MPLS Traffic Engineering with Per L2tpv3 Tunnel

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VRF CUST_A = R3-R4-R5-R7 (RED PATH)

VRF CUST_B = R3- R6- R7 (BLUE PATH)

MPLS Traffice Engineering with L2TPv3
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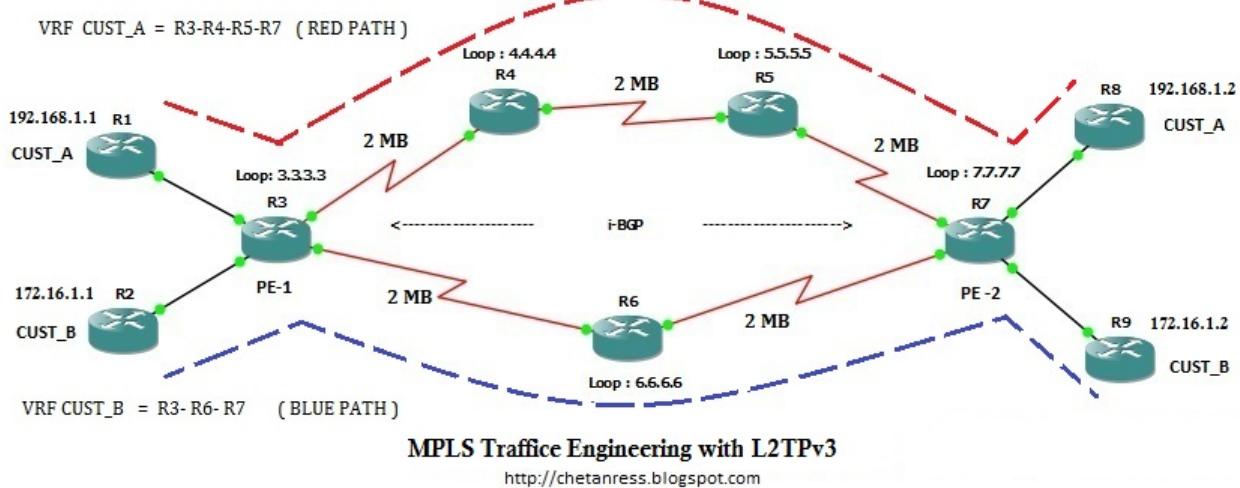
MPLS Traffic Engineering with per L2TPv3 Tunnel

As we saw in my previous post that "How to configure MPLS Traffic Engineering with Per VRF" ,

But now if Customer required Layer 2 Circuit then we How we can do traffic Engineering with

Layer 2 .

We can provide Layer 2 Circuit using MPLS or L2TPv3, Here we are going to see " Traffic

Engineering with L2TPv3" using MPLS Core.

Objective:

Configure MPLS Traffic Engineering on R3 & R7 in such a way that Pseudo wire CUST_A traffic

should pass through RED PATH (I.e. R3-R4-R5-R7) & Pseudo wire VRF CUST_B should pass

through BLUE PATH (i.e. R3-R6-R7)

1. Direction:
2. 1] Create a basic topology.
3. 2] Configure MPLS Traffic Engineering on PE routers.

4. ***Below configuration for MPLS - Traffic Engineering with Per L2TPv3 Tunnel.

Configuration for MPLS Traffic Engineering Per VRF/VPN

R1 – Router

```
interface Loopback1
 ip address 10.1.1.1 255.255.255.252
!
interface Loopback2
 ip address 10.2.1.1 255.255.255.255
!
interface Loopback3
 ip address 10.3.1.1 255.255.255.255
!
interface FastEthernet0/0
 description ***** Connected to PE1 Router *****
 ip address 192.168.1.1 255.255.255.252
 duplex auto
 speed auto
!
!
router ospf 1
 log-adjacency-changes
 network 10.1.1.1 0.0.0.0 area 0
 network 10.2.1.1 0.0.0.0 area 0
 network 10.3.1.1 0.0.0.0 area 0
 network 192.168.1.0 0.0.0.3 area 0
!
```

R2 – Router

```
!
interface Loopback1
 ip address 20.1.1.1 255.255.255.255
!
interface Loopback2
 ip address 20.2.1.1 255.255.255.255
!
interface Loopback3
 ip address 20.3.1.1 255.255.255.255
!
interface FastEthernet0/0
 no ip address
```

```
 shutdown
 duplex half
!
interface FastEthernet1/0
 description ***** Connected to PE-2 *****
 ip address 172.16.1.1 255.255.255.252
 duplex auto
 speed auto
!
 router ospf 2
 log-adjacency-changes
 network 20.1.1.1 0.0.0.0 area 0
 network 20.2.1.1 0.0.0.0 area 0
 network 20.3.1.1 0.0.0.0 area 0
 network 172.16.1.0 0.0.0.3 area 0
!
```

R3 --Router

```
!
pseudowire-class CUST_A
 encapsulation l2tpv3
 ip local interface Loopback100
!
pseudowire-class CUST_B
 encapsulation l2tpv3
 ip local interface Loopback200
!
interface Loopback10
 ip address 3.3.3.3 255.255.255.255
!
interface Loopback100
 description **** Tunnel 20 - Explicit *****
 ip address 100.100.100.100 255.255.255.255
!
interface Loopback200
 description ***** Tunnel 10 Dynamic *****
 ip address 50.50.50.50 255.255.255.255
!
interface Tunnel10
 ip unnumbered Loopback10
 mpls ip
```

```
 tunnel destination 7.7.7.7
 tunnel mode mpls traffic-eng
 tunnel mpls traffic-eng priority 1 1
 tunnel mpls traffic-eng bandwidth  2000
 tunnel mpls traffic-eng path-option 1 dynamic
 no routing dynamic
!
interface Tunnel20
 ip unnumbered Loopback10
 mpls ip
 tunnel destination 7.7.7.7
 tunnel mode mpls traffic-eng
 tunnel mpls traffic-eng priority 1 1
 tunnel mpls traffic-eng bandwidth  2000
 tunnel mpls traffic-eng path-option 1 explicit name R3-R4-R5-R7
 no routing dynamic
!
interface FastEthernet0/0
 description ***** Connected to R1 *****
 no ip address
 duplex auto
 speed auto
 no cdp enable
 xconnect 200.200.200.200 10 pw-class CUST_A
!
interface FastEthernet1/0
 description ***** Connected to R2 *****
 no ip address
 duplex auto
 speed auto
 no cdp enable
 xconnect 60.60.60.60 20 pw-class CUST_B
!
interface Serial3/0
 description *****Connected to P2_CORE *****
 bandwidth 2000
 ip address 15.1.1.1 255.255.255.252
 encapsulation ppp
 mpls label protocol ldp
 mpls ip
 mpls traffic-eng tunnels
 serial restart-delay 0
 ip rsvp bandwidth 2000 2000
```

```
!
interface Serial3/1
 description *****Connected to P1_CORE*****
 bandwidth 2000
 ip address 15.3.1.1 255.255.255.252
 encapsulation ppp
 mpls label protocol ldp
 mpls ip
 mpls traffic-eng tunnels
 serial restart-delay 0
 ip rsvp bandwidth 2000 2000
!
!
router ospf 10
 mpls traffic-eng router-id Loopback10
 mpls traffic-eng area 0
 router-id 3.3.3.3
 log-adjacency-changes
 no auto-cost
 network 3.3.3.3 0.0.0.0 area 0
 network 15.1.1.0 0.0.0.3 area 0
 network 15.3.1.0 0.0.0.3 area 0
!
router bgp 65000
 bgp log-neighbor-changes
 neighbor 7.7.7.7 remote-as 65000
 neighbor 7.7.7.7 update-source Loopback10
 !
 address-family ipv4
 neighbor 7.7.7.7 activate
 no auto-summary
 no synchronization
 exit-address-family
 !
 address-family vpnv4
 neighbor 7.7.7.7 activate
 neighbor 7.7.7.7 send-community extended
 exit-address-family
!
ip route 60.60.60.60 255.255.255.255 Tunnel10
ip route 200.200.200.200 255.255.255.255 Tunnel20
!
ip explicit-path name R3-R4-R5-R7 enable
```

```
 next-address 15.1.1.2
 next-address 15.2.1.2
 next-address 15.5.1.2
 next-address 7.7.7.7
!
```

R4 - Router

```
!
mpls traffic-eng tunnels
!
!
interface Loopback10
 ip address 4.4.4.4 255.255.255.255
!
!
interface Serial3/0
 description *****Connected to PE1_ROUTER *****
 bandwidth 2000
 ip address 15.1.1.2 255.255.255.252
 encapsulation ppp
 mpls label protocol ldp
 mpls ip
 mpls traffic-eng tunnels
 serial restart-delay 0
 ip rsvp bandwidth 2000 2000
!
interface Serial3/1
 description *****Connected to P3_CORE *****
 bandwidth 2000
 ip address 15.2.1.1 255.255.255.252
 encapsulation ppp
 mpls label protocol ldp
 mpls ip
 mpls traffic-eng tunnels
 serial restart-delay 0
 ip rsvp bandwidth 2000 2000
!
!
router ospf 10
 mpls traffic-eng router-id Loopback10
 mpls traffic-eng area 0
 router-id 4.4.4.4
```

```
 log-adjacency-changes
 no auto-cost
 network 4.4.4.4 0.0.0.0 area 0
 network 15.1.1.0 0.0.0.3 area 0
 network 15.2.1.0 0.0.0.3 area 0
!
mpls ldp router-id Loopback10
!
```

R5 - Router

```
!
mpls traffic-eng tunnels
!
!
interface Loopback10
 ip address 5.5.5.5 255.255.255.255
!
!
interface Serial3/1
 description *****Connected to P2_CORE*****
 bandwidth 2000
 ip address 15.2.1.2 255.255.255.252
 encapsulation ppp
 mpls label protocol ldp
 mpls ip
 mpls traffic-eng tunnels
 serial restart-delay 0
 ip rsvp bandwidth 2000 2000
!
interface Serial3/2
 description ***** Connected to PE2_ROUTER *****
 bandwidth 2000
 ip address 15.5.1.1 255.255.255.252
 encapsulation ppp
 mpls label protocol ldp
 mpls ip
 mpls traffic-eng tunnels
 serial restart-delay 0
 ip rsvp bandwidth 2000 2000
!
router ospf 10
 mpls traffic-eng area 0
 router-id 5.5.5.5
```

```
 log-adjacency-changes
 no auto-cost
 network 5.5.5.5 0.0.0.0 area 0
 network 15.2.1.0 0.0.0.3 area 0
 network 15.5.1.0 0.0.0.3 area 0
!
!
mpls ldp router-id Loopback10
```

R6 - Router

```
!
mpls traffic-eng tunnels
!
interface Loopback10
 ip address 6.6.6.6 255.255.255.255
!
!
interface Serial3/0
 description ***** Connected to PE2_ROUTER *****
 bandwidth 2000
 ip address 15.4.1.1 255.255.255.252
 encapsulation ppp
 mpls label protocol ldp
 mpls ip
 mpls traffic-eng tunnels
 serial restart-delay 0
 ip rsvp bandwidth 2000 2000
!
interface Serial3/1
 description *****Connected to PE1_ROUETR *****
 bandwidth 2000
 ip address 15.3.1.2 255.255.255.252
 encapsulation ppp
 mpls label protocol ldp
 mpls ip
 mpls traffic-eng tunnels
 serial restart-delay 0
 ip rsvp bandwidth 2000 2000
!
!
router ospf 10
```

```
mpls traffic-eng router-id Loopback10
mpls traffic-eng area 0
router-id 6.6.6.6
log-adjacency-changes
no auto-cost
network 6.6.6.6 0.0.0.0 area 0
network 15.3.1.0 0.0.0.3 area 0
network 15.4.1.0 0.0.0.3 area 0
!
mpls ldp router-id Loopback10
!
```

R7 - Router

```
!
!
pseudowire-class CUST_A
 encapsulation l2tpv3
 ip local interface Loopback100
!
pseudowire-class CUST_B
 encapsulation l2tpv3
 ip local interface Loopback60
!
!
interface Loopback10
 ip address 7.7.7.7 255.255.255.255
!
interface Loopback60
 description ***** Tunnel 10 Dynamic  *****
 ip address 60.60.60.60 255.255.255.255
!
interface Loopback100
 description ***** Tunnel 20 Explicit *****
 ip address 200.200.200.200 255.255.255.255
!
interface Tunnel10
 ip unnumbered Loopback10
 mpls ip
 tunnel destination 3.3.3.3
 tunnel mode mpls traffic-eng
 tunnel mpls traffic-eng priority 1 1
 tunnel mpls traffic-eng bandwidth  2000
 tunnel mpls traffic-eng path-option 1 dynamic
```

```
 no routing dynamic
!
interface Tunnel20
 ip unnumbered Loopback10
 mpls ip
 tunnel destination 3.3.3.3
 tunnel mode mpls traffic-eng
 tunnel mpls traffic-eng priority 1 1
 tunnel mpls traffic-eng bandwidth  2000
 tunnel mpls traffic-eng path-option 1 explicit name R7-R5-R4-R3
 no routing dynamic
!
interface FastEthernet0/0
 description ***** Connected to R8 *****
 no ip address
 duplex auto
 speed auto
 no cdp enable
 xconnect 100.100.100.100 10 pw-class CUST_A
!
interface FastEthernet1/0
 description ***** Connected to R9 *****
 no ip address
 duplex auto
 speed auto
 no cdp enable
 xconnect 50.50.50.50 20 pw-class CUST_B
!
!
interface Serial3/0
 description ***** Connected to P1_CORE *****
 bandwidth 2000
 ip address 15.4.1.2 255.255.255.252
 encapsulation ppp
 mpls label protocol ldp
 mpls ip
 mpls traffic-eng tunnels
 serial restart-delay 0
 ip rsvp bandwidth 2000
!
!
```

```
interface Serial3/2
 description ***** Connected to P3_CORE *****
 bandwidth 2000
 ip address 15.5.1.2 255.255.255.252
 encapsulation ppp
 mpls label protocol ldp
 mpls ip
 mpls traffic-eng tunnels
 serial restart-delay 0
 ip rsvp bandwidth 2000
!
!
router ospf 10
 mpls traffic-eng router-id Loopback10
 mpls traffic-eng area 0
 log-adjacency-changes
 network 7.7.7.7 0.0.0.0 area 0
 network 15.4.1.0 0.0.0.3 area 0
 network 15.5.1.0 0.0.0.3 area 0
!
router bgp 65000
 bgp log-neighbor-changes
 neighbor 3.3.3.3 remote-as 65000
 neighbor 3.3.3.3 update-source Loopback10
 !
 address-family ipv4
 neighbor 3.3.3.3 activate
 no auto-summary
 no synchronization
 exit-address-family
 !
 address-family vpnv4
 neighbor 3.3.3.3 activate
 neighbor 3.3.3.3 send-community extended
 exit-address-family
!
ip route 50.50.50.50 255.255.255.255 Tunnel10
ip route 100.100.100.100 255.255.255.255 Tunnel20
!
no ip http server
no ip http secure-server
!
!
```

```
ip explicit-path name R7-R5-R4-R3 enable
 next-address 15.5.1.1
 next-address 15.2.1.1
 next-address 15.1.1.1
 next-address 3.3.3.3
!
```

R8 - Router

```
!
interface Loopback1
 ip address 80.1.1.1 255.255.255.255
!
interface Loopback2
 ip address 80.2.1.1 255.255.255.255
!
interface Loopback3
 ip address 80.3.1.1 255.255.255.255
!
interface FastEthernet0/0
 description ***** Connected to PE-2 *****
 ip address 192.168.1.2 255.255.255.252
 duplex auto
 speed auto
!
!
router ospf 1
 log-adjacency-changes
 network 80.1.1.1 0.0.0.0 area 0
 network 80.2.1.1 0.0.0.0 area 0
 network 80.3. 1 0.0.0.0 area 0
 network 192.168.1.0 0.0.0.3 area 0
!
```

R9 - Router

```
!
interface Loopback1
 ip address 90.1.1.1 255.255.255.255
!
interface Loopback2
 ip address 90.2.1.1 255.255.255.255
!
interface Loopback3
 ip address 90.3.1.1 255.255.255.255
!
!
interface FastEthernet1/0
 description ***** Connected to PE-2 *****
 ip address 172.16.1.2 255.255.255.252
 duplex auto
 speed auto
!
!
router ospf 2
 log-adjacency-changes
 network 90.1.1.1 0.0.0.0 area 0
 network 90.2.1.1 0.0.0.0 area 0
 network 90.3.1.1 0.0.0.0 area 0
 network 172.16.1.0 0.0.0.3 area 0
!
```

Verification :

CUST_A - R1- Router

```
Dynamips(2): R1, Console port                                    [ - ][ □ ][ X ]

CUST_A#sh ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
80.3.1.1          1   FULL/DR         00:00:30    192.168.1.2     FastEthernet0/
0
CUST_A#ping 192.168.1.2 re 100

Type escape sequence to abort.
Sending 100, 100-byte ICMP Echos to 192.168.1.2, timeout is 2 seconds:
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!.
Success rate is 98 percent (51/52), round-trip min/avg/max = 144/221/312 ms
CUST_A#tra
CUST_A#sh ip arp
CUST_A#sh ip arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  192.168.1.1            -    ca02.13b4.0008  ARPA   FastEthernet0/0
Internet  192.168.1.2           61    ca08.0fb8.0008  ARPA   FastEthernet0/0
CUST_A#sh ip cef 192.168.1.2
192.168.1.2/32, version 15, epoch 0, connected, cached adjacency 192.168.1.2
0 packets, 0 bytes
  via 192.168.1.2, FastEthernet0/0, 0 dependencies
    next hop 192.168.1.2, FastEthernet0/0
    valid cached adjacency
CUST_A#
```

```
Dynamips(2): R1, Console port                                    [ - ][ □ ][ X ]

CUST_A>en
CUST_A#sh ip rou
CUST_A#sh ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route

Gateway of last resort is not set

     80.0.0.0/32 is subnetted, 3 subnets
O       80.1.1.1 [110/2] via 192.168.1.2, 00:59:41, FastEthernet0/0
O       80.2.1.1 [110/2] via 192.168.1.2, 00:59:41, FastEthernet0/0
O       80.3.1.1 [110/2] via 192.168.1.2, 00:59:41, FastEthernet0/0
     10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
C       10.2.1.1/32 is directly connected, Loopback2
C       10.3.1.1/32 is directly connected, Loopback3
C       10.1.1.0/30 is directly connected, Loopback1
     192.168.1.0/30 is subnetted, 1 subnets
C       192.168.1.0 is directly connected, FastEthernet0/0
CUST_A#
```

CUST_B - R2 Router

```
Dynamips(3): R2, Console port
CUST_B#
CUST_B#sh ip rou
CUST_B#sh ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route

Gateway of last resort is not set

     20.0.0.0/32 is subnetted, 3 subnets
C       20.1.1.1 is directly connected, Loopback1
C       20.2.1.1 is directly connected, Loopback2
C       20.3.1.1 is directly connected, Loopback3
     172.16.0.0/30 is subnetted, 1 subnets
C       172.16.1.0 is directly connected, FastEthernet1/0
     90.0.0.0/32 is subnetted, 3 subnets
O       90.2.1.1 [110/2] via 172.16.1.2, 01:03:49, FastEthernet1/0
O       90.3.1.1 [110/2] via 172.16.1.2, 01:03:49, FastEthernet1/0
O       90.1.1.1 [110/2] via 172.16.1.2, 01:03:49, FastEthernet1/0
CUST_B#
```

```
Dynamips(3): R2, Console port
CUST_B#sh ip arp
CUST_B#sh ip arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  172.16.1.1             -    ca03.13b4.001c  ARPA   FastEthernet1/0
Internet  172.16.1.2            65    ca00.0cb0.001c  ARPA   FastEthernet1/0
CUST_B#sh ip os
CUST_B#sh ip ospf ne
CUST_B#sh ip ospf neighbor

Neighbor ID     Pri   State           Dead Time   Address         Interface
90.3.1.1          1   FULL/DR         00:00:36    172.16.1.2      FastEthernet1/
0
CUST_B#sh ip arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  172.16.1.1             -    ca03.13b4.001c  ARPA   FastEthernet1/0
Internet  172.16.1.2            65    ca00.0cb0.001c  ARPA   FastEthernet1/0
CUST_B#sh ip cef 172.16.1.2
172.16.1.2/32, version 12, epoch 0, connected, cached adjacency 172.16.1.2
0 packets, 0 bytes
  via 172.16.1.2, FastEthernet1/0, 0 dependencies
    next hop 172.16.1.2, FastEthernet1/0
    valid cached adjacency
CUST_B#
CUST_B#
```

R-3 Router - PE-1

```
Dynamips(4): R3, Console port                                          [_][□][x]

%No active L2F tunnels

L2TP Tunnel Information Total tunnels 2 sessions 2

LocID RemID Remote Name    State  Remote Address  Port  Sessions L2TP Class/
                                                                 VPDN Group
13037 63983 PE2_ROUTER     est    200.200.200.200 0     1        l2tp_default_cl
48972 55846 PE2_ROUTER     est    60.60.60.60     0     1        l2tp_default_cl

%No active PPTP tunnels
PE1_ROUTER#sh l2tun se

%No active L2F tunnels

L2TP Session Information Total tunnels 2 sessions 2

LocID       RemID       TunID       Username, Intf/     State  Last Chg Uniq ID
                                    Vcid, Circuit
44714       48149       13037       10, Fa0/0           est    01:13:15 1
44715       48148       48972       20, Fa1/0           est    01:13:15 2

%No active PPTP tunnels
PE1_ROUTER#
```

```
Dynamips(4): R3, Console port                                          [_][□][x]
PE1_ROUTER#
PE1_ROUTER#sh ip cef 200.200.200.200
200.200.200.200/32, version 24, epoch 0, attached
0 packets, 0 bytes
  tag information set
    local tag: 24
    fast tag rewrite with Tu20, point2point, tags imposed: {19}
  via Tunnel20, 0 dependencies
    valid adjacency
    tag rewrite with Tu20, point2point, tags imposed: {19}
PE1_ROUTER#
PE1_ROUTER#
PE1_ROUTER#sh ip cef 60.60.60.60
60.60.60.60/32, version 25, epoch 0, attached
0 packets, 0 bytes
  tag information set
    local tag: 25
    fast tag rewrite with Tu10, point2point, tags imposed: {18}
  via Tunnel10, 0 dependencies
    valid adjacency
    tag rewrite with Tu10, point2point, tags imposed: {18}
PE1_ROUTER#
PE1_ROUTER#
PE1_ROUTER#
```

Dynamips(4): R3, Console port

```
Name: PE1_ROUTER_t10                            (Tunnel10) Destination: 7.7.7.7
  Status:
    Admin: up           Oper: up       Path: valid        Signalling: connected

    path option 1, type dynamic (Basis for Setup, path weight 3124)

  Config Parameters:
    Bandwidth: 2000       kbps (Global)  Priority: 1  1   Affinity: 0x0/0xFFFF
    Metric Type: TE (default)
    AutoRoute:  disabled  LockDown: disabled  Loadshare: 2000     bw-based
    auto-bw: disabled

  InLabel  :  -
  OutLabel : Serial3/1, 18
  RSVP Signalling Info:
       Src 3.3.3.3, Dst 7.7.7.7, Tun_Id 10, Tun_Instance 12
    RSVP Path Info:
      My Address: 3.3.3.3
      Explicit Route: 15.3.1.2 15.4.1.2 7.7.7.7
      Record Route:   NONE
      Tspec: ave rate=2000 kbits, burst=1000 bytes, peak rate=2000 kbits
    RSVP Resv Info:
      Record Route:   NONE
      Fspec: ave rate=2000 kbits, burst=1000 bytes, peak rate=2000 kbits
```

Dynamips(4): R3, Console port

```
       Uptime: 1 hours, 16 minutes

Name: PE1_ROUTER_t20                            (Tunnel20) Destination: 7.7.7.7
  Status:
    Admin: up           Oper: up       Path: valid        Signalling: connected

    path option 1, type explicit R3-R4-R5-R7 (Basis for Setup, path weight 4686)

  Config Parameters:
    Bandwidth: 2000       kbps (Global)  Priority: 1  1   Affinity: 0x0/0xFFFF
    Metric Type: TE (default)
    AutoRoute:  disabled  LockDown: disabled  Loadshare: 2000     bw-based
    auto-bw: disabled

  InLabel  :  -
  OutLabel : Serial3/0, 19
  RSVP Signalling Info:
       Src 3.3.3.3, Dst 7.7.7.7, Tun_Id 20, Tun_Instance 12
    RSVP Path Info:
      My Address: 3.3.3.3
      Explicit Route: 15.1.1.2 15.2.1.2 15.5.1.2 7.7.7.7
      Record Route:   NONE
      Tspec: ave rate=2000 kbits, burst=1000 bytes, peak rate=2000 kbits
    RSVP Resv Info:
      Record Route:   NONE
```

```
Dynamips(4): R3, Console port                                    ─ □ ✕

PE1_ROUTER#sh mpls traffic-eng tunnels br
PE1_ROUTER#sh mpls traffic-eng tunnels brief
Signalling Summary:
    LSP Tunnels Process:            running
    RSVP Process:                   running
    Forwarding:                     enabled
    Periodic reoptimization:        every 3600 seconds, next in 2498 seconds
    Periodic auto-bw collection:    disabled
TUNNEL NAME                     DESTINATION      UP IF      DOWN IF    STATE/PROT
PE1_ROUTER_t10                  7.7.7.7          -          Se3/1      up/up
PE1_ROUTER_t20                  7.7.7.7          -          Se3/0      up/up
PE2_ROUTER_t10                  3.3.3.3          Se3/1      -          up/up
PE2_ROUTER_t20                  3.3.3.3          Se3/0      -          up/up
Displayed 2 (of 2) heads, 0 (of 0) midpoints, 2 (of 2) tails
PE1_ROUTER#
```
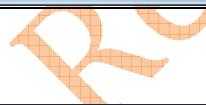
```
Dynamips(7): R7, Console port                                   ─ □ ✕

PE2_ROUTER#sh l2tun tu
PE2_ROUTER#sh l2tun tunnel

%No active L2F tunnels

L2TP Tunnel Information Total tunnels 2 sessions 2

LocID RemID Remote Name    State  Remote Address    Port  Sessions L2TP Class/
                                                                    VPDN Group
55846 48972 PE1_ROUTER     est    50.50.50.50       0     1        l2tp_default_cl
63983 13037 PE1_ROUTER     est    100.100.100.100 0     1        l2tp_default_cl

%No active PPTP tunnels
PE2_ROUTER#sh mpl tra tu br
Signalling Summary:
    LSP Tunnels Process:            running
    RSVP Process:                   running
    Forwarding:                     enabled
    Periodic reoptimization:        every 3600 seconds, next in 2396 seconds
    Periodic auto-bw collection:    disabled
TUNNEL NAME                     DESTINATION      UP IF      DOWN IF    STATE/PROT
PE2_ROUTER_t10                  3.3.3.3          -          Se3/0      up/up
PE2_ROUTER_t20                  3.3.3.3          -          Se3/2      up/up
PE1_ROUTER_t10                  7.7.7.7          Se3/0      -          up/up
PE1_ROUTER_t20                  7.7.7.7          Se3/2      -          up/up
Displayed 2 (of 2) heads, 0 (of 0) midpoints, 2 (of 2) tails
PE2_ROUTER#
```