

CCIE Service Provider Lab Workbook v4.0 (<http://labs.ine.com/workbook/toc/service-provider-v4>) » CCIE SP v4 Advanced Technology Labs - IGP

Single-Level IS-IS

« OSPFv3 Encryption and Authentication (</workbook/view/service-provider-v4/task/ospfv3-encryption-and-authentication-MjgzNg%3D%3D>) | IS-IS Network Types (</workbook/view/service-provider-v4/task/is-is-network-types-MjgzOA%3D%3D>) »

Last updated: April 23, 2016

Note:

Initial Configuration & Diagrams: [Load the initial configuration files for the section named Base IPv4, which can be found in CCIE SPv4 Topology Diagrams & Initial Configurations \(<http://labs.ine.com/workbook/view/service-provider-v4/task/ccie-spv4-topology-diagrams-initial-configs>\).](#) [Refer to the Base IPv4 Diagram in order to complete this task.](#)

Task

- Using the Base IPv4 Diagram, configure IS-IS Level 2 on all interfaces of all devices.
- Use NET addresses in the format 49.0001.0000.0000.000Y.00, where Y is the router number.
- Advertise the Loopback interfaces of the routers using the **passive-interface** or **passive** command.
- Once complete, all devices should have IPv4 reachability to each other.

Configuration [Click to collapse](#)

```
R1:
interface GigabitEthernet1.12
 ip router isis
 !
router isis
 net 49.0001.0000.0000.0001.00
 is-type level-2-only
 passive-interface Loopback0
```

```
R2:
interface GigabitEthernet1.23
 ip router isis
 !
interface GigabitEthernet1.24
 ip router isis
 !
interface GigabitEthernet1.12
 ip router isis
 !
router isis
 net 49.0001.0000.0000.0002.00
 is-type level-2-only
 passive-interface Loopback0
```

```
R3:
interface GigabitEthernet1.23
 ip router isis
 !
interface GigabitEthernet1.34
 ip router isis
 !
interface GigabitEthernet1.36
 ip router isis
 !
router isis
 net 49.0001.0000.0000.0003.00
 is-type level-2-only
 passive-interface Loopback0
```

```
R4:
interface GigabitEthernet1.24
 ip router isis
 !
interface GigabitEthernet1.34
 ip router isis
 !
interface GigabitEthernet1.45
 ip router isis
 !
interface GigabitEthernet1.46
 ip router isis
 !
router isis
```

```
net 49.0001.0000.0000.0004.00
```

```
is-type level-2-only
```

```
passive-interface Loopback0
```

```
R5:
```

```
interface GigabitEthernet1.45
```

```
ip router isis
```

```
!
```

```
interface GigabitEthernet1.56
```

```
ip router isis
```

```
!
```

```
interface GigabitEthernet1.519
```

```
ip router isis
```

```
!
```

```
router isis
```

```
net 49.0001.0000.0000.0005.00
```

```
is-type level-2-only
```

```
passive-interface Loopback0
```

```
R6:
```

```
interface GigabitEthernet1.36
```

```
ip router isis
```

```
!
```

```
interface GigabitEthernet1.46
```

```
ip router isis
```

```
!
```

```
interface GigabitEthernet1.56
```

```
ip router isis
```

```
!
```

```
interface GigabitEthernet1.619
```

```
ip router isis
```

```
!
```

```
router isis
```

```
net 49.0001.0000.0000.0006.00
```

```
is-type level-2-only
```

```
passive-interface Loopback0
```

```
XR1:
```

```
router isis 1
```

```
is-type level-2-only
```

```
net 49.0001.0000.0000.0019.00
```

```
interface Loopback0
```

```
passive
```

```
address-family ipv4 unicast
```

```
!
```

```
!
```

```
interface GigabitEthernet0/0/0.519
```

```
address-family ipv4 unicast
```

```
!
```

```
!
```

```
interface GigabitEthernet0/0/0.619
```

```
address-family ipv4 unicast
```

```
!
```

```
!
```

```

interface GigabitEthernet0/0/0/0.1920
    address-family ipv4 unicast
    !
    !
    !
XR2:
router isis 1
    is-type level-2-only
    net 49.0001.0000.0000.0020.00
    interface Loopback0
        passive
        address-family ipv4 unicast
        !
        !
    interface GigabitEthernet0/0/0/0.1920
        address-family ipv4 unicast
        !
        !
        !

```

Verification

All devices should have Level 2 IS-IS adjacencies with their directly connected neighbors.

```

R6#show isis neighbors

System Id      Type Interface  IP Address      State Holdtime Circuit Id
-----
R3             L2   Gi1.36        20.3.6.3        UP      8           R3.03
R4             L2   Gi1.46        20.4.6.4        UP      26          R6.02
R5             L2   Gi1.56        20.5.6.5        UP      20          R6.03
XR1            L2   Gi1.619       20.6.19.19      UP      24          R6.04

RP/0/0/CPU0:XR1#show isis adjacency

Thu Apr 23 19:21:47.737 UTC

IS-IS 1 Level-2 adjacencies:

System Id      Interface      SNPA              State Hold Changed  NSF IPv4 IPv6
                                     BFD  BFD
-----
R6             Gi0/0/0/0.619  0050.569e.5cec   Up    7    00:02:12 Yes None None
R5             Gi0/0/0/0.519  0050.569e.0962   Up    22   00:02:12 Yes None None
XR2            Gi0/0/0/0.1920 0050.569e.27ac   Up    28   00:01:21 Yes None None

Total adjacency count: 3

```

All devices should have identical Link State Databases, with a single LSP generated by all routers in addition to a Pseudo Node LSP generated for each Ethernet segment. This behavior is similar to how the OSPF Designated Router originates a Network LSA (LSA Type 2) for segments running OSPF Network Type Broadcast.

R6#show isis database

IS-IS Level-2 Link State Database:

LSPID	LSP Seq Num	LSP Checksum	LSP Holdtime	ATT/P/OL
R1.00-00	0x00000003	0x29C1	782	0/0/0
R1.01-00	0x00000001	0x21B9	783	0/0/0
R2.00-00	0x00000005	0x1535	796	0/0/0
R2.02-00	0x00000001	0x5283	797	0/0/0
R3.00-00	0x00000007	0xE443	860	0/0/0
R3.01-00	0x00000001	0x2DA9	789	0/0/0
R3.02-00	0x00000001	0x587B	795	0/0/0
R3.03-00	0x00000002	0x814E	860	0/0/0
R4.00-00	0x00000007	0x2C1D	859	0/0/0
R4.03-00	0x00000001	0x705F	803	0/0/0
R5.00-00	0x00000007	0xC914	1024	0/0/0
R6.00-00	* 0x00000007	0xDE36	1025	0/0/0
R6.02-00	* 0x00000002	0x6864	861	0/0/0
R6.03-00	* 0x00000002	0x7A50	862	0/0/0
R6.04-00	* 0x00000001	0x6B4B	1026	0/0/0
XR1.00-00	0x00000004	0x67E4	1073	0/0/0
XR1.01-00	0x00000001	0xA2E9	1073	0/0/0
XR1.05-00	0x00000001	0xE0C2	1027	0/0/0
XR2.00-00	0x00000003	0xEF2B	1079	0/0/0

RP/0/0/CPU0:XR1#show isis database

Thu Apr 23 19:22:44.274 UTC

IS-IS 1 (Level-2) Link State Database

LSPID	LSP Seq Num	LSP Checksum	LSP Holdtime	ATT/P/OL
R1.00-00	0x00000003	0x29c1	770	0/0/0
R1.01-00	0x00000001	0x21b9	771	0/0/0
R2.00-00	0x00000005	0x1535	784	0/0/0
R2.02-00	0x00000001	0x5283	785	0/0/0
R3.00-00	0x00000007	0xe443	844	0/0/0
R3.01-00	0x00000001	0x2da9	777	0/0/0
R3.02-00	0x00000001	0x587b	783	0/0/0
R3.03-00	0x00000002	0x814e	844	0/0/0
R4.00-00	0x00000007	0x2c1d	845	0/0/0
R4.03-00	0x00000001	0x705f	791	0/0/0
R5.00-00	0x00000007	0xc914	1016	0/0/0
R6.00-00	0x00000007	0xde36	1016	0/0/0
R6.02-00	0x00000002	0x6864	843	0/0/0
R6.03-00	0x00000002	0x7a50	846	0/0/0
R6.04-00	0x00000001	0x6b4b	1016	0/0/0
XR1.00-00	* 0x00000004	0x67e4	1061	0/0/0
XR1.01-00	0x00000001	0xa2e9	1061	0/0/0
XR1.05-00	0x00000001	0xe0c2	1017	0/0/0
XR2.00-00	0x00000003	0xef2b	1068	0/0/0

Total Level-2 LSP count: 19 Local Level-2 LSP count: 1

R1#show ip route isis

Codes: L - local, 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, H - NHRP, l - LISP

a - application route

+ - replicated route, % - next hop override

Gateway of last resort is not set

```

2.0.0.0/32 is subnetted, 1 subnets
i L2 2.2.2.2 [115/10] via 10.1.2.2, 00:07:20, GigabitEthernet1.12
3.0.0.0/32 is subnetted, 1 subnets
i L2 3.3.3.3 [115/20] via 10.1.2.2, 00:07:20, GigabitEthernet1.12
4.0.0.0/32 is subnetted, 1 subnets
i L2 4.4.4.4 [115/20] via 10.1.2.2, 00:07:10, GigabitEthernet1.12
5.0.0.0/32 is subnetted, 1 subnets
i L2 5.5.5.5 [115/30] via 10.1.2.2, 00:07:10, GigabitEthernet1.12
6.0.0.0/32 is subnetted, 1 subnets
i L2 6.6.6.6 [115/30] via 10.1.2.2, 00:06:11, GigabitEthernet1.12
10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
i L2 10.19.20.0/24 [115/50] via 10.1.2.2, 00:03:28, GigabitEthernet1.12
19.0.0.0/32 is subnetted, 1 subnets
i L2 19.19.19.19 [115/40] via 10.1.2.2, 00:03:28, GigabitEthernet1.12
20.0.0.0/8 is variably subnetted, 10 subnets, 2 masks
i L2 20.2.3.0/24 [115/20] via 10.1.2.2, 00:07:20, GigabitEthernet1.12
i L2 20.2.4.0/24 [115/20] via 10.1.2.2, 00:07:20, GigabitEthernet1.12
i L2 20.3.4.0/24 [115/30] via 10.1.2.2, 00:07:10, GigabitEthernet1.12
i L2 20.3.6.0/24 [115/30] via 10.1.2.2, 00:07:20, GigabitEthernet1.12
i L2 20.4.5.0/24 [115/30] via 10.1.2.2, 00:07:10, GigabitEthernet1.12
i L2 20.4.6.0/24 [115/30] via 10.1.2.2, 00:07:10, GigabitEthernet1.12
i L2 20.5.6.0/24 [115/40] via 10.1.2.2, 00:06:11, GigabitEthernet1.12
i L2 20.5.19.0/24 [115/40] via 10.1.2.2, 00:07:10, GigabitEthernet1.12
i L2 20.6.19.0/24 [115/40] via 10.1.2.2, 00:06:11, GigabitEthernet1.12
i L2 20.20.20.0/32 [115/50] via 10.1.2.2, 00:02:39, GigabitEthernet1.12

```

RP/0/0/CPU0:XR2#show route ipv4 isis

Thu Apr 23 19:23:33.001 UTC

```

i L2 1.1.1.1/32 [115/50] via 10.19.20.19, 00:02:55, GigabitEthernet0/0/0.1920
i L2 2.2.2.2/32 [115/40] via 10.19.20.19, 00:02:55, GigabitEthernet0/0/0.1920
i L2 3.3.3.3/32 [115/30] via 10.19.20.19, 00:02:55, GigabitEthernet0/0/0.1920
i L2 4.4.4.4/32 [115/30] via 10.19.20.19, 00:02:55, GigabitEthernet0/0/0.1920
i L2 5.5.5.5/32 [115/20] via 10.19.20.19, 00:02:55, GigabitEthernet0/0/0.1920
i L2 6.6.6.6/32 [115/20] via 10.19.20.19, 00:02:55, GigabitEthernet0/0/0.1920
i L2 10.1.2.0/24 [115/50] via 10.19.20.19, 00:02:55, GigabitEthernet0/0/0.1920
i L2 19.19.19.19/32 [115/10] via 10.19.20.19, 00:03:01, GigabitEthernet0/0/0.1920
i L2 20.2.3.0/24 [115/40] via 10.19.20.19, 00:02:55, GigabitEthernet0/0/0.1920
i L2 20.2.4.0/24 [115/40] via 10.19.20.19, 00:02:55, GigabitEthernet0/0/0.1920
i L2 20.3.4.0/24 [115/40] via 10.19.20.19, 00:02:55, GigabitEthernet0/0/0.1920

```



All devices should have full reachability to all other devices in the topology.

```
i L2 20.3.6.0/24 [115/30] via 10.19.20.19, 00:02:55, GigabitEthernet0/0/0.1920
i L2 20.4.5.0/24 [115/30] via 10.19.20.19, 00:02:55, GigabitEthernet0/0/0.1920
i L2 20.4.6.0/24 [115/30] via 10.19.20.19, 00:02:55, GigabitEthernet0/0/0.1920
i L2 20.5.6.0/24 [115/30] via 10.19.20.19, 00:02:55, GigabitEthernet0/0/0.1920
i L2 20.5.19.0/24 [115/20] via 10.19.20.19, 00:03:01, GigabitEthernet0/0/0.1920
i L2 20.6.19.0/24 [115/20] via 10.19.20.19, 00:03:01, GigabitEthernet0/0/0.1920
```

```
R1#ping 20.20.20.20
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 20.20.20.20, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/5/10 ms
```

```
R1#traceroute 20.20.20.20
Type escape sequence to abort.
Tracing the route to 20.20.20.20
VRF info: (vrf in name/id, vrf out name/id)
 1 10.1.2.2 4 msec 1 msec 1 msec
 2 20.2.3.3 6 msec 2 msec 1 msec
 3 20.3.6.6 1 msec 1 msec 1 msec
 4 20.6.19.19 10 msec 12 msec 13 msec
 5 10.19.20.20 13 msec * 3 msec
```

```
RP/0/0/CPU0:XR2#ping 1.1.1.1
Thu Apr 23 19:24:27.227 UTC
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.1.1.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/9 ms
```

```
RP/0/0/CPU0:XR2#traceroute 1.1.1.1
Thu Apr 23 19:24:31.847 UTC
Type escape sequence to abort.
Tracing the route to 1.1.1.1
 1 10.19.20.19 0 msec 0 msec 0 msec
 2 20.5.19.5 0 msec 0 msec 0 msec
 3 20.4.5.4 0 msec 0 msec 0 msec
 4 20.2.4.2 0 msec 0 msec 0 msec
 5 10.1.2.1 39 msec * 0 msec
```

« OSPFv3 Encryption and Authentication (/workbook/view/service-provider-v4/task/ospfv3-encryption-and-authentication-MjgzNg%3D%3D) | IS-IS Network Types (/workbook/view/service-provider-v4/task/is-is-network-types-MjgzOA%3D%3D) »