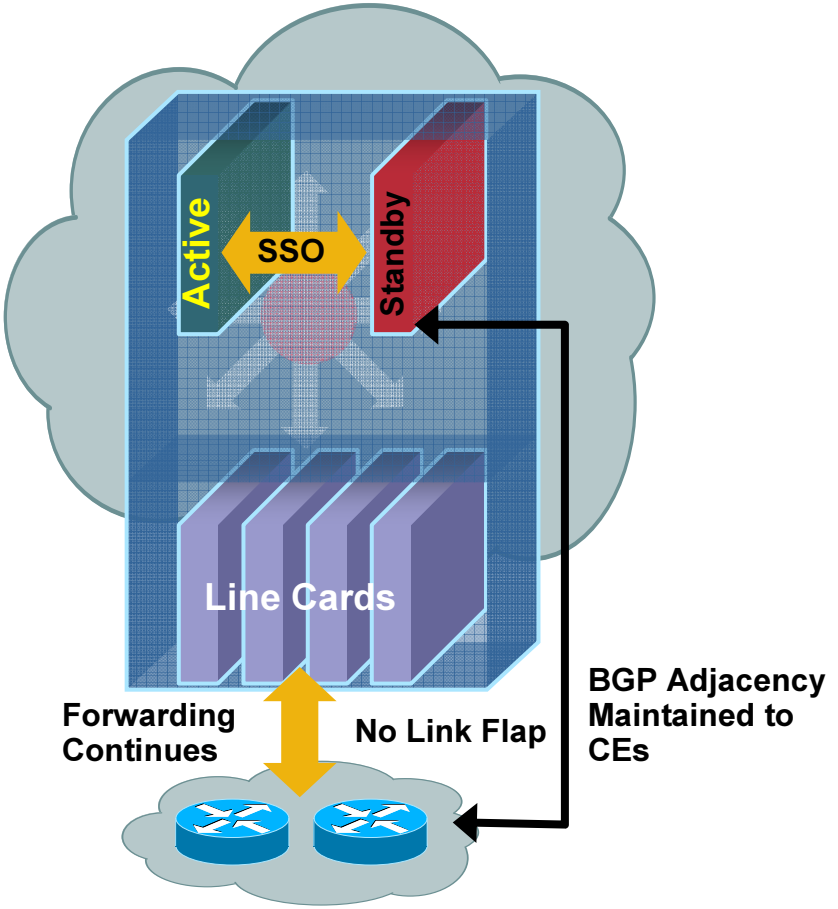
BGP Nonstop Routing

Technical Overview

BGP Non-Stop Routing

Unique, Self-Contained Edge Routing HA Solution

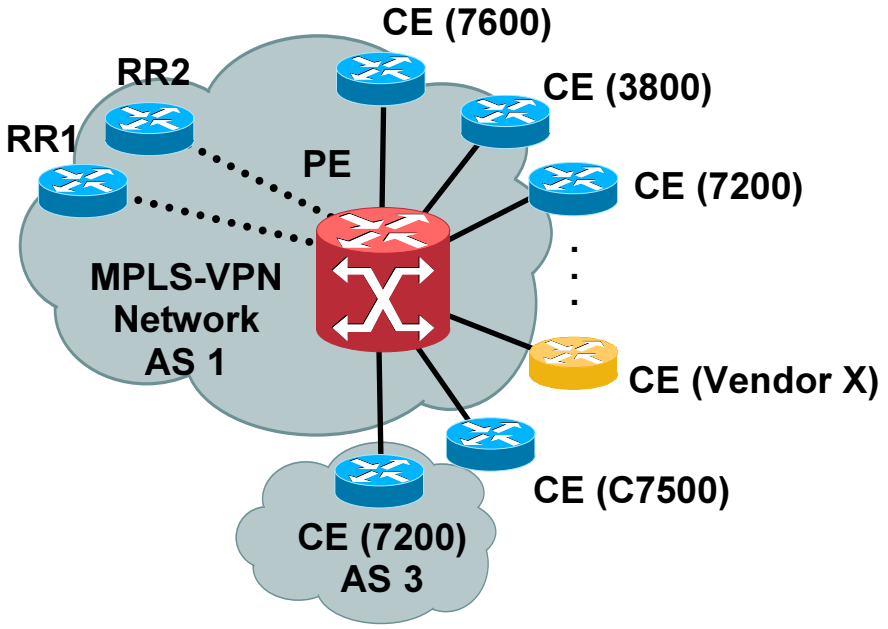
- **Simplifies NSF/SSO deployment by synchronizing edge routes automatically**
  - **NSF-aware Customer Edge devices not needed**
  - **Addresses additional network scenarios—e.g. unmanaged CPEs**
- **Delivers persistent routing for the entire customer edge**
- **Retains scalability and safety of NSF with benefits of NSR**



BGP Non-Stop Routing with SSO

- **Simplified deployment for service providers**
  - Only PEs need to be upgraded to support NSR (incremental deployment)
  - CEs are not touched! (i.e., no software upgrade required)
- **Scaling optimizations**
  - PE uses NSR with CEs that are not NSF-aware
  - PE uses NSF (Graceful Re-Start) with NSF-aware CEs
  - iBGP sessions to RRs use NSF (Graceful Re-Start)

PE Focused Deployment Scenario

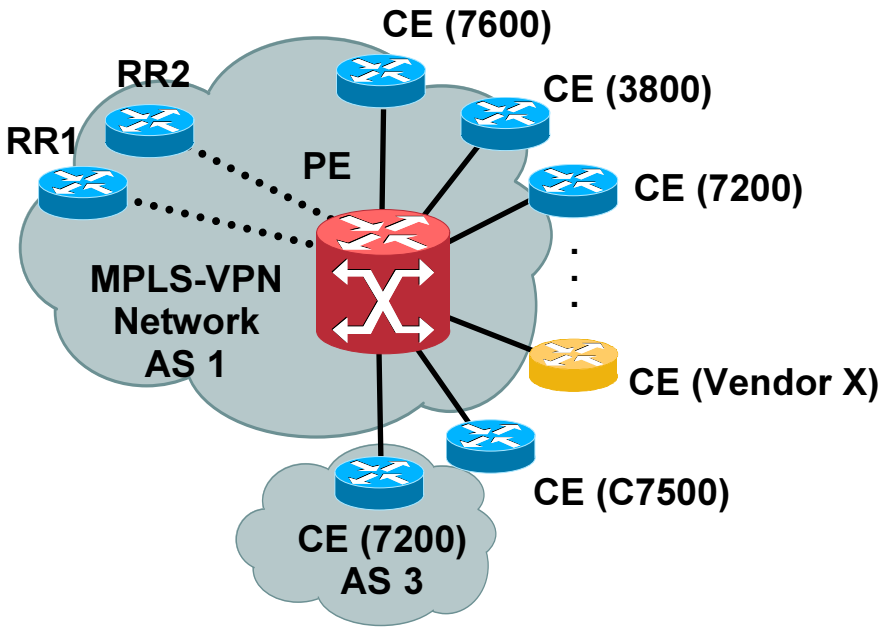


RR: 10.1.1.1 RR: Route Reflector
PE: 10.2.2.2 PE: Provider Edge
CE: 10.3.3.3 CE: Customer Edge

Sample Provider Edge Configuration
NSR Peering with Desired CEs

```
router bgp 1
no synchronization
bgp log-neighbor-changes
bgp graceful-restart restart-time 120
bgp graceful-restart stalepath-time 360
bgp graceful-restart
neighbor 10.1.1.1 remote-as 1
neighbor 10.1.1.1 update-source Loopback0
no auto-summary
!
address-family vpnv4
 neighbor 10.1.1.1 activate
 neighbor 10.1.1.1 send-community both
exit-address-family
!
address-family ipv4 vrf Customer1
 neighbor 10.3.3.3 remote-as 3
 neighbor 10.3.3.3 ha-mode sso
 neighbor 10.3.3.3 activate
 neighbor 10.3.3.3 as-override
exit-address-family
!
```

BGP NSR with SSO Deployment Scenario

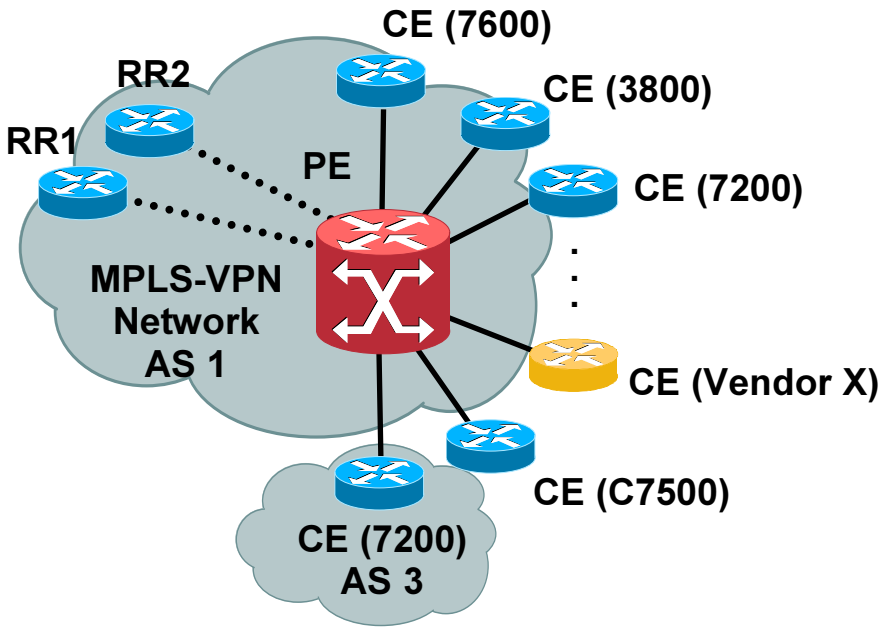


RR: 10.1.1.1 — RR: Route Reflector
PE: 10.2.2.2 — PE: Provider Edge
CE: 10.3.3.3 — CE: Customer Edge

Sample Customer Edge Configuration
Regular BGP Peering Between CE and PE

```
router bgp 3
neighbor 10.2.2.2 remote-as 1
!
```

BGP NSR with SSO Deployment Scenario



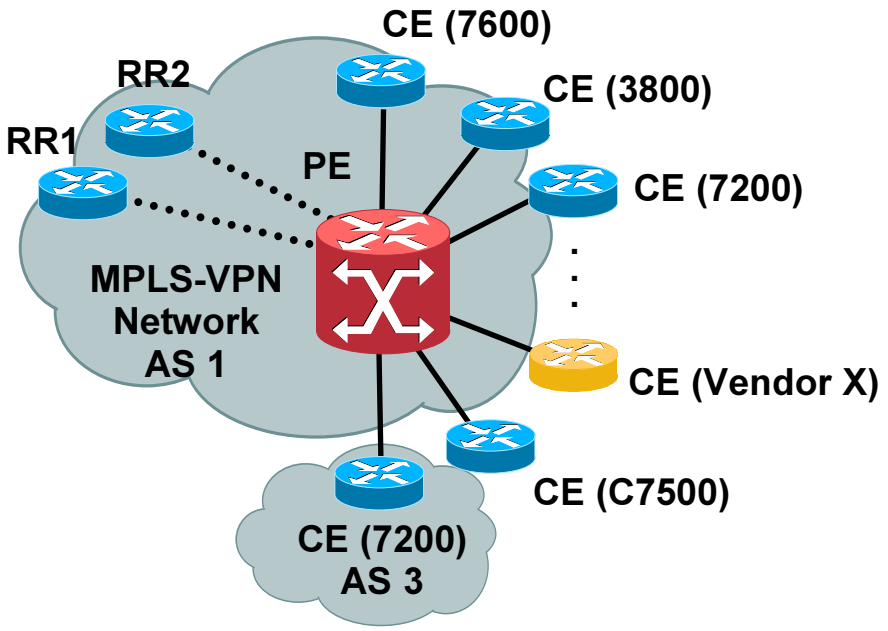
NOTE: No Special BGP Code/Configuration (i.e., NSF-Awareness) Needed on the CE Side to Take Advantage of the Non-Stop Routing Capabilities of the PE

RR: 10.1.1.1	RR: Route Reflector
PE: 10.2.2.2	PE: Provider Edge
CE: 10.3.3.3	CE: Customer Edge

Sample Route Reflector Configuration
Graceful Re-Start Between RR and PE

```
router bgp 1
no synchronization
bgp log-neighbor-changes
bgp graceful-restart restart-time 120
bgp graceful-restart stalepath-time 360
bgp graceful-restart
neighbor 10.2.2.2 remote-as 1
neighbor 10.2.2.2 update-source Loopback0
no auto-summary
!
address-family vpnv4
neighbor 10.2.2.2 activate
neighbor 10.2.2.2 route-reflector-client
neighbor 10.2.2.2 send-community both
no auto-summary
exit-address-family
!
```

BGP NSR with SSO Deployment Scenario



RR: 10.1.1.1 — RR: Route Reflector
PE: 10.2.2.2 — PE: Provider Edge
CE: 10.3.3.3 — CE: Customer Edge

BGP NSR Related Commands

neighbor *ip-address* ha-mode sso

***ip-address*: IP address of the neighbor router**

- **The `neighbor ha-mode sso` command is used to configure a BGP neighbor to support SSO; SSO is not enabled by default**
- **SSO is supported for BGP peer, BGP peer group, and BGP session template configurations; in the context of Cisco BGP NSR, SSO provides a transparent BGP failover mechanism that ensures BGP NSF in MPLS VPNv4 deployments where PE routers engage in eBGP peering relations with CEs that do not support the graceful restart mechanism**
- **SSO is enabled in BGP peer and BGP peer group configurations by issuing the neighbor ha-mode sso command under address family configuration mode for IPv4 VRF address sessions; SSO is configured in peer session templates by issuing the ha-mode sso command in session-template configuration mode**

BGP NSR Related Commands

debug ip bgp sso {events | transactions} [detail]

- **Events:** Displays BGP SSO events
- **Transactions:** Displays debugging information for Border Gateway Protocol (BGP) speaker interactions between the active RP and standby RP
- **Detail:** Displays detailed debugging information

debug ip tcp ha {events | transactions} [detail]

- **Events:** Displays TCP SSO events
- **Transactions:** Displays debugging information for TCP stack interactions between the active RP and standby RP
- **Detail:** (Optional) displays detailed debugging information

BGP NSR Related Commands

show ip bgp vpnv4 all sso summary

- **The** `show ip bgp vpnv4 all sso summary` **command is used to display the number of BGP neighbors that support Cisco BGP NSF**

```
Router# show ip bgp vpnv4 all sso summary
    Stateful switchover support enabled for 40 neighbors
```

BGP NSR Related Commands

show ip bgp vpnv4 {all | rd route-distinguisher | vrf vrf-name}
[rib-failure] [ip-prefix/length [longer-prefixes] [output-modifiers]]
[network-address [mask] [longer-prefixes] [output-modifiers]]
[cidr-only] [community] [community-list] [dampened-paths] [filter-list]
[flap-statistics] [inconsistent-as] [neighbors] [paths [line]]
[peer-group] [quote-regexp] [regexp] [summary] [labels]

- **Use this command to display VPNv4 information from the BGP database; the** `show ip bgp vpnv4 all` **command displays all available VPNv4 information**
- **The** `show ip bgp vpnv4 summary` **command displays BGP neighbor status**
- **This display output was modified to indicate whether SSO support is enabled**

BGP NSR Related Commands

show tcp ha connections

- **To display connection ID to TCP mapping data, use the** `show tcp ha connections` **command in EXEC mode**

```
Router# show tcp ha connections
SSO enabled for 40 connections
TCB      Local Address Foreign Address (state) Conn Id
71EACE60 2.0.56.1.179   2.0.56.3.58671  ESTAB  37
71EA9320 2.0.53.1.179   2.0.53.3.58659  ESTAB  34
71EA35F8 2.0.41.1.179   2.0.41.3.58650  ESTAB  22
71A21FE0 2.0.39.1.179   2.0.39.3.58641  ESTAB  20
71EAA6E0 2.0.54.1.179   2.0.54.3.58663  ESTAB  35
71EA2238 2.0.40.1.179   2.0.40.3.58646  ESTAB  21
<snip>…
```

BGP NSR Related Commands

show tcp [line-number] [tcb address]

- **To display the status of TCP connections, use the `show tcp` command in privileged EXEC mode; the display output was modified to include the SSO capability flag and to indicate the reason that the SSO property failed on a TCP connection**

Q and A