

MSR Connect With Cisco Router By MPLS VPN

Keywords: MSR;Cisco;MPLS;VPN;TDP;LDP;BGP;HoVPN;HoPE

I Network topology

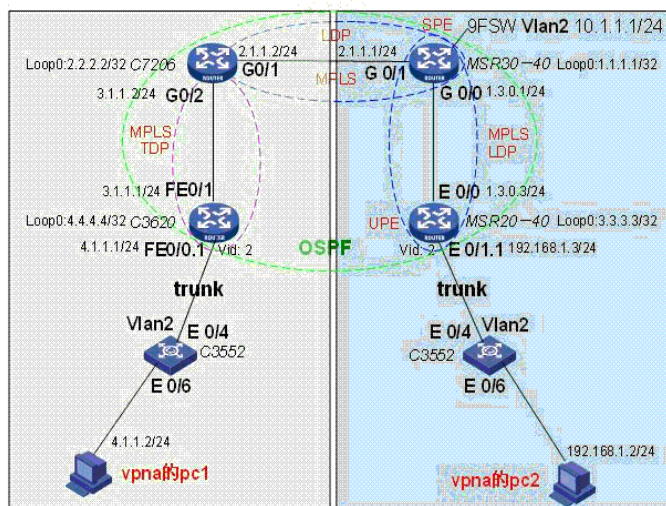


Figure 1 MSR Connect With Cisco by MPLS VPN and Multi-label

II Description of the problem

MSR connect with Cisco Router through three layer VPN. All the router run OSPF, TDP was used on Cisco device, LDP was used on MSR device. Cisco7206 work as reflector, connect MSR30-40 with LDP, connect C3620 with TDP. The lable was transfered on C7206. MSR30-40 is SPE, MSR20-40 is UPE, MSR30-40 use 9DSIC FSW, and binding VPN instance on virtual interface, access PC. MSR20-40 using sub-interface connect switch by trunk and binding VPN instance. Cisco 3620 using sub-interface connect switch by trunk, access PC.

Device List: 2 MSR; 1 Cisco router;2 Cisco 3500 Switch;2 PC

CMW Version: MSR Version 5.20, Beta 1106;

Cisco IOS Software Version 12.4

III Process analysis:

- 1) Connect every device as Figure 1, and config ip address. Running OSPF to provide the connection of each device;
- 2) Config MPLS VPN, and binding VPN instance under defined interface;

The whole configuration show below:

```
MSR30-40
sysname MSR30-40
#
router id 1.1.1.1
#
//config VPN instance, RT is 1:1
ip vpn-instance vpna
route-distinguisher 1:1
vpn-target 1:1 export-extcommunity
vpn-target 1:1 import-extcommunity
#
mpls lsr-id 1.1.1.1
#
mpls
#
mpls ldp
#
interface LoopBack0
ip address 1.1.1.1 255.255.255.255
#
vlan 2
#
//virtual interface of vlan which binding VPNA
interface Vlan-interface2
ip binding vpn-instance vpna
ip address 10.1.1.1 255.255.255.0
```

```

#
interface Ethernet4/0
port link-mode bridge
port access vlan 2

#
interface Ethernet4/1
port link-mode bridge
port access vlan 2
#
interface Ethernet4/2
port link-mode bridge
port access vlan 2
#
interface Ethernet4/3
port link-mode bridge
port access vlan 2
#
interface Ethernet4/4
port link-mode bridge
port access vlan 2
#
//connect MSR20-40, enable MPLS and LDP
interface GigabitEthernet0/0
port link-mode route
combo enable copper
ip address 1.3.0.1 255.255.255.0
mpls
mpls ldp
#
//connect Cisco 7206, enable MPLS and LDP
interface GigabitEthernet0/1
port link-mode route
combo enable copper
ip address 2.1.1.1 255.255.255.0
mpls
mpls ldp
#
//BGP part
bgp 1
undo synchronization
group 1 internal
peer 1 connect-interface LoopBack0
peer 2.2.2.2 group 1
peer 3.3.3.3 group 1
#
ipv4-family vpnv4
peer 1 enable
peer 2.2.2.2 enable
peer 2.2.2.2 group 1
peer 3.3.3.3 enable
peer 3.3.3.3 group 1
//Specify MSR20-40 as UPE
peer 3.3.3.3 upe
//distribute a default routing info of VPNA to peer 3.3.3.3
peer 3.3.3.3 default-route-advertise vpn-instance vpna
#
//import VPNA routing
ipv4-family vpn-instance vpna
import-route direct

#
ospf 1
area 0.0.0.0
network 1.1.1.1 0.0.0.0
network 1.3.0.0 0.0.0.255
network 2.1.1.0 0.0.0.255
#
return

```

MSR20-40

```
#
sysname MSR20-40

#
router id 3.3.3.3
#
//VPNA instance, pay more attention to VPN-TARGET, it must identical with MSR
30-40
ip vpn-instance vpna
route-distinguisher 3:1
vpn-target 1:1 export-extcommunity
vpn-target 1:1 import-extcommunity
#
mpls lsr-id 3.3.3.3
#
mpls
#
mpls ldp
#
//Connect MSR, enable MPLS and LDP
interface Ethernet0/0
port link-mode route
ip address 1.3.0.3 255.255.255.0
mpls
mpls ldp

#
interface Ethernet0/1
port link-mode route
#
//sub-interface of ethernet binding VPN instance
interface Ethernet0/1.1
vlan-type dot1q vid 2
ip binding vpn-instance vpna
ip address 192.168.1.3 255.255.255.0
#
interface LoopBack0
ip address 3.3.3.3 255.255.255.255

#
//BGP part
bgp 1
undo synchronization
peer 1.1.1.1 as-number 1
peer 1.1.1.1 connect-interface LoopBack0
#
ipv4-family vpnv4
peer 1.1.1.1 enable

#
ipv4-family vpn-instance vpna
import-route direct
#
ospf 1
area 0.0.0.0
network 3.3.3.3 0.0.0.0
network 1.3.0.0 0.0.0.255

#
return
```

C7206

```

!
hostname C7206
!
ip cef
!
//the VPN instance of Cisco, Router-Target equal VPN-TARGET of MSR
ip vrf vpna
rd 2:1
route-target export 1:1
route-target import 1:1
!
//default using TDP label
mpls label protocol tdp
!
interface Loopback0
ip address 2.2.2.2 255.255.255.255
!
interface GigabitEthernet0/1
ip address 2.1.1.2 255.255.255.0
duplex auto
speed auto
media-type rj45
no negotiation auto
//Using LDP on interface which connect with MSR
mpls label protocol ldp
tag-switching ip
!
interface GigabitEthernet0/2
ip address 3.1.1.2 255.255.255.0
duplex auto
speed auto
media-type rj45
no negotiation auto
//Using TDP on interface which connect with C3620
mpls label protocol tdp
tag-switching ip
!
//binding sub-interface of VPNA
interface GigabitEthernet0/2.10
encapsulation dot1Q 2
ip vrf forwarding vpna
ip address 4.1.1.1 255.255.255.0
no snmp trap link-status
!
router ospf 1
log-adjacency-changes
network 2.1.1.0 0.0.0.255 area 0.0.0.0
network 2.2.2.2 0.0.0.0 area 0.0.0.0
network 3.1.1.0 0.0.0.255 area 0.0.0.0
!
//BGP configuration of Cisco
router bgp 1
no synchronization
bgp log-neighbor-changes
neighbor 1.1.1.1 remote-as 1
neighbor 1.1.1.1 update-source Loopback0
neighbor 4.4.4.4 remote-as 1
neighbor 4.4.4.4 update-source Loopback0
no auto-summary
!
address-family vpnv4
neighbor 1.1.1.1 activate
neighbor 1.1.1.1 send-community extended
//Set MSR30-40 as the reflect client
neighbor 1.1.1.1 route-reflector-client
neighbor 4.4.4.4 activate
neighbor 4.4.4.4 send-community extended
//Set C3620 as the reflect client
neighbor 4.4.4.4 route-reflector-client
exit-address-family
!
//import routing info of VPNA
address-family ipv4 vrf vpna
redistribute connected
redistribute static
no auto-summary
no synchronization
exit-address-family
!
end

```

C3620

```

!
hostname C2800
!
ip cef
!
//the VPN instance of Cisco, Router-Target equal VPN-TARGET of MSR
ip vrf vpna
rd 4:1
route-target export 1:1
route-target import 1:1
!
mpls label protocol tdp
!
voice-card 0
no dspfarm
!
interface Loopback0
ip address 4.4.4.4 255.255.255.255
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
!
//Binding sub-interface of VPNA
interface FastEthernet0/0.1
encapsulation dot1Q 2
ip vrf forwarding vpna
ip address 4.1.1.1 255.255.255.0
no snmp trap link-status
!
interface FastEthernet0/1
ip address 3.1.1.1 255.255.255.0
duplex auto
speed auto
mpls ip
!
router ospf 1
log-adjacency-changes
network 3.1.1.0 0.0.0.255 area 0.0.0.0
network 4.1.1.0 0.0.0.255 area 0.0.0.0
network 4.4.4.4 0.0.0.0 area 0.0.0.0
!
//BGP configuration part
router bgp 1
no synchronization
bgp log-neighbor-changes
neighbor 2.2.2.2 remote-as 1
neighbor 2.2.2.2 update-source Loopback0
no auto-summary
!
//Distribute routing info to C7206
address-family vpnv4
neighbor 2.2.2.2 activate
neighbor 2.2.2.2 send-community extended
exit-address-family
!
//import routing info of VPNA
address-family ipv4 vrf vpna
redistribute connected
no auto-summary
no synchronization
exit-address-family
!
end

```

C3552

```

!
//Connect sub-interface of router
interface FastEthernet0/4
switchport trunk encapsulation dot1q
switchport trunk allowed vlan 2
switchport mode trunk
no cdp enable
!
//connect PC
interface FastEthernet0/6
switchport access vlan 2
switchport mode dynamic desirable
!

```

IV Result Analysis

After confiuration, PC2 can reach PC1, but could not reach either of the middle loopback address of router.

The crux in configuration is Using TDP global on C7206 and Using LDP under the interface which connect MSR30-40.

From this test, we make sure that MSR can communicate with Cisco Router under different MPLS VPN labels. Also, MSR can binding VPN instance under sub-interface of ethernet, virtual interface of vlan.