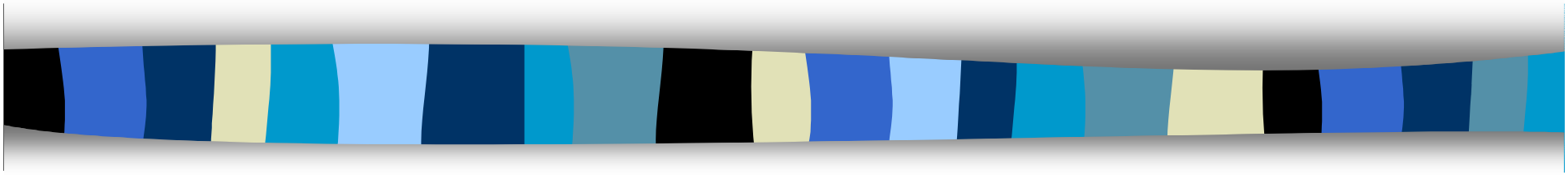
MPLS Configration 事例



JANOG6　MPLSパネル

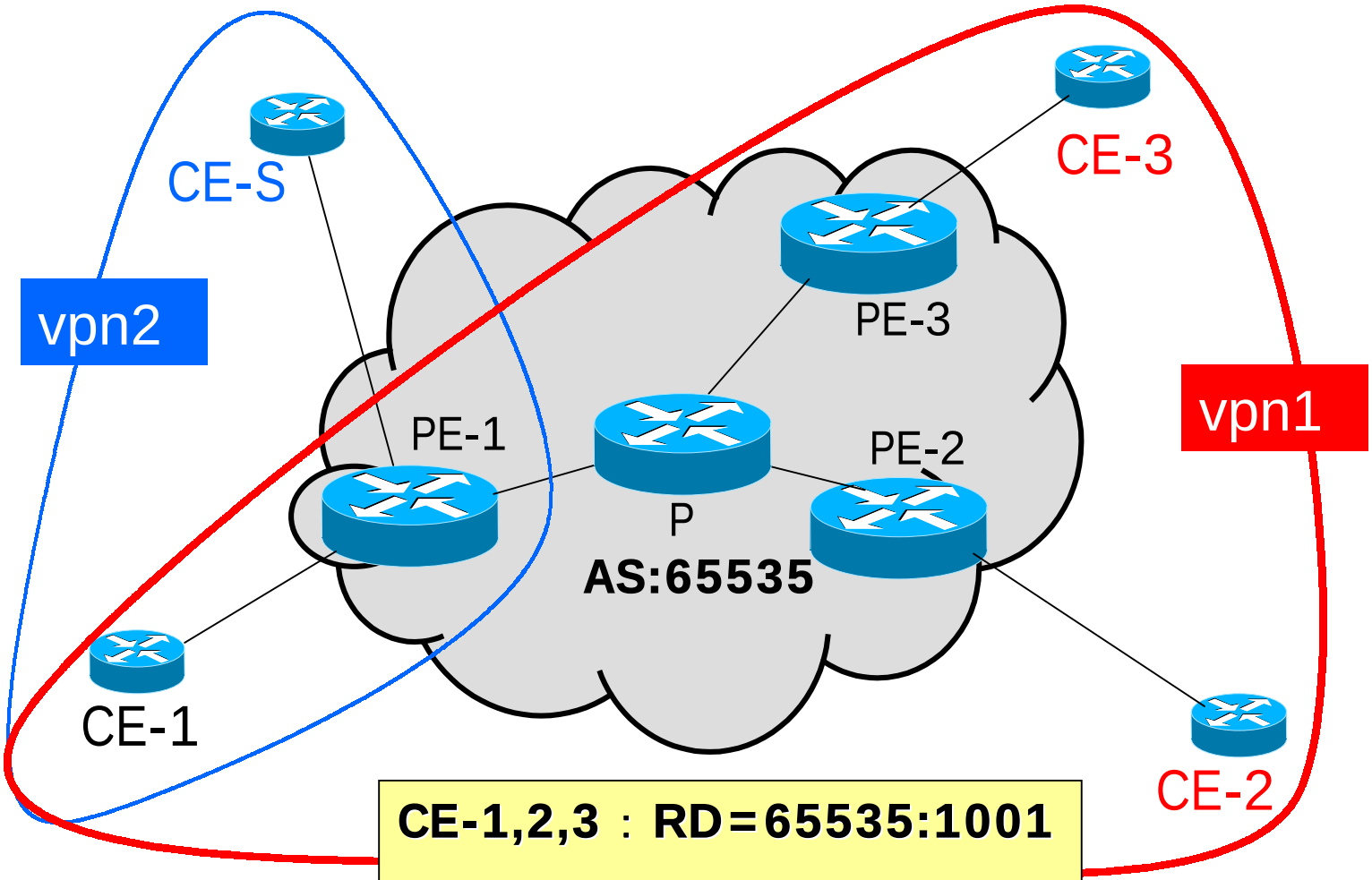
グローバルワン株式会社

MPLS Configration

- なにが必要？(Ciscoしかわかりません)
  - IOSは12.0(7) T以上がいい。
  - PEは3600, 4500, 7200, and 7500
  - PはCisco LS1010, 7200, 7500, Catalyst 8540, BPX 8650, Cisco GSR12000

  っていうのが一般的なのかな？

MPLS Configration 事例



CE-1,2,3：RD=65535:1001

CE-S：RD=65535:1002

※CE-SはCE-1とのみ通信可能

参考：Cisco社資料

MPLS Configration 事例(CE)

- CE router 編
  - 特別な設定は必要なし。(I/F、routingのみ)
  - CE-PEでのRoutingは。。。。
    - Staticが基本かな。ほかのDynamic Routing Protocolは、プロバイダーと相談

MPLS Configration 事例(CE)

Sample CE-1 configuration:

```
!
interface Ethernet 0
ip address 10.1.1.1 255.255.255.0
!
interface Serial 0
ip address 10.1.2.2 255.255.255.252
!
router bgp 1
 no synchronization
redistribute connected
neighbor PE-1 remote-as 65535
neighbor PE-1 version 4
neighbor 202.216.40.1 peer-group PE-1
default-metric 100
 no auto-summary
or ip route 0.0.0.0 0.0.0.0 serial0
!
```

CE-PEをBGP設定

→ CE-PEをstatic設定

MPLS Configration 事例(PE)

- PE router 編
  - **LDP(TDP)の設定**
  - vrf(VPN Routing/Forwarding table)の設定
  - MP-iBGPの設定
  - address-family(ipv4＆vpnv4)の設定

MPLS Configration 事例(PE)

- TDP**を動かしたい**Router/Interface**に**

cisco(config)#tag-switching ip
cisco(config-if)#tag-switching ip

と書くだけ。

MPLS Configration 事例(PE)

- PE router 編
  - LDP(TDP)の設定
  - **vrf(VPN Routing/Forwarding table)の設定**
  - MP-iBGPの設定
  - address-family(ipv4＆vpnv4)の設定

MPLS Configration 事例(PE)

- VPN**毎に**RD、route-target**を設定する**

●PE-1の場合

ip vrf vpn1　　→ vpn1という名前のvrfを定義する

rd 65535:1001　　→ <ASN>:<32 bit number>

route-target both 65535:10001

route-target export 65535:1002

route-target import 65535:1002

（PE-1のvrf=vpn1はこれらのRDの経路をinport/exportする）

ip vrf vpn2

rd 65535:1002

route-target both 65535:10002

●PE-2の場合

ip vrf vpn1

rd 65535:1001

route-target both 65535:10001

MPLS Configration 事例(PE)

- I/Fとvrfを関連付ける

●PE-1の場合

```
interface Serial5/1/2
 description Connect to CE-1
 ip vrf forwarding vpn1
 ip address 10.1.2.1 255.255.255.252
interface Serial5/1/3
 description Connect to CE-S
 ip vrf forwarding vpn2
 ip address 192.168.1.1 255.255.255.252
```

●PE-2の場合

```
interface Serial8/1/1
 description Connect to CE-2
 ip vrf forwarding vpn1
 ip address 10.1.3.1 255.255.255.252
```

MPLS Configration 事例(PE)

- PE router 編
  - LDP(TDP)の設定
  - vrf(VPN Routing/Forwarding table)の設定
  - **MP-iBGPの設定**
  - address-family(ipv4＆vpnv4)の設定

MPLS Configration 事例(PE)

```
router bgp 65535
 no synchronization
 no bgp default ipv4
 neighbor JANOG-MPLS peer-group
 neighbor JANOG-MPLS remote-as 65535
 neighbor JANOG-MPLS update-source Loopback0
 neighbor JANOG-MPLS send-community extended
 neighbor PE-2 peer-group JANOG-MPLS
 neighbor PE-3 peer-group JANOG-MPLS
 default-metric 100
 no auto-summary
```

MPLS Configration 事例(PE)

- PE router 編
  - LDP(TDP)の設定
  - vrf(VPN Routing/Forwarding table)の設定
  - MP-iBGPの設定
  - **address-family(ipv4＆vpnv4)の設定**

MPLS Configration 事例(PE)

```
 address-family ipv4 vrf vpn1
 neighbor CE-1 remote-as 1
 neighbor CE-1 activate
 no auto-summary
 no synchronization
 exit-address-family
 !
address-family ipv4 vrf vpn1
 redistribute static metric 100
 no auto-summary
 no synchronization
 exit-address-family
 !
 address-family vpnv4
 neighbor JANOG-MPLS activate
 neighbor JANOG-MPLS send-community extended
 neighbor CE-2 peer-group JANOG-MPLS
 neighbor CE-3 peer-group JANOG-MPLS
 default-metric 100
 no auto-summary
 exit-address-family
```

PE-CEでBGPを使用する場合

PE-CEでStaticを使用する場合

MPLS Configration 事例(PE)

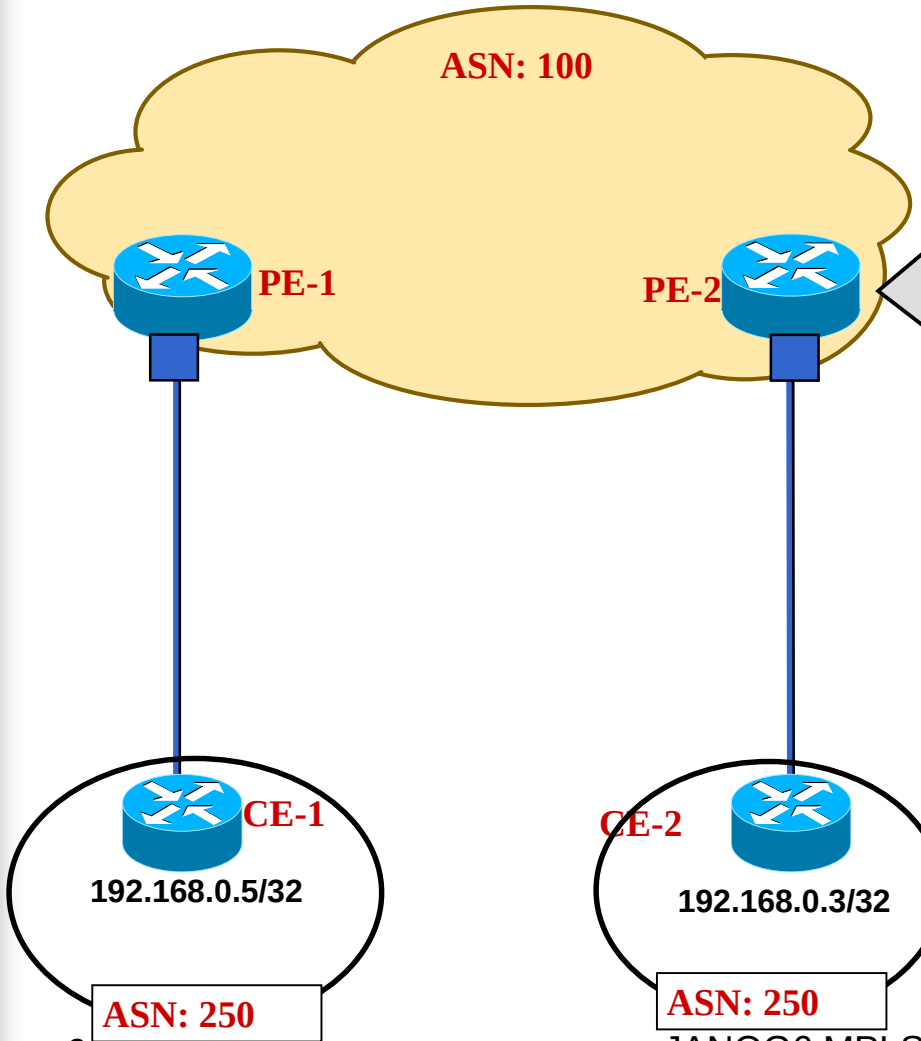
```
cisco#sh run
Building configuration...

Current configuration:
!
version 12.1
service timestamps debug uptime
service timestamps log datetime localtime show-timezone
service password-encryption
!
hostname zebra test
!
boot system flash slot0:c7200-p-mz.120-6.S.bin
boot system flash slot0:c7200-p-mz.121-1a.T1.bin
logging console warnings
logging monitor informational
!!
ip subnet-zero
ip rcmd rsh-enable
ip cef
no ip finger
no ip domain-lookup
tag-switching ip
!
ip vrf zebra
 rd 65501:111
 route-target export 65501:111
 route-target import 65501:111
clns routing
!
!interface Loopback0
 ip address 10.1.1.1 255.0.0.0
!
interface Fddi2/0
 ip address 192.168.18.1 255.255.255.0 secondary
 ip accounting mac-address input
 ip accounting mac-address output
 rate-limit output access-group rate-limit 100 30000000 200000 200000 conform-action
transmit exceed-action
 drop
 rate-limit output access-group rate-limit 101 2000000 8000 8000 conform-action transmit
exceed-action drop
 ip route-cache policy
 ip route-cache flow
 no ip mroute-cache
 ip policy route-map class
 no keepalive
 random-detect
!
router bgp 65501
 bgp redistribute-internal
 neighbor 202.1.1.1 remote-as 65501
 neighbor 202.1.1.1 update-source FastEthernet3/0
 neighbor 202.1.1.1 send-community extended
 neighbor 202.2.1.1 remote-as 65501
 neighbor 202.2.1.1 update-source FastEthernet3/0
 neighbor 202.2.1.1 send-community extended
  !
 address-family ipv4 vrf  zebra
 neighbor 202.1.1.1 remote-as 65501
 neighbor 202.1.1.1 update-source FastEthernet3/0
 neighbor 202.1.1.1 activate
 neighbor 202.1.1.1 send-community extended
 exit-address-family
 !
address-family vpnv4
 neighbor 202.1.1.1 activate
 neighbor 202.1.1.1 send-community both
 exit-address-family
!
```

MPLS Configration 事例(新機能)

- 新機能編
  - **ASN Override**
  - Site of Origin

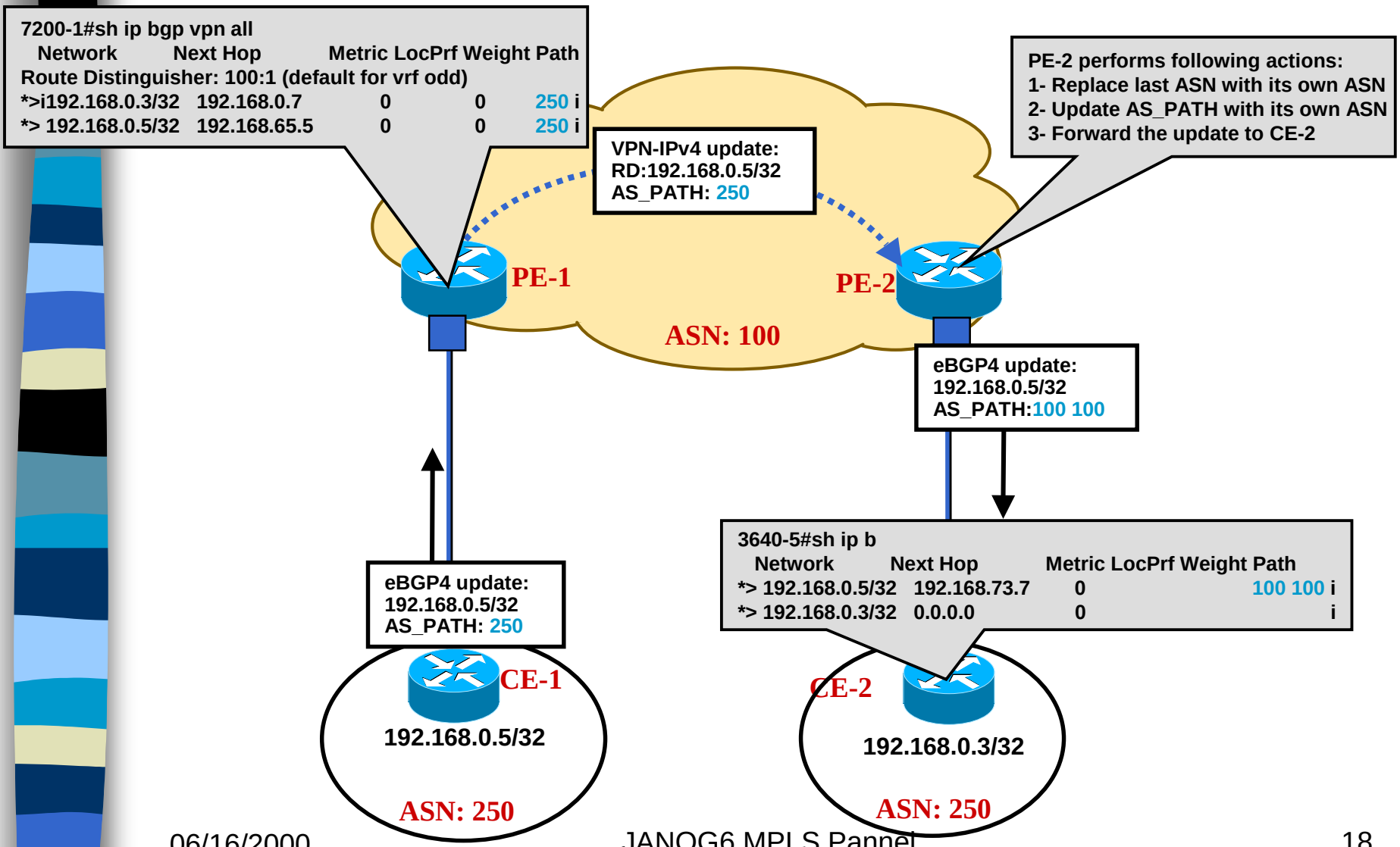
MPLS Configration 事例(ASN Override)




```
ip vrf odd
 rd 100:1
 route-target export 100:3
 route-target import 100:3
!
interface Serial1
 ip vrf forwarding odd
 ip address 192.168.73.7 255.255.255.0
!
router bgp 100
 no synchronization
 no bgp default ipv4-unicast
 neighbor 192.168.0.6 remote-as 100
 neighbor 192.168.0.6 update-source Loop0
 neighbor 192.168.0.6 activate
 neighbor 192.168.0.6 next-hop-self
 no auto-summary
 !
 address-family ipv4 vrf odd
 neighbor 192.168.73.3 remote-as 250
 neighbor 192.168.73.3 activate
 neighbor 192.168.73.3 as-override
 no auto-summary
 no synchronization
 exit-address-family
 !
 address-family vpnv4
 neighbor 192.168.0.6 activate
 neighbor 192.168.0.6 send-community extended
 no auto-summary
 exit-address-family
!
```


参考：Cisco社資料

MPLS Configration 事例(ASN Override)

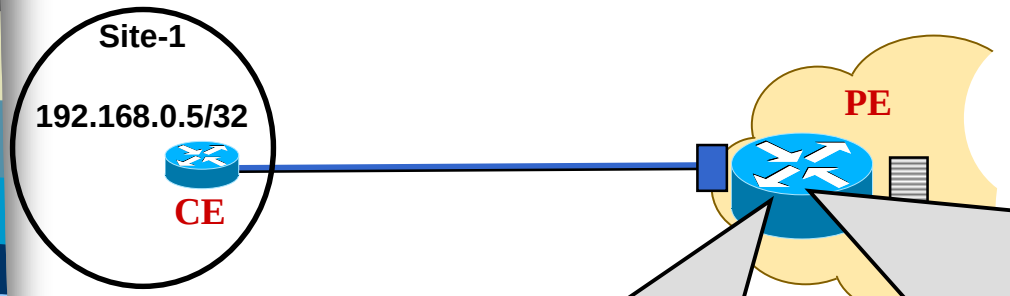


参考：Cisco社資料

MPLS Configration 事例(新機能)

- 新機能編
  - ASN Override
  - **Site of Origin**

MPLS Configration 事例(Site of Origin)

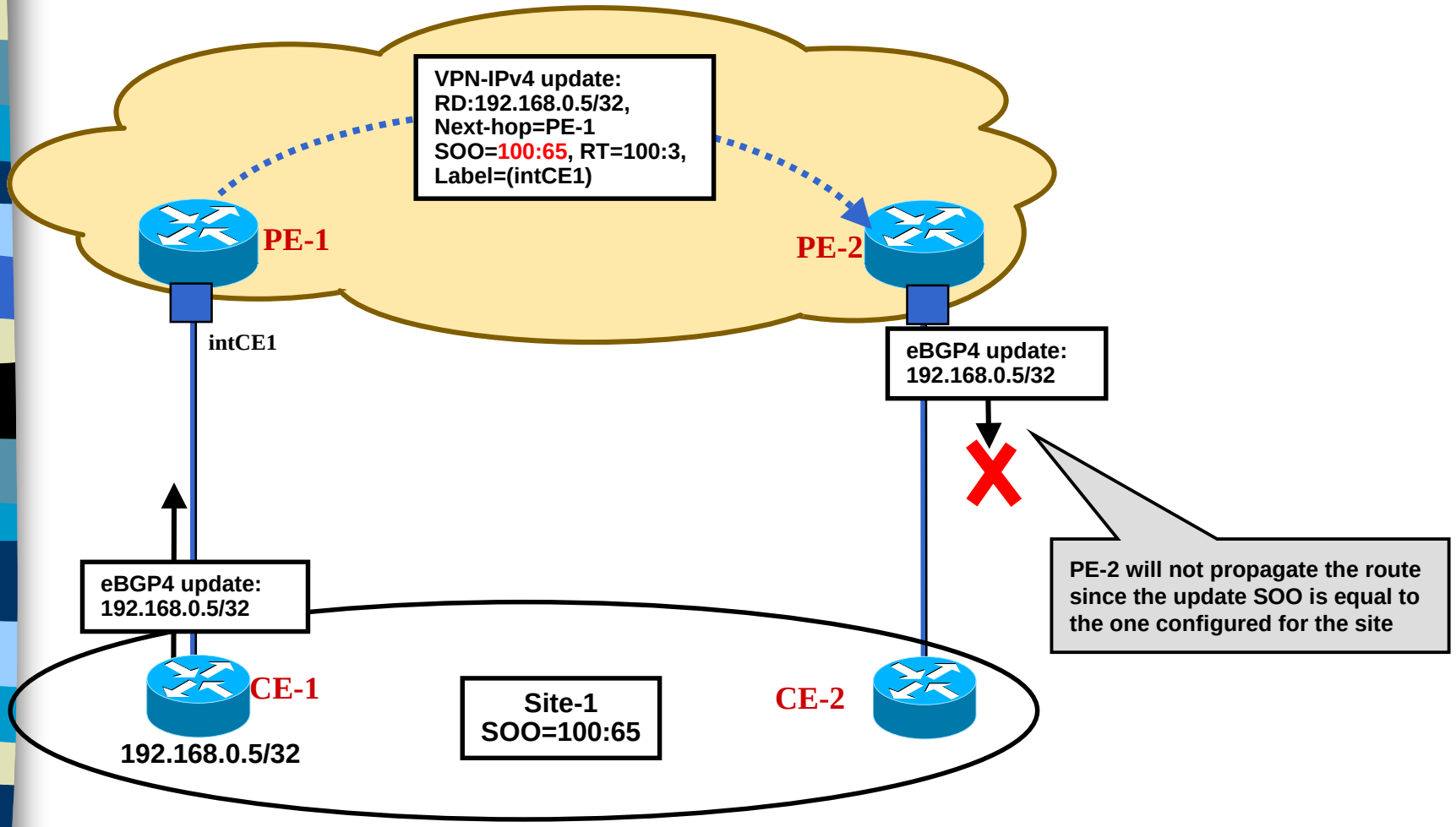



```
ip vrf odd
 rd 100:1
 route-target export 100:3
 route-target import 100:3
!
interface Serial1
 ip vrf forwarding odd
 ip address 192.168.65.6 255.255.255.0
!
router bgp 100
 no synchronization
 no bgp default ipv4-unicast
 neighbor 192.168.0.7 remote-as 100
 neighbor 192.168.0.7 update-source Loop0
 neighbor 192.168.0.7 activate
 neighbor 192.168.0.7 next-hop-self
 no auto-summary
 !
 address-family ipv4 vrf odd
 neighbor 192.168.65.5 remote-as 250
 neighbor 192.168.65.5 activate
 neighbor 192.168.65.5 route-map setsoo in
 no auto-summary
 no synchronization
 exit-address-family
 !
 address-family vpnv4
 neighbor 192.168.0.7 activate
 neighbor 192.168.0.7 send-community extended
 no auto-summary
 exit-address-family
!
route-map setsoo permit 10
 set extcommunity soo 100:65
```

```
7200-1#sh ip route vrf odd
C    192.168.65.0/24 is directly connected, Serial2
B       192.168.0.5 [20/0] via 192.168.65.5, 00:08:44, Serial2
7200-1#
7200-1#sh ip bgp vpn all
   Network          Next Hop            Metric LocPrf Weight Path
Route Distinguisher: 100:1 (default for vrf odd)
*> 192.168.0.5/32    192.168.65.5             0             0      250 i
7200-1#sh ip bgp vpn all 192.168.0.5
BGP routing table entry for 100:1:192.168.0.5/32, version 17
Paths: (1 available, best #1)
  Advertised to non peer-group peers:
  192.168.0.7
  250
    192.168.65.5 from 192.168.65.5 (192.168.0.5)
      Origin IGP, metric 0, localpref 100, valid, external, best
      Extended Community: SoO:100:65 RT:100:3
7200-1#
```


参考：Cisco社資料

MPLS Configration 事例(Site of Origin)



参考：Cisco社資料

Zebra MPLS-VPN support

- ** MPLS-VPN PE-RR support is added.
- New address family vpnv4 unicast is introduced.

```
!
address-family vpnv4 unicast
 neighobr PEER activate
 network A.B.C.D rd RD tag TAG
exit-address-family
!
```

Zebra MPLS-VPN support

- To make it route-reflector, please configure it under normal router bgp ASN.

```
router bgp 7675
 no bgp default ipv4-unicast
 bgp router-id 10.0.0.100
 bgp cluster-id 10.0.0.100
 neighbor 10.0.0.1 remote-as 65535
 neighbor 10.0.0.1 route-reflector-client
 neighbor 10.0.0.2 remote-as 65535
 neighbor 10.0.0.2 route-reflector-client
 neighbor 10.0.0.3 remote-as 65535
 neighbor 10.0.0.3 route-reflector-client
!
 address-family vpnv4 unicast
 neighbor 10.0.0.1 activate
 neighbor 10.0.0.2 activate
 neighbor 10.0.0.3 activate
 exit-address-family
!
```