

CCIE Service Provider Lab Workbook v4.0

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CCIE SP v4 Advanced Technology Labs - IGP

CONTENTS

IS-IS Path Selection

« [IS-IS Network Types \(/workbook/view/service-provider-v4/task/is-is-network-types-MjgzOA%3D%3D\)](/workbook/view/service-provider-v4/task/is-is-network-types-MjgzOA%3D%3D) | [IS-IS BFD \(/workbook/view/service-provider-v4/task/is-is-bfd-Mjg0MA%3D%3D\)](/workbook/view/service-provider-v4/task/is-is-bfd-Mjg0MA%3D%3D) »

Last updated: April 23, 2016

Note:

This task assumes that you have already completed the [Single-Level IS-IS \(http://labs.ine.com/workbook/view/service-provider-v4/task/single-level-is-is-MjgzNw%3D%3D\)](http://labs.ine.com/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.

Comments...

Task

Cancel

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- Change the IS-IS metric on the link between R6 and XR1 so that bidirectional traffic between R1 and XR2 prefers to use the link between R5 and XR1.

Configuration [Click to collapse](#)

```
R6:
interface GigabitEthernet1.619
  isis metric 20 level-2

XR1:
router isis 1
interface GigabitEthernet0/0/0/0.619
  address-family ipv4 unicast
    metric 20
  !
  !
  !
```

Verification

Unlike OSPF, IS-IS metric values are not based on bandwidth. Instead, each interface gets a default metric of 10, as seen below. All link types, including Ethernet, FastEthernet, GigabitEthernet, and OC-48 POS links have a metric of 10:

```
R5#show clns interface | include line protocol|Metric
GigabitEthernet1 is up, line protocol is up
GigabitEthernet1.5 is deleted, line protocol is down
GigabitEthernet1.45 is up, line protocol is up
    Level-2 Metric: 10, Priority: 64, Circuit ID: R4.03
    Level-2 IPv6 Metric: 10
GigabitEthernet1.56 is up, line protocol is up
    Level-2 Metric: 10, Priority: 64, Circuit ID: R6.03
    Level-2 IPv6 Metric: 10
GigabitEthernet1.58 is deleted, line protocol is down
GigabitEthernet1.100 is deleted, line protocol is down
GigabitEthernet1.519 is up, line protocol is up
    Level-2 Metric: 10, Priority: 64, Circuit ID: XR1.00
    Level-2 IPv6 Metric: 10
GigabitEthernet2 is up, line protocol is up
GigabitEthernet3 is up, line protocol is up
Loopback0 is up, line protocol is up

RP/0/0/CPU0:XR1#show isis interface | include "Loopback|Gig|Metric"
Sat Apr 25 19:51:54.886 UTC
Loopback0                Enabled
    Metric (L1/L2):      0/0
GigabitEthernet0/0/0/0.519 Enabled
    Metric (L1/L2):      10/10
GigabitEthernet0/0/0/0.619 Enabled
    Metric (L1/L2):      10/10
GigabitEthernet0/0/0/0.1920 Enabled
    Metric (L1/L2):      10/10
```

The result of this is that traffic follows the shortest hop count from the source to the destination in the network. Paths that have equal number of hops are then sent to CEF for the specific source, destination, flow, etc. load balancing method that is configured.

R2#show ip route 20.20.20.20

Routing entry for 20.20.20.20/32

Known via "isis", distance 115, metric 40, type level-2

Redistributing via isis

Last update from 20.2.3.3 on GigabitEthernet1.23, 00:00:20 ago

Routing Descriptor Blocks:

* 20.2.4.4, from 20.20.20.20, 00:00:20 ago, via GigabitEthernet1.24

Route metric is 40, traffic share count is 1

20.2.3.3, from 20.20.20.20, 00:00:20 ago, via GigabitEthernet1.23

Route metric is 40, traffic share count is 1

R2#show isis topology XR2

Translating "XR2"

Tag null:

IS-IS 0 level-2 path to XR2

System Id	Metric	Next-Hop	Interface	SNPA
XR2	40	R3	Gi1.23	0050.569e.6e6a
		R4	Gi1.24	0050.569e.1302

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 1 msec 6 msec 2 msec

3 20.3.6.6 1 msec 1 msec 2 msec

4 20.6.19.19 9 msec 12 msec 13 msec

5 10.19.20.20 13 msec * 4 msec

RP/0/0/CPU0:XR1#show route ipv4 1.1.1.1/32

Sat Apr 25 19:53:41.229 UTC

Routing entry for 1.1.1.1/32

Known via "isis 1", distance 115, metric 40, type level-2

Installed Apr 25 19:51:28.058 for 00:02:13

Routing Descriptor Blocks

20.5.19.5, from 1.1.1.1, via GigabitEthernet0/0/0.519

Route metric is 40

20.6.19.6, from 1.1.1.1, via GigabitEthernet0/0/0.619

Route metric is 40

No advertising protos.

RP/0/0/CPU0:XR2#traceroute 1.1.1.1

Sat Apr 25 19:54:01.938 UTC

Type escape sequence to abort.

```
Tracing the route to 1.1.1.1
```

```

1  10.19.20.19 9 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 0 msec  * 0 msec

```

By increasing the cost of less desirable paths, these links are eliminated from the resulting Shortest Path Tree of the SPF calculation.

```
R2#show ip route 20.20.20.20
```

```
Routing entry for 20.20.20.20/32
```

```
Known via "isis", distance 115, metric 40, type level-2
```

```
Redistributing via isis
```

```
Last update from 20.2.4.4 on GigabitEthernet1.24, 00:00:07 ago
```

```
Routing Descriptor Blocks:
```

```
* 20.2.4.4, from 20.20.20.20, 00:00:07 ago, via GigabitEthernet1.24
```

```
Route metric is 40, traffic share count is 1
```

```
R2#show isis topology XR2
```

```
Translating "XR2"
```

```
Tag null:
```

```
IS-IS 0 level-2 path to XR2
```

System Id	Metric	Next-Hop	Interface	SNPA
XR2	40	R4	Gi1.24	0050.569e.1302

```
RP/0/0/CPU0:XR1#show route ipv4 1.1.1.1/32
```

```
Sat Apr 25 19:55:29.241 UTC
```

```
Routing entry for 1.1.1.1/32
```

```
Known via "isis 1", distance 115, metric 40, type level-2
```

```
Installed Apr 25 19:54:45.414 for 00:00:43
```

```
Routing Descriptor Blocks
```

```
20.5.19.5, from 1.1.1.1, via GigabitEthernet0/0/0.519
```

```
Route metric is 40
```

```
No advertising protos.
```

The result of this change is that the R6 to XR1 link is avoided unless it is the only possible option.

```
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 20.2.4.4 1 msec 1 msec 1 msec
 3 20.4.5.5 1 msec 2 msec 5 msec
 4 20.5.19.19 10 msec 12 msec 13 msec
 5 10.19.20.20 13 msec * 3 msec
```

```
RP/0/0/CPU0:XR2#traceroute 1.1.1.1
```

```
Sat Apr 25 19:56:27.038 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 0 msec * 0 msec
```

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