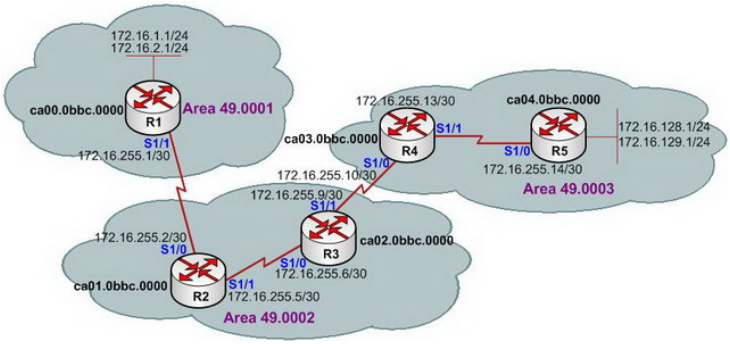
IS-IS Lab2 - Configuring IS-IS Multi Area and Summary Route

?Lab Objectives?

1. To master the basic IS-IS routing protocol configuration.
2. To understand the type of L1/L2 route.
3. To master the summary configuration of IS-IS area.

?Lab Topology?



?Lab Steps?

1. Configure the router's IP address, and use the command Ping to confirm the connect's interoperability of each router.
2. The configuration of each router is shown as below:

```
R1(config)#interface   Loopback0
R1(config-if)#ip   address 172.16.1.1 255.255.255.0
R1(config-if)#ip   router isis cisco
R1(config-if)#isis circuit-type level-1
R1(config-if)#exit
R1(config)#
R1(config)#interface   Loopback1
R1(config-if)#ip   address 172.16.2.1 255.255.255.0
R1(config-if)#ip   router isis cisco
R1(config-if)#isis circuit-type level-1
R1(config-if)#exit
R1(config)#
R1(config)#interface   Serial1/1
R1(config-if)#ip   address 172.16.255.1 255.255.255.252
R1(config-if)#ip   router isis cisco
R1(config-if)#isis circuit-type level-2-only
R1(config-if)#exit
R1(config)#
R1(config)#router isis cisco
R1(config-if)#net   49.0001.ca00.0bbc.0000.00
R1(config-if)#exit
```

```
R2(config)#interface   Serial1/0
R2(config-if)#ip   address 172.16.255.2 255.255.255.252
R2(config-if)#ip   router isis cisco
R2(config-if)#isis circuit-type level-2-only
R2(config-if)#exit
R2(config)#
R2(config)#interface   Serial1/1
R2(config-if)#ip   address 172.16.255.5 255.255.255.252
R2(config-if)#ip   router isis cisco
R2(config-if)#exit
R2(config)#
R2(config)#router isis cisco
R2(config-if)#net   49.0002.ca01.0bbc.0000.00
R2(config-if)#exit
R2(config)#
```

```
R3(config)#interface   Serial1/0
R3(config-if)#ip   address 172.16.255.6 255.255.255.252
R3(config-if)#ip   router isis cisco
R3(config-if)#exit
R3(config)#
R3(config-if)#interface   Serial1/1
R3(config-if)#ip   address 172.16.255.9 255.255.255.252
R3(config-if)#ip   router isis cisco
R3(config-if)#isis circuit-type level-2-only
R3(config-if)#exit
R3(config)#
R3(config-if)#router isis cisco
R3(config-if)#net   49.0002.ca02.0bbc.0000.00
R3(config-if)#exit
```

```
R4(config)#interface   Serial1/0
R4(config-if)#ip   address 172.16.255.10 255.255.255.252
R4(config-if)#ip   router isis cisco
R4(config-if)#isis circuit-type level-2-only
R4(config-if)#exit
R4(config)#
R4(config-if)#interface   Serial1/1
R4(config-if)#ip   address 172.16.255.13 255.255.255.252
R4(config-if)#ip   router isis cisco
R4(config-if)#isis circuit-type level-1
R4(config-if)#exit
R4(config)#
R4(config-if)#router isis cisco
R4(config-if)#net   49.0003.ca03.0bbc.0000.00
R4(config)#exit
```

```
R5(config)#interface   Loopback0
R5(config-if)#ip   address 172.16.128.1 255.255.255.0
R5(config-if)#ip   router isis cisco
R5(config-if)#isis circuit-type level-1
R5(config-if)#exit
R5(config)#
R5(config-if)#interface   Loopback1
R5(config-if)#ip   address 172.16.129.1 255.255.255.0
R5(config-if)#ip   router isis cisco
R5(config-if)#exit
R5(config)#
R5(config-if)#interface   Serial1/0
R5(config-if)#ip   address 172.16.255.14 255.255.255.252
R5(config-if)#ip router   isis cisco
R5(config-if)#exit
R5(config)#
R5(config-if)#router isis cisco
R5(config-if)#net   49.0003.ca04.0bbc.0000.00
R5(config-if)#is-type level-1
R5(config-if)#exit
```

3. Check the neighbor table of R2, R3, R4, to observe the neighbors relationship under the multi-area environment:

R2#show isis neighbors
System Id Type Interface IP Address State Holdtime Circuit Id
R3 L1L2 Se1/1 172.16.255.6 UP 29 01
R1 L2 Se1/0 172.16.255.1 UP 23 00

R3#show isis neighbors
System Id Type Interface IP Address State Holdtime Circuit Id
R2 L1L2 Se1/0 172.16.255.5 UP 25 01
R4 L2 Se1/1 172.16.255.10 UP 27 00
R3#

R4#show isis neighbors
System Id Type Interface IP Address State Holdtime Circuit Id
R3 L2 Se1/0 172.16.255.9 UP 23 00
R5 L1 Se1/1 172.16.255.14 UP 22 00

4. Check the routing table of R1 and R5, and observe the difference:

R1#show ip route

Gateway of last resort is not set

```
 172.16.0.0/16 is variably subnetted, 8   subnets, 2 masks
i L2 172.16.128.0/24 [115/50] via   172.16.255.2, Serial1/1
i L2 172.16.129.0/24 [115/50] via   172.16.255.2, Serial1/1
C 172.16.255.0/30 is directly connected,   Serial1/1
i L2 172.16.255.4/30 [115/20] via 172.16.255.2, Serial1/1
i L2 172.16.255.8/30 [115/30] via 172.16.255.2, Serial1/1
i L2 172.16.255.12/30 [115/40] via 172.16.255.2, Serial1/1
C 172.16.1.0/24 is directly connected,   Loopback0
C 172.16.2.0/24 is directly connected,   Loopback1
```

```
R1#show isis database
IS-IS Level-1 Link State   Database:
LSPID LSP Seq Num LSP Checksum LSP Holdtime ATT/P/OL
R1.00-00 * 0x0000000B 0xD33B 679 1/0/0
IS-IS Level-2 Link State   Database:
LSPID LSP Seq Num LSP Checksum LSP Holdtime  ATT/P/OL
R1.00-00 * 0x0000000E 0xCC4D 736 0/0/0
R2.00-00  0x00000013 0xA297 427 0/0/0
R3.00-00 0x0000000F 0x65C8 1097 0/0/0
R4.00-00  0x00000011 0x4B41 818 0/0/0
```

```
R5#show ip route

Gateway of last resort   is 172.16.255.13 to network 0.0.0.0

 172.16.0.0/16 is variably subnetted, 3   subnets, 2 masks
C 172.16.128.0/24 is directly connected,   Loopback0
C 172.16.129.0/24 is directly connected,   Loopback1
C 172.16.255.12/30 is directly   connected, Serial1/0
i*L1 0.0.0.0/0 [115/10] via 172.16.255.13, Serial1/0
R5#
R5#show isis database
```

IS-IS Level-1 Link State Database:
LSPID LSP Seq Num LSP Checksum LSP Holdtime ATT/P/OL
R4.00-00 0x0000000C 0x7BA1 770 1/0/0
R5.00-00 * 0x0000000D 0xF411 649 0/0/0

5. Use command ping to confirm route:

R1#ping 172.16.129.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.129.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 220/240/264 ms

6. In order to be able to more effectively reduce the size of the routing table, you can configure the IS-IS summary. First of all, to check the R4 routing table:

R4#show ip route

Gateway of last resort is not set

172.16.0.0/16 is variably subnetted, 8 subnets, 2 masks
i L1 172.16.128.0/24 [115/20] via 172.16.255.14, Serial1/1
i L1 172.16.129.0/24 [115/20] via 172.16.255.14, Serial1/1
i L2 172.16.255.0/30 [115/30] via 172.16.255.9, Serial1/0
i L2 172.16.255.4/30 [115/20] via 172.16.255.9, Serial1/0
C 172.16.255.8/30 is directly connected, Serial1/0
C 172.16.255.12/30 is directly connected, Serial1/1
i L2 172.16.1.0/24 [115/40] via 172.16.255.9, Serial1/0
i L2 172.16.2.0/24 [115/40] via 172.16.255.9, Serial1/0

7. To configure address summary on R1:

```
R1(config)#router isis cisco
R1(config-router)#summary-address 172.16.0.0   255.255.128.0
R1(config-router)#exit
R1(config)#exit
```

8. Check routing table of R4 again:

```
R4#show ip route

Gateway of last resort   is not set

 172.16.0.0/16 is variably subnetted, 7   subnets, 3 masks
i L1 172.16.128.0/24 [115/20] via   172.16.255.14, Serial1/1
i L1 172.16.129.0/24 [115/20] via   172.16.255.14, Serial1/1
i L2 172.16.255.0/30 [115/30] via   172.16.255.9, Serial1/0
i L2 172.16.255.4/30 [115/20] via   172.16.255.9, Serial1/0
C 172.16.255.8/30 is directly connected,   Serial1/0
C 172.16.255.12/30 is directly   connected, Serial1/1
i L2 172.16.0.0/17 [115/40] via 172.16.255.9, Serial1/0
```

9. To confirm the validity of routing summary:

```
R4#ping 172.16.1.1

Type escape sequence   to abort.
Sending 5, 100-byte   ICMP Echos to 172.16.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100   percent (5/5), round-trip min/avg/max = 192/225/240 ms
```

10. Lab completed.
Hope to helpful for you!