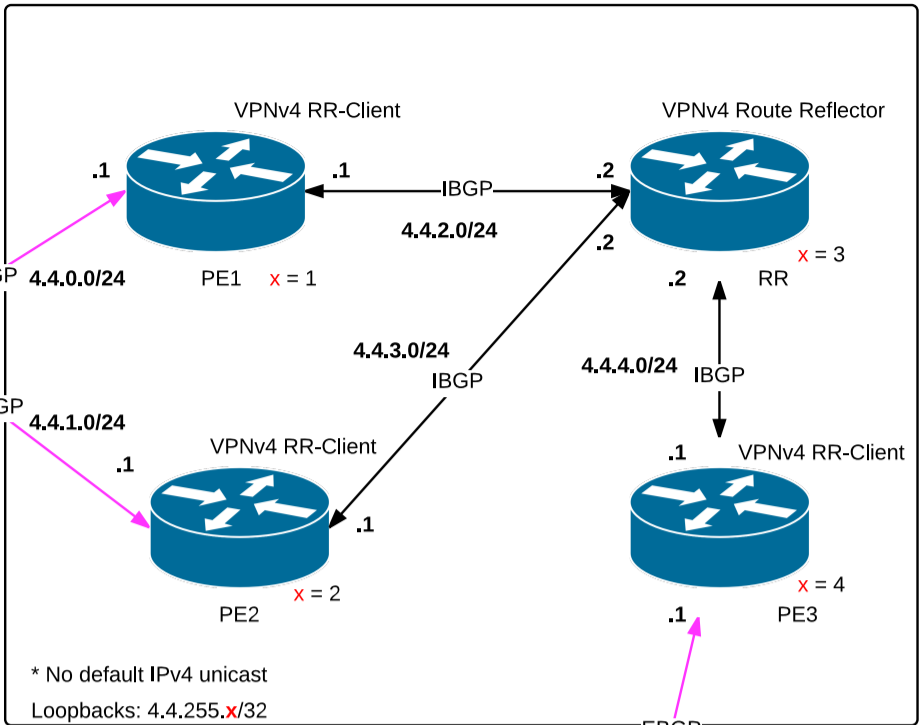
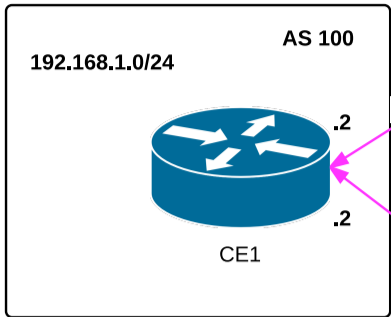
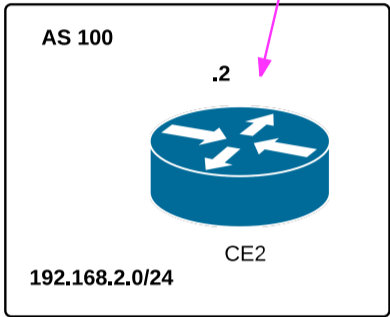


router bgp 100
neighbor 4.4.0.1 remote-as 4.4
! do not remove this next line
neighbor 4.4.0.1 weight 500
neighbor 4.4.1.1 remote-as 4.4



VRF VPN_CCIE



Tasks

MPLS/IGP

1. Configure an IGP for AS 4.4 such that the command **mpls ldp autoconfig** can be used.
2. Configure LDP within AS 4.4 using the command **mpls ldp autoconfig** rather than the interface command **mpls ip**

MP-IBGP

1. Configure MP-IBGP within AS 4.4
2. RR is the VPNv4 route reflector; all other routers are VPNv4 RR clients
3. Ensure the default IPv4 unicast address family is not activated for every neighbour

VRE

1. Configure the VRF "VPN_CCIE" using RD(s) of your choice
2. Configure the import and export RT for the VRF as 100:100

PE-CE Routing

1. Configure PE-CE routing using EBGP, noting that CE1 and CE2 have the same AS number
2. Configure CE1 to prefer the CE1-PE1 link using BGP Weight (consider this link the primary path for the site)
3. Verify connectivity between the CE routers
4. At this point CE1 should have two known paths for the 192.168.2.0/24 network

CE Convergence Optimization

1. Configure CE1 such that it can switch over to an alternative, pre-downloaded (to the CEF tables) path immediately after the primary path fails. The solution should result in the following output:

```
CE1#show ip bgp
BGP table version is 6, local router ID is 4.4.1.2
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
*> 192.168.1.0    0.0.0.0                0   32768 i
*b 192.168.2.0    4.4.1.1                0 262148 100 i
*>                4.4.0.1                500 262148 100 i
```

And

```
CE1#show ip route repair-paths | b ^B
B   192.168.2.0/24 [20/0] via 4.4.0.1, 00:11:56
    [RPR][20/0] via 4.4.1.1, 00:11:56
```

VPNv4 Convergence Optimization

1. Configure the appropriate device(s) in AS 4.4 such that PE2's BGP table has two paths to the 192.168.1.0/24 network **without** changing the BGP peerings (i.e. do not create a full mesh of IBGP peers between the PE's)

BGP routing table entry for 4.4.255.4:100:192.168.1.0/24, version 4

Paths: (2 available, best #2, table VPN_CCIE)

Advertised to update-groups:

3

Refresh Epoch 4

100, imported path from 4.4.255.2:100:192.168.1.0/24

4.4.255.2 (metric 21) from 4.4.255.3 (4.4.255.3)

Origin IGP, metric 0, localpref 100, valid, internal

Extended Community: RT:100:100

Originator: 4.4.3.1, Cluster list: 4.4.255.3

mpls labels in/out nolabel/16

Refresh Epoch 4

100, imported path from 4.4.255.1:100:192.168.1.0/24

4.4.255.1 (metric 21) from 4.4.255.3 (4.4.255.3)

Origin IGP, metric 0, localpref 100, valid, internal, best

Extended Community: RT:100:100

Originator: 4.4.2.1, Cluster list: 4.4.255.3

mpls labels in/out nolabel/1