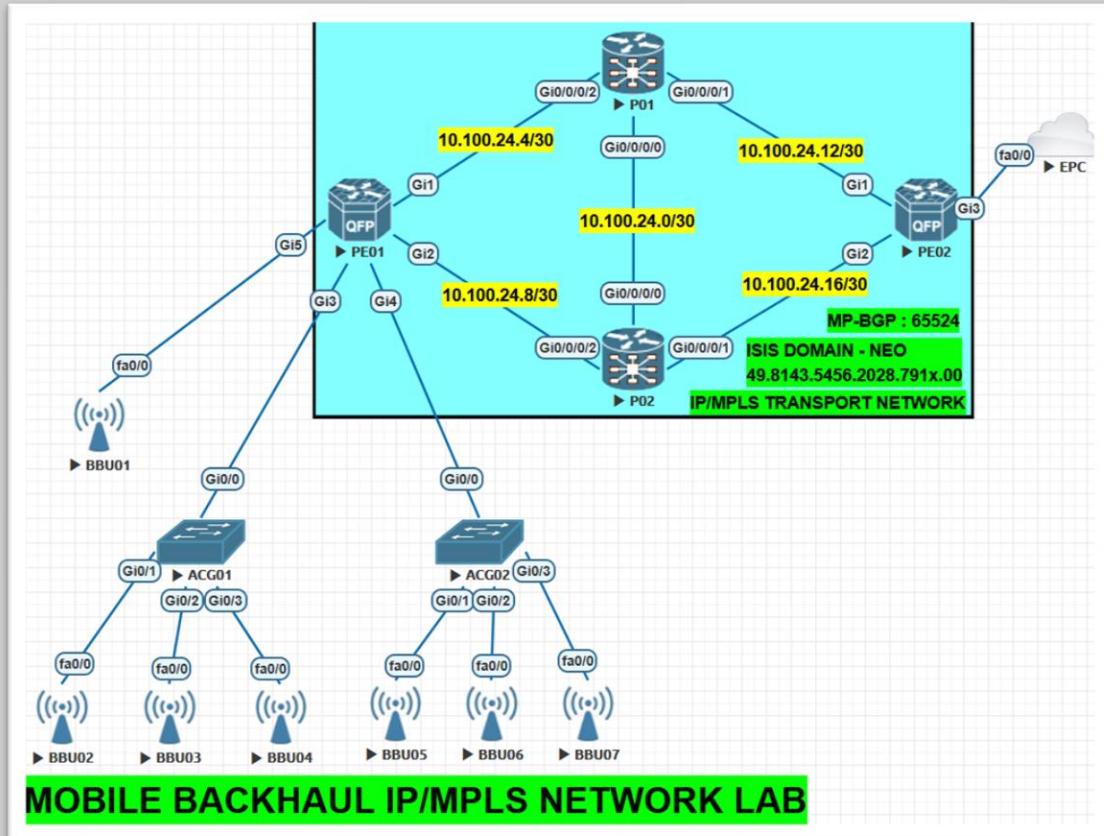
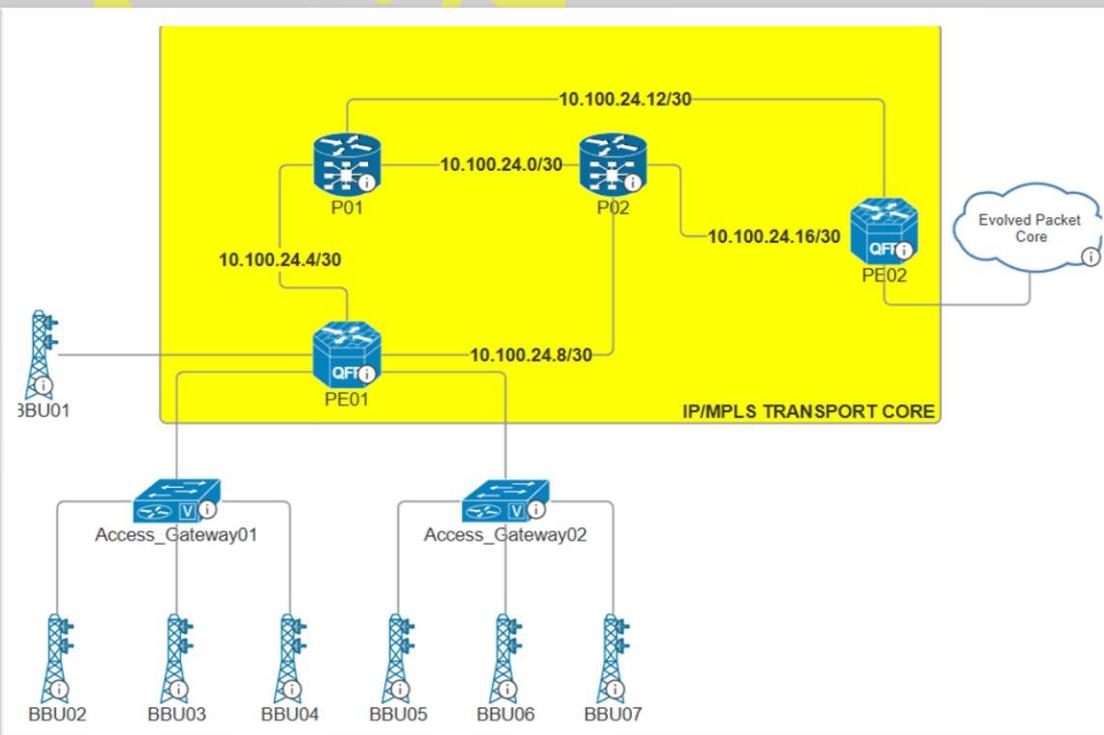


Mobile Backhaul IP/MPLS L3VPN Lab

[BBU to EPC End-to-End IP Reachability]



MOBILE BACKHAUL IP/MPLS NETWORK LAB



Lab Requirements

1. Provide end-to-end IP/MPLS transport connectivity to ensure seamless reachability between the BBU service domain and the EPC service domain with full routing and service awareness.

IP Addressing Plan

Node Name	S1-U	S1-C	OAM
BBU01	192.168.250.0/30	192.168.251.0/30	172.16.32.0/30
BBU02	192.168.250.4/30	192.168.251.4/30	172.16.32.4/30
BBU03	192.168.250.8/30	192.168.251.8/30	172.16.32.8/30
BBU04	192.168.250.12/30	192.168.251.12/30	172.16.32.12/30
BBU05	192.168.250.16/30	192.168.251.16/30	172.16.32.16/30
BBU06	192.168.250.20/30	192.168.251.20/30	172.16.32.20/30
BBU07	192.168.250.24/30	192.168.251.24/30	172.16.32.24/30
EPC	192.168.254.252/30	192.168.255.252/30	172.16.32.252/30

IP/MPLS CORE

IGP Configuration: IS-IS

P01

router isis NEO

is-type level-2-only

net 49.8143.5456.2028.7911.00

address-family ipv4 unicast

metric-style wide

!

interface Loopback0

address-family ipv4 unicast

!

```
interface GigabitEthernet0/0/0/0
    point-to-point
    hello-interval 3
    hello-multiplier 12
    address-family ipv4 unicast
```

!

```
interface GigabitEthernet0/0/0/1
    point-to-point
    hello-interval 3
    hello-multiplier 12
    address-family ipv4 unicast
```

!

```
interface GigabitEthernet0/0/0/2
    point-to-point
    hello-interval 3
    hello-multiplier 12
    address-family ipv4 unicast
```

!

P02

```
router isis NEO
    is-type level-2-only
    net 49.8143.5456.2028.7912.00
    address-family ipv4 unicast
```

metric-style wide

!

interface Loopback0

address-family ipv4 unicast

!

interface GigabitEthernet0/0/0/0

point-to-point

hello-interval 3

hello-multiplier 12

address-family ipv4 unicast

!

interface GigabitEthernet0/0/0/1

point-to-point

hello-interval 3

hello-multiplier 12

address-family ipv4 unicast

!

interface GigabitEthernet0/0/0/2

point-to-point

hello-interval 3

hello-multiplier 12

address-family ipv4 unicast

!

PE01

router isis NEO

net 49.8143.5456.2028.7913.00

is-type level-2-only

metric-style wide

!

interface range gi1-2

ip router isis NEO

isis network point-to-point

isis hello-multiplier 12

isis hello-interval 3

!

PE02

router isis NEO

net 49.8143.5456.2028.7914.00

is-type level-2-only

metric-style wide

!

interface range gi1-2

ip router isis NEO

isis network point-to-point

isis hello-multiplier 12

isis hello-interval 3

!

Configure MPLS in Respective Interfaces

!

MP-BGP Configuration

P01

```
router bgp 65524
  bgp router-id 10.255.255.1
  bgp cluster-id 10.255.255.1
  address-family ipv4 unicast
  !
  address-family vpngv4 unicast
  !
  neighbor-group CORE-RR
    remote-as 65524
    password neo!!!!
    update-source Loopback0
    address-family ipv4 unicast
    route-reflector-client
  !
  address-family vpngv4 unicast
  route-reflector-client
  !
  neighbor 10.255.255.3
  use neighbor-group CORE-RR
  description PE01
```

!

neighbor 10.255.255.4

use neighbor-group CORE-RR

description PE02

!

P02

router bgp 65524

bgp router-id 10.255.255.2

bgp cluster-id 10.255.255.1

address-family ipv4 unicast

!

address-family vpngv4 unicast

!

neighbor-group CORE-RR

remote-as 65524

password neo!!!!

update-source Loopback0

address-family ipv4 unicast

route-reflector-client

!

address-family vpngv4 unicast

route-reflector-client

!

neighbor 10.255.255.3

```
use neighbor-group CORE-RR
```

```
description PE01
```

```
!
```

```
neighbor 10.255.255.4
```

```
use neighbor-group CORE-RR
```

```
description PE02
```

```
!
```

PE01

```
router bgp 65524
```

```
bgp router-id 10.255.255.3
```

```
neighbor 10.255.255.1 remote-as 65524
```

```
neighbor 10.255.255.1 password neo!!!!
```

```
neighbor 10.255.255.1 update-source Loopback0
```

```
neighbor 10.255.255.2 remote-as 65524
```

```
neighbor 10.255.255.2 password neo!!!!
```

```
neighbor 10.255.255.2 update-source Loopback0
```

```
!
```

```
address-family ipv4
```

```
neighbor 10.255.255.1 activate
```

```
neighbor 10.255.255.2 activate
```

```
exit-address-family
```

```
!
```

```
address-family vpnv4
```

```
neighbor 10.255.255.1 activate
```

```
neighbor 10.255.255.1 send-community extended
```

```
neighbor 10.255.255.2 activate
```

```
neighbor 10.255.255.2 send-community extended
```

```
exit-address-family
```

```
!
```

```
address-family ipv4 vrf OAM
```

```
redistribute connected
```

```
exit-address-family
```

```
!
```

```
address-family ipv4 vrf S1-C
```

```
redistribute connected
```

```
exit-address-family
```

```
!
```

```
address-family ipv4 vrf S1-U
```

```
redistribute connected
```

```
exit-address-family
```

```
!
```

PE02

```
router bgp 65524
```

```
bgp router-id 10.255.255.4
```

```
neighbor 10.255.255.1 remote-as 65524
```

```
neighbor 10.255.255.1 password neo!!!!
```

```
neighbor 10.255.255.1 update-source Loopback0
```

```
neighbor 10.255.255.2 remote-as 65524
```

```
neighbor 10.255.255.2 password neo!!!!  
neighbor 10.255.255.2 update-source Loopback0  
!  
address-family ipv4  
neighbor 10.255.255.1 activate  
neighbor 10.255.255.2 activate  
exit-address-family  
!  
address-family vpnv4  
neighbor 10.255.255.1 activate  
neighbor 10.255.255.1 send-community extended  
neighbor 10.255.255.2 activate  
neighbor 10.255.255.2 send-community extended  
exit-address-family  
!  
address-family ipv4 vrf OAM  
redistribute connected  
exit-address-family  
!  
address-family ipv4 vrf S1-C  
redistribute connected  
exit-address-family  
!  
address-family ipv4 vrf S1-U
```

```
 redistribute connected
```

```
 exit-address-family
```

```
!
```

VRF Configuration

PE01

```
 ip vrf OAM
```

```
 rd 65524:3003
```

```
 route-target both 65524:3003
```

```
!
```

```
 ip vrf S1-C
```

```
 rd 65524:2002
```

```
 route-target both 65524:2002
```

```
!
```

```
 ip vrf S1-U
```

```
 rd 65524:1001
```

```
 route-target both 65524:1001
```

```
!
```

```
 interface GigabitEthernet3.21
```

```
 encapsulation dot1Q 21
```

```
 ip vrf forwarding S1-U
```

```
 ip address 192.168.250.5 255.255.255.252
```

```
!
```

```
 interface GigabitEthernet3.22
```

```
 encapsulation dot1Q 22
```

```
ip vrf forwarding S1-C
ip address 192.168.251.5 255.255.255.252
!
interface GigabitEthernet3.23
encapsulation dot1Q 23
ip vrf forwarding OAM
ip address 172.16.32.5 255.255.255.252
!
interface GigabitEthernet3.31
encapsulation dot1Q 31
ip vrf forwarding S1-U
ip address 192.168.250.9 255.255.255.252
!
interface GigabitEthernet3.32
encapsulation dot1Q 32
ip vrf forwarding S1-C
ip address 192.168.251.9 255.255.255.252
!
interface GigabitEthernet3.33
encapsulation dot1Q 33
ip vrf forwarding OAM
ip address 172.16.32.9 255.255.255.252
!
interface GigabitEthernet3.41
```

```
encapsulation dot1Q 41  
ip vrf forwarding S1-U  
ip address 192.168.250.13 255.255.255.252
```

!

```
interface GigabitEthernet3.42
```

```
encapsulation dot1Q 42
```

```
ip vrf forwarding S1-C
```

```
ip address 192.168.251.13 255.255.255.252
```

!

```
interface GigabitEthernet3.43
```

```
encapsulation dot1Q 43
```

```
ip vrf forwarding OAM
```

```
ip address 172.16.32.13 255.255.255.252
```

!

```
interface GigabitEthernet4.51
```

```
encapsulation dot1Q 51
```

```
ip vrf forwarding S1-U
```

```
ip address 192.168.250.17 255.255.255.252
```

!

```
interface GigabitEthernet4.52
```

```
encapsulation dot1Q 52
```

```
ip vrf forwarding S1-C
```

```
ip address 192.168.251.17 255.255.255.252
```

!

```
interface GigabitEthernet4.53
encapsulation dot1Q 53
ip vrf forwarding OAM
ip address 172.16.32.17 255.255.255.252
```

!

```
interface GigabitEthernet4.61
encapsulation dot1Q 61
ip vrf forwarding S1-U
ip address 192.168.250.21 255.255.255.252
```

!

```
interface GigabitEthernet4.62
encapsulation dot1Q 62
ip vrf forwarding S1-C
ip address 192.168.251.21 255.255.255.252
```

!

```
interface GigabitEthernet4.63
encapsulation dot1Q 63
ip vrf forwarding OAM
ip address 172.16.32.21 255.255.255.252
```

!

```
interface GigabitEthernet4.71
encapsulation dot1Q 71
ip vrf forwarding S1-U
ip address 192.168.250.25 255.255.255.252
```

!

```
interface GigabitEthernet4.72
  encapsulation dot1Q 72
  ip vrf forwarding S1-C
  ip address 192.168.251.25 255.255.255.252
!
interface GigabitEthernet4.73
  encapsulation dot1Q 73
  ip vrf forwarding OAM
  ip address 172.16.32.25 255.255.255.252
!
interface GigabitEthernet5.11
  encapsulation dot1Q 11
  ip vrf forwarding S1-U
  ip address 192.168.250.1 255.255.255.252
!
interface GigabitEthernet5.12
  encapsulation dot1Q 12
  ip vrf forwarding S1-C
  ip address 192.168.251.1 255.255.255.252
!
interface GigabitEthernet5.13
  encapsulation dot1Q 13
  ip vrf forwarding OAM
```

ip address 172.16.32.1 255.255.255.252

!

PE02

ip vrf OAM

rd 65524:3003

route-target both 65524:3003

!

ip vrf S1-C

rd 65524:2002

route-target both 65524:2002

!

ip vrf S1-U

rd 65524:1001

route-target both 65524:1001

!

interface GigabitEthernet3.1

encapsulation dot1Q 1

ip vrf forwarding S1-U

ip address 192.168.254.253 255.255.255.252

!

interface GigabitEthernet3.2

encapsulation dot1Q 2

ip vrf forwarding S1-C

ip address 192.168.255.253 255.255.255.252

```
!  
interface GigabitEthernet3.3  
encapsulation dot1Q 3  
ip vrf forwarding OAM  
ip address 172.16.32.253 255.255.255.252
```

```
!
```

Access Switch Configuration

ACCG01

```
interface GigabitEthernet0/0  
switchport trunk allowed vlan 21-23,31-33,41-43  
switchport trunk encapsulation dot1q  
switchport mode trunk
```

```
!
```

```
interface GigabitEthernet0/1  
switchport trunk allowed vlan 21-23  
switchport trunk encapsulation dot1q  
switchport mode trunk
```

```
!
```

```
interface GigabitEthernet0/2  
switchport trunk allowed vlan 31-33  
switchport trunk encapsulation dot1q  
switchport mode trunk
```

```
!
```

```
interface GigabitEthernet0/3
```

```
switchport trunk allowed vlan 41-43  
switchport trunk encapsulation dot1q  
switchport mode trunk  
!
```

ACCG02

```
interface GigabitEthernet0/0  
switchport trunk allowed vlan 51-53,61-63,71-73  
switchport trunk encapsulation dot1q  
switchport mode trunk  
!  
interface GigabitEthernet0/1  
switchport trunk allowed vlan 51-53  
switchport trunk encapsulation dot1q  
switchport mode trunk  
!  
interface GigabitEthernet0/2  
switchport trunk allowed vlan 61-63  
switchport trunk encapsulation dot1q  
switchport mode trunk  
!  
interface GigabitEthernet0/3  
switchport trunk allowed vlan 71-73  
switchport trunk encapsulation dot1q  
switchport mode trunk
```

Mobile Configuration (Emulation)

BBU01

```
ip vrf OAM  
ip vrf S1-C  
ip vrf S1-U  
!  
interface FastEthernet0/0.11  
encapsulation dot1Q 11  
ip vrf forwarding S1-U  
ip address 192.168.250.2 255.255.255.252  
!  
interface FastEthernet0/0.12  
encapsulation dot1Q 12  
ip vrf forwarding S1-C  
ip address 192.168.251.2 255.255.255.252  
!  
interface FastEthernet0/0.13  
encapsulation dot1Q 13  
ip vrf forwarding OAM  
ip address 172.16.32.2 255.255.255.252  
!  
ip route vrf OAM 0.0.0.0 0.0.0.0 172.16.32.1  
ip route vrf S1-C 0.0.0.0 0.0.0.0 192.168.251.1  
ip route vrf S1-U 0.0.0.0 0.0.0.0 192.168.250.1
```

BBU02

ip vrf OAM

ip vrf S1-C

ip vrf S1-U

!

interface FastEthernet0/0.21

encapsulation dot1Q 21

ip vrf forwarding S1-U

ip address 192.168.250.6 255.255.255.252

!

interface FastEthernet0/0.22

encapsulation dot1Q 22

ip vrf forwarding S1-C

ip address 192.168.251.6 255.255.255.252

!

interface FastEthernet0/0.23

encapsulation dot1Q 23

ip vrf forwarding OAM

ip address 172.16.32.6 255.255.255.252

!

ip route vrf OAM 0.0.0.0 0.0.0.0 172.16.32.5

ip route vrf S1-C 0.0.0.0 0.0.0.0 192.168.251.5

ip route vrf S1-U 0.0.0.0 0.0.0.0 192.168.250.5

!

BBU03

ip vrf OAM

ip vrf S1-C

ip vrf S1-U

!

interface FastEthernet0/0.31

encapsulation dot1Q 31

ip vrf forwarding S1-U

ip address 192.168.250.10 255.255.255.252

!

interface FastEthernet0/0.32

encapsulation dot1Q 32

ip vrf forwarding S1-C

ip address 192.168.251.10 255.255.255.252

!

interface FastEthernet0/0.33

encapsulation dot1Q 33

ip vrf forwarding OAM

ip address 172.16.32.10 255.255.255.252

!

ip route vrf OAM 0.0.0.0 0.0.0.0 172.16.32.9

ip route vrf S1-C 0.0.0.0 0.0.0.0 192.168.251.9

ip route vrf S1-U 0.0.0.0 0.0.0.0 192.168.250.9

!

BBU04

ip vrf OAM

ip vrf S1-C

ip vrf S1-U

!

interface FastEthernet0/0.41

encapsulation dot1Q 41

ip vrf forwarding S1-U

ip address 192.168.250.14 255.255.255.252

!

interface FastEthernet0/0.42

encapsulation dot1Q 42

ip vrf forwarding S1-C

ip address 192.168.251.14 255.255.255.252

!

interface FastEthernet0/0.43

encapsulation dot1Q 43

ip vrf forwarding OAM

ip address 172.16.32.14 255.255.255.252

!

ip route vrf OAM 0.0.0.0 0.0.0.0 172.16.32.13

ip route vrf S1-C 0.0.0.0 0.0.0.0 192.168.251.13

ip route vrf S1-U 0.0.0.0 0.0.0.0 192.168.250.13

!

BBU05

ip vrf OAM

ip vrf S1-C

ip vrf S1-U

!

interface FastEthernet0/0.51

encapsulation dot1Q 51

ip vrf forwarding S1-U

ip address 192.168.250.18 255.255.255.252

!

interface FastEthernet0/0.52

encapsulation dot1Q 52

ip vrf forwarding S1-C

ip address 192.168.251.18 255.255.255.252

!

interface FastEthernet0/0.53

encapsulation dot1Q 53

ip vrf forwarding OAM

ip address 172.16.32.18 255.255.255.252

!

ip route vrf OAM 0.0.0.0 0.0.0.0 172.16.32.17

ip route vrf S1-C 0.0.0.0 0.0.0.0 192.168.251.17

ip route vrf S1-U 0.0.0.0 0.0.0.0 192.168.250.17

!

BBU06

```
ip vrf OAM
ip vrf S1-C
ip vrf S1-U
!
interface FastEthernet0/0.61
encapsulation dot1Q 61
ip vrf forwarding S1-U
ip address 192.168.250.22 255.255.255.252
!
interface FastEthernet0/0.62
encapsulation dot1Q 62
ip vrf forwarding S1-C
ip address 192.168.251.22 255.255.255.252
!
interface FastEthernet0/0.63
encapsulation dot1Q 63
ip vrf forwarding OAM
ip address 172.16.32.22 255.255.255.252
!
ip route vrf OAM 0.0.0.0 0.0.0.0 172.16.32.21
ip route vrf S1-C 0.0.0.0 0.0.0.0 192.168.251.21
ip route vrf S1-U 0.0.0.0 0.0.0.0 192.168.250.21
!
```

BBU07

ip vrf OAM

ip vrf S1-C

ip vrf S1-U

!

interface FastEthernet0/0.71

encapsulation dot1Q 71

ip vrf forwarding S1-U

ip address 192.168.250.26 255.255.255.252

!

interface FastEthernet0/0.72

encapsulation dot1Q 72

ip vrf forwarding S1-C

ip address 192.168.251.26 255.255.255.252

!

interface FastEthernet0/0.73

encapsulation dot1Q 73

ip vrf forwarding OAM

ip address 172.16.32.26 255.255.255.252

!

ip route vrf OAM 0.0.0.0 0.0.0.0 172.16.32.25

ip route vrf S1-C 0.0.0.0 0.0.0.0 192.168.251.25

ip route vrf S1-U 0.0.0.0 0.0.0.0 192.168.250.25

!

EPC

```
ip vrf OAM
ip vrf S1-C
ip vrf S1-U
!
interface FastEthernet0/0.1
encapsulation dot1Q 1
ip vrf forwarding S1-U
ip address 192.168.254.254 255.255.255.252
!
interface FastEthernet0/0.2
encapsulation dot1Q 2
ip vrf forwarding S1-C
ip address 192.168.255.254 255.255.255.252
!
interface FastEthernet0/0.3
encapsulation dot1Q 3
ip vrf forwarding OAM
ip address 172.16.32.254 255.255.255.252
!
ip route vrf S1-C 0.0.0.0 0.0.0.0 192.168.255.253
ip route vrf S1-U 0.0.0.0 0.0.0.0 192.168.254.253
ip route vrf OAM 0.0.0.0 0.0.0.0 172.16.32.253
```

Ko Lwin (Network)