

CCIE Service Provider Lab Workbook v4.0

(<http://labs.ine.com/workbook/toc/service-provider-v4>) »

CCIE SP v4 Advanced Technology Labs - IGP

› IS-IS Network Types

« [Single-Level IS-IS \(/workbook/view/service-provider-v4/task/single-level-is-is-MjgzNw%3D%3D\)](#) | [IS-IS Path Selection \(/workbook/view/service-provider-v4/task/is-is-path-selection-MjgzOQ%3D%3D\)](#) »

Last updated: April 23, 2016

Note:

This task assumes that you have already completed the [Single-Level IS-IS \(/workbook/view/service-provider-v4/task/single-level-is-is-MjgzNw%3D%3D\)](#) task. Refer to the **Base IPv4 Diagram** in order to complete this task.

Task

- Change the IS-IS Network Type of the link between R5 and XR1 to Point-to-Point.

Configuration [Click to collapse](#)

```
R5:
interface GigabitEthernet1.519
  isis network point-to-point

XR1:
router isis 1
interface GigabitEthernet0/0/0.519
  point-to-point
!
!
!
```

Verification

Prior to changing the IS-IS Network Type, R5 and XR1 generate L2 LAN Hellos on the Ethernet link connecting them.

```

R5#debug isis adj-packets GigabitEthernet1.519

IS-IS Adjacency related packets debugging is on for router process null

R5#

IS-IS-Adj: Rec L2 IIH from 0050.569e.59fe (GigabitEthernet1.519), cir type L2, cir id 0000.0000.0019.05, length 1497, ht(10)

IS-IS-Adj: he_knows_us 1, old state 0, new state 0, level 2

R5#

IS-IS-Adj: Rec L2 IIH from 0050.569e.59fe (GigabitEthernet1.519), cir type L2, cir id 0000.0000.0019.05, length 1497, ht(10)

IS-IS-Adj: he_knows_us 1, old state 0, new state 0, level 2

R5#

IS-IS-Adj: Rec L2 IIH from 0050.569e.59fe (GigabitEthernet1.519), cir type L2, cir id 0000.0000.0019.05, length 1497, ht(10)

IS-IS-Adj: he_knows_us 1, old state 0, new state 0, level 2

IS-IS-Adj: Sending L2 LAN IIH on GigabitEthernet1.519, length 1497

R5#

IS-IS-Adj: Rec L2 IIH from 0050.569e.59fe (GigabitEthernet1.519), cir type L2, cir id 0000.0000.0019.05, length 1497, ht(10)

IS-IS-Adj: he_knows_us 1, old state 0, new state 0, level 2

```

While running the default Network Type of Broadcast, a Pseudo Node LSP is generated by the Designated Intermediate System (DIS) on the link between R5 and XR1. In this case R5 was elected the DIS.

```

RP/0/0/CPU0:XR1#show isis database XR1.05-00 detail

Thu Apr 23 21:48:01.046 UTC

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

LSPID                LSP Seq Num  LSP Checksum  LSP Holdtime  ATT/P/OL
XR1.05-00            0x0000000c   0xcacd        848           0/0/0

  Metric: 0          IS XR1.00
  Metric: 0          IS R5.00

```

Once the Network Type is changed to Point-to-Point, R5 and XR1 generate P2P Hellos, and there is no DIS election nor Pseudo Node LSP for the segment between them. Like in OSPF this helps reduce the size of the database and simplifies the SPF calculation for links that are broadcast (e.g. Ethernet) but only have two routers on them.

```

R5#conf t

Enter configuration commands, one per line. End with CNTL/Z.

R5(config)# interface GigabitEthernet1.519

R5(config-subif)# isis network point-to-point

R5(config-subif)#

RP/0/0/CPU0:XR1#conf t

Thu Apr 23 21:48:57.943 UTC

RP/0/0/CPU0:XR1(config)# router isis 1

RP/0/0/CPU0:XR1(config-isis)# interface GigabitEthernet0/0/0.519

RP/0/0/CPU0:XR1(config-isis-if)# point-to-point

RP/0/0/CPU0:XR1(config-isis-if)# !

RP/0/0/CPU0:XR1(config-isis-if)#commit

Thu Apr 23 21:49:00.562 UTC

```

The Circuit ID of 00 means that there is no DIS on the segment, and hence the Network Type is Point-to-Point.

```
R5#show isis neighbors
```

System Id	Type	Interface	IP Address	State	Holdtime	Circuit Id
R4	L2	Gi1.45	20.4.5.4	UP	9	R4.03
R6	L2	Gi1.56	20.5.6.6	UP	9	R6.03
XR1	L2	Gi1.519	20.5.19.19	UP	25	00

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

```
Thu Apr 23 21:51:01.564 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	6	02:31:25	Yes	None	None
R5	Gi0/0/0/0.519	*PtoP*	Up	26	00:01:51	Yes	None	None
XR2	Gi0/0/0/0.1920	0050.569e.27ac	Up	24	02:30:35	Yes	None	None

```
Total adjacency count: 3
```

R5 now sends and receives Serial (Point-to-Point) Hellos on the segment to XR1.

```
R5#debug isis adj-packets GigabitEthernet1.519
```

```
IS-IS Adjacency related packets debugging is on for router process null
```

```
R5#
```

```
ISIS-Adj: Sending serial IIH on GigabitEthernet1.519, 3way state:UP, length 1496
```

```
R5#
```

```
ISIS-Adj: Rec serial IIH from 0050.569e.59fe (GigabitEthernet1.519), cir type L2, cir id 00, length 1497
```

```
ISIS-Adj: rcvd state UP, old state UP, new state UP, nbr usable TRUE
```

```
ISIS-Adj: newstate:0, state_changed:0, going_up:0, going_down:0
```

```
ISIS-Adj: Action = ACCEPT
```

```
ISIS-Adj: ACTION_ACCEPT:
```

A Pseudo Node LSP is no longer generated for this segment in the database. The LSP Holdtime of 0 indicates that the old LSP is currently aging out and will eventually be deleted.

R5#show isis database

IS-IS Level-2 Link State Database:

LSPID	LSP Seq Num	LSP Checksum	LSP Holdtime	ATT/P/OL
R1.00-00	0x0000000E	0x13CC	505	0/0/0
R1.01-00	0x0000000D	0x09C5	1060	0/0/0
R2.00-00	0x00000010	0xFE40	504	0/0/0
R2.02-00	0x0000000C	0x3C8E	643	0/0/0
R3.00-00	0x00000012	0xCE4E	603	0/0/0
R3.01-00	0x0000000C	0x17B4	1008	0/0/0
R3.02-00	0x0000000D	0x4087	1072	0/0/0
R3.03-00	0x0000000D	0x6B59	546	0/0/0
R4.00-00	0x00000012	0x1628	682	0/0/0
R4.03-00	0x0000000C	0x5A6A	524	0/0/0
R5.00-00	* 0x00000014	0xB421	997	0/0/0
R6.00-00	0x00000012	0xC841	720	0/0/0
R6.02-00	0x0000000D	0x526F	670	0/0/0
R6.03-00	0x0000000E	0x625C	794	0/0/0
R6.04-00	0x0000000C	0x5556	501	0/0/0
XR1.00-00	0x00000011	0xD384	993	0/0/0
XR1.01-00	0x0000000C	0x8CF4	810	0/0/0
XR1.05-00	0x0000000C	0x0000	0 (987)	0/0/0
XR2.00-00	0x0000000E	0xD936	665	0/0/0

R5#show isis database XR1.00-00 detail

IS-IS Level-2 LSP XR1.00-00

LSPID	LSP Seq Num	LSP Checksum	LSP Holdtime	ATT/P/OL
XR1.00-00	0x00000011	0xD384	868	0/0/0

Area Address: 49.0001

NLPID: 0xCC

Hostname: XR1

IP Address: 19.19.19.19

Metric: 10 IS XR1.01

Metric: 10 IS R6.04

Metric: 10 IS R5.00

Metric: 10 IP 10.19.20.0 255.255.255.0

Metric: 0 IP 19.19.19.19 255.255.255.255

Metric: 10 IP 20.5.19.0 255.255.255.0

Metric: 10 IP 20.6.19.0 255.255.255.0

R5#show isis database R5.00-00 detail

IS-IS Level-2 LSP R5.00-00

LSPID	LSP Seq Num	LSP Checksum	LSP Holdtime	ATT/P/OL
R5.00-00	* 0x00000014	0xB421	804	0/0/0

Area Address: 49.0001

NLPID: 0xCC

Hostname: R5

Metric: 10 IS R4.03

```

Metric: 10      IS R6.03
Metric: 10      IS XR1.00
IP Address:    5.5.5.5
Metric: 10      IP 20.4.5.0 255.255.255.0
Metric: 10      IP 20.5.6.0 255.255.255.0
Metric: 10      IP 20.5.19.0 255.255.255.0
Metric: 0       IP 5.5.5.5 255.255.255.255
    
```

R5 is only advertising one LSP, however XR1 is advertising two. This is because XR1 is the DIS for the segment between XR1 and XR2.

```

R5#show isis database

IS-IS Level-2 Link State Database:

LSPID          LSP Seq Num  LSP Checksum  LSP Holdtime  ATT/P/OL
-----
R1.00-00      0x00000011  0x0DCf        781            0/0/0
R1.01-00      0x0000000F  0x05C7        566            0/0/0
R2.00-00      0x00000013  0xF843        864            0/0/0
R2.02-00      0x0000000F  0x3691        1035           0/0/0
R3.00-00      0x00000015  0xC851        782            0/0/0
R3.01-00      0x0000000E  0x13B6        542            0/0/0
R3.02-00      0x0000000F  0x3C89        624            0/0/0
R3.03-00      0x00000010  0x655C        679            0/0/0
R4.00-00      0x00000015  0x102B        1154           0/0/0
R4.03-00      0x0000000F  0x546D        608            0/0/0
R5.00-00      * 0x00000016  0xB023        390            0/0/0
R6.00-00      0x00000015  0xC244        966            0/0/0
R6.02-00      0x00000010  0x4C72        811            0/0/0
R6.03-00      0x00000011  0x5C5F        1018           0/0/0
R6.04-00      0x0000000F  0x4F59        632            0/0/0
XR1.00-00     0x00000013  0xCF86        629            0/0/0
XR1.01-00     0x0000000F  0x86F7        1073           0/0/0
XR2.00-00     0x00000011  0xD339        1043           0/0/0

R5#show isis database XR1.01-00 detail

IS-IS Level-2 LSP XR1.01-00

LSPID          LSP Seq Num  LSP Checksum  LSP Holdtime  ATT/P/OL
-----
XR1.01-00      0x0000000F  0x86F7        981            0/0/0

Metric: 0      IS XR1.00
Metric: 0      IS XR2.00
    
```

Another benefit gained by changing the network type to point-to-point on directly connected LAN segments is the reduced flooding of CSNP packets. On a point-to-point link, ISIS will send an initial CSNP (Complete Sequence Number Packet) when the adjacency is being established. This is similar to the DBD exchange in OSPF. As soon as the adjacency is established and the CSNP is exchanged, each device on the point-to-point link will acknowledge the CSNP with a PSNP. This makes flooding over point-to-point links reliable, as CSNP packets are acknowledged. In contrast, broadcast segments flood CSNP packets at set intervals instead of only during adjacency establishment - causing additional overhead. The flooded CSNP packets are not acknowledged over LAN segments. Instead of relying on acknowledgments for reliability, the DIS floods the CSNP periodically to ensure all devices in the LAN segment have the latest CSNP.

Notice that the CSNP is being flooded by the DIS every 10 seconds on the broadcast segment adjacencies, yet no SNP packets are received from XR1.


```
R5#show isis neighbors
```

System Id	Type	Interface	IP Address	State	Holdtime	Circuit Id
R4	L2	Gi1.45	20.4.5.4	UP	8	R4.03
R6	L2	Gi1.56	20.5.6.6	UP	8	R6.03
XR1	L2	Gi1.519	20.5.19.19	UP	25	00

```
R5#debug isis snp-packets
```

```
*Apr 25 19:37:24.777: %SYS-5-CONFIG_I: Configured from console by console
*Apr 25 19:37:24.964: ISIS-Snp: Rec L2 CSNP from 0000.0000.0004 (GigabitEthernet1.45)
*Apr 25 19:37:24.964: ISIS-SNP: CSNP range 0000.0000.0000.00-00 to FFFF.FFFF.FFFF.FF-FF
*Apr 25 19:37:24.964: ISIS-SNP: Same entry 0000.0000.0001.00-00, seq B
*Apr 25 19:37:24.964: ISIS-SNP: Same entry 0000.0000.0001.01-00, seq 9
*Apr 25 19:37:24.964: ISIS-SNP: Same entry 0000.0000.0002.00-00, seq D
*Apr 25 19:37:24.964: ISIS-SNP: Same entry 0000.0000.0002.02-00, seq 9
R5#
*Apr 25 19:37:24.965: ISIS-SNP: Same entry 0000.0000.0003.00-00, seq D
*Apr 25 19:37:24.965: ISIS-SNP: Same entry 0000.0000.0003.01-00, seq 9
*Apr 25 19:37:24.965: ISIS-SNP: Same entry 0000.0000.0003.02-00, seq 9
*Apr 25 19:37:24.965: ISIS-SNP: Same entry 0000.0000.0003.03-00, seq 9
*Apr 25 19:37:24.965: ISIS-SNP: Same entry 0000.0000.0004.00-00, seq E0
*Apr 25 19:37:24.965: ISIS-SNP: Same entry 0000.0000.0004.03-00, seq 9
*Apr 25 19:37:24.965: ISIS-SNP: Same entry 0000.0000.0005.00-00, seq D
R5#
*Apr 25 19:37:24.965: ISIS-SNP: Same entry 0000.0000.0006.00-00, seq E1
*Apr 25 19:37:24.965: ISIS-SNP: Same entry 0000.0000.0006.02-00, seq 9
*Apr 25 19:37:24.965: ISIS-SNP: Same entry 0000.0000.0006.03-00, seq 9
*Apr 25 19:37:24.965: ISIS-SNP: Same entry 0000.0000.0006.04-00, seq 9
*Apr 25 19:37:24.965: ISIS-SNP: Same entry 0000.0000.0019.00-00, seq E4
*Apr 25 19:37:24.965: ISIS-SNP: Same entry 0000.0000.0019.01-00, seq DC
*Apr 25 19:37:24.965: ISIS-SNP: Same entry 0000.0000.0020.00-00, seq DE
R5#
R5#
*Apr 25 19:37:30.964: ISIS-Snp: Rec L2 CSNP from 0000.0000.0006 (GigabitEthernet1.56)
*Apr 25 19:37:30.964: ISIS-SNP: CSNP range 0000.0000.0000.00-00 to FFFF.FFFF.FFFF.FF-FF
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0001.00-00, seq B
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0001.01-00, seq 9
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0002.00-00, seq D
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0002.02-00, seq 9
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0003.00-00, seq D
R5#
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0003.01-00, seq 9
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0003.02-00, seq 9
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0003.03-00, seq 9
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0004.00-00, seq E0
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0004.03-00, seq 9
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0005.00-00, seq D
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0006.00-00, seq E1
R5#
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0006.02-00, seq 9
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0006.03-00, seq 9
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0006.04-00, seq 9
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0019.00-00, seq E4
```

```

*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0019.01-00, seq DC
*Apr 25 19:37:30.964: ISIS-SNP: Same entry 0000.0000.0020.00-00, seq DE
*Apr 25 19:37:33.327: ISIS-Snp: Rec L2 CSNP from 0000.0000.0004 (GigabitEthernet1.45)
RS#
*Apr 25 19:37:33.327: ISIS-SNP: CSNP range 0000.0000.0000.00-00 to FFFF.FFFF.FFFF.FF-FF
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0001.00-00, seq B
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0001.01-00, seq 9
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0002.00-00, seq D
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0002.02-00, seq 9
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0003.00-00, seq D
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0003.01-00, seq 9
RS#
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0003.02-00, seq 9
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0003.03-00, seq 9
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0004.00-00, seq E0
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0004.03-00, seq 9
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0005.00-00, seq D
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0006.00-00, seq E1
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0006.02-00, seq 9
RS#
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0006.03-00, seq 9
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0006.04-00, seq 9
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0019.00-00, seq E4
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0019.01-00, seq DC
*Apr 25 19:37:33.327: ISIS-SNP: Same entry 0000.0000.0020.00-00, seq DE
*Apr 25 19:37:39.033: ISIS-Snp: Rec L2 CSNP from 0000.0000.0006 (GigabitEthernet1.56)
*Apr 25 19:37:39.033: ISIS-SNP: CSNP range 0000.0000.0000.00-00 to FFFF.FFFF.FFFF.FF-FF
*Apr 25 19:37:39.033: ISIS-SNP: Same entry 0000.0000.0001.00-00, seq B
*Apr 25 19:37:39.033: ISIS-SNP: Same entry 0000.0000.0001.01-00, seq 9
*Apr 25 19:37:39.033: ISIS-SNP: Same entry 0000.0000.0002.00-00, seq D
*Apr 25 19:37:39.033: ISIS-SNP: Same entry 0000.0000.0002.02-00, seq 9
*Apr 25 19:37:39.033: ISIS-SNP: Same entry 0000.0000.0003.00-00, seq D
RS#
*Apr 25 19:37:39.033: ISIS-SNP: Same entry 0000.0000.0003.01-00, seq 9
*Apr 25 19:37:39.033: ISIS-SNP: Same entry 0000.0000.0003.02-00, seq 9
*Apr 25 19:37:39.033: ISIS-SNP: Same entry 0000.0000.0003.03-00, seq 9
*Apr 25 19:37:39.033: ISIS-SNP: Same entry 0000.0000.0004.00-00, seq E0
*Apr 25 19:37:39.033: ISIS-SNP: Same entry 0000.0000.0004.03-00, seq 9
*Apr 25 19:37:39.033: ISIS-SNP: Same entry 0000.0000.0005.00-00, seq D
*Apr 25 19:37:39.033: ISIS-SNP: Same entry 0000.0000.0006.00-00, seq E1
RS#
*Apr 25 19:37:39.033: ISIS-SNP: Same entry 0000.0000.0006.02-00, seq 9
*Apr 25 19:37:39.033: ISIS-SNP: Same entry 0000.0000.0006.03-00, seq 9
*Apr 25 19:37:39.034: ISIS-SNP: Same entry 0000.0000.0006.04-00, seq 9
*Apr 25 19:37:39.034: ISIS-SNP: Same entry 0000.0000.0019.00-00, seq E4
*Apr 25 19:37:39.034: ISIS-SNP: Same entry 0000.0000.0019.01-00, seq DC
*Apr 25 19:37:39.034: ISIS-SNP: Same entry 0000.0000.0020.00-00, seq DE
RS#

```