

# CCIE Service Provider Lab Workbook v4.0

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

## CCIE SP v4 Advanced Technology Labs - IGP

### › OSPFv3 Path Selection

« [OSPFv3 Network Types \(/workbook/view/service-provider-v4/task/ospfv3-network-types-MjgzMw%3D%3D\)](/workbook/view/service-provider-v4/task/ospfv3-network-types-MjgzMw%3D%3D) | [OSPFv3 BFD \(/workbook/view/service-provider-v4/task/ospfv3-bfd-MjgzNQ%3D%3D\)](/workbook/view/service-provider-v4/task/ospfv3-bfd-MjgzNQ%3D%3D) »

Last updated: April 23, 2016

#### Note:

This task assumes that you have already completed the [OSPFv3](http://labs.ine.com/workbook/view/service-provider-v4/task/ospfv3-MjgzMg%3D%3D) (<http://labs.ine.com/workbook/view/service-provider-v4/task/ospfv3-MjgzMg%3D%3D>) task. Refer to the **Base IPv6 Diagram** in order to complete this task.

### Task

- Change the OSPF cost 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
  ipv6 ospf cost 100

XR1:
router ospfv3 1
  area 0
  interface GigabitEthernet0/0/0.619
    cost 100
  !
  !
  !
```

### Verification

With the higher cost value of 100, the link between R6 and XR1 will be the less preferred path through the network.

```

R6#show ipv6 ospf interface | include line protocol|Cost
Loopback0 is up, line protocol is up
  Network Type LOOPBACK, Cost: 1
GigabitEthernet1.619 is up, line protocol is up
  Network Type BROADCAST, Cost: 100
GigabitEthernet1.56 is up, line protocol is up
  Network Type BROADCAST, Cost: 1
GigabitEthernet1.46 is up, line protocol is up
  Network Type BROADCAST, Cost: 1
GigabitEthernet1.36 is up, line protocol is up
  Network Type BROADCAST, Cost: 1

RP/0/0/CPU0:XR1#show ospfv3 interface | include "line protocol|Cost"
Tue Apr 21 22:04:52.605 UTC
GigabitEthernet0/0/0.519 is up, line protocol is up
  Network Type POINT_TO_POINT, Cost: 1
GigabitEthernet0/0/0.619 is up, line protocol is up
  Network Type BROADCAST, Cost: 100
GigabitEthernet0/0/0.1920 is up, line protocol is up
  Network Type BROADCAST, Cost: 1
Loopback0 is up, line protocol is up
  Network Type LOOPBACK, Cost: 0

```

The result of this cost change is that traffic avoids the link between R6 and XR1 due to its higher cost value and instead uses the link between R5 and XR1.

```

R1#traceroute 2001::20:20:20:20
Type escape sequence to abort.
Tracing the route to 2001::20:20:20:20

 1 2001:10:1:2::2 11 msec 2 msec 1 msec
 2 2001:20:2:4::4 2 msec 1 msec 3 msec
 3 2001:20:4:5::5 14 msec 15 msec 14 msec
 4 2001:20:5:19::19 17 msec 12 msec 14 msec
 5 2001::20:20:20:20 26 msec 16 msec 16 msec

RP/0/0/CPU0:XR2#traceroute 2001::1:1:1
Tue Apr 21 22:12:18.445 UTC
Type escape sequence to abort.
Tracing the route to 2001::1:1:1

 1 2001:10:19:20::19 19 msec 9 msec 9 msec
 2 2001:20:5:19::5 9 msec 9 msec 9 msec
 3 2001:20:4:5::4 9 msec 9 msec 9 msec
 4 2001:20:4:2::2 19 msec 19 msec 39 msec
 5 2001:10:1:2::12 49 msec 19 msec 19 msec

```

Note that depending on the ECMP hashing done by the routers making forwarding decisions, the path prior to making the metric change could have also been traversing the R5-XR1 link.

```

RP/0/0/CPU0:XR1(config)# router ospfv3 1
RP/0/0/CPU0:XR1(config-ospfv3)# area 0
RP/0/0/CPU0:XR1(config-ospfv3-ar)# interface GigabitEthernet0/0/0.619
RP/0/0/CPU0:XR1(config-ospfv3-ar-if)# no cost 100
RP/0/0/CPU0:XR1(config-ospfv3-ar-if)#commit

R6(config)# interface GigabitEthernet1.619
R6(config-subif)# no ipv6 ospf cost 100

```

With the costs reset to their default values, XR1 uses two equal cost paths to reach R1. Depending on the input to the ECMP hash function (L3-L4 headers), XR1 could forward packets towards R5. Both of the available paths are marked as "path-idx 0" and "path-idx 1". This index corresponds to the output of the hash, as can be gleaned from the bottom section of the show command.

```

RP/0/0/CPU0:XR1#show cef ipv6 2001::1:1:1:1/128 detail
Tue Apr 21 22:17:21.263 UTC
2001::1:1:1:1/128 , version 348, internal 0x4000001 0x0 (ptr 0xa0ef6a74) [1], 0x0 (0xa0ec17e8), 0x0 (0x0)
Updated Apr 21 22:08:42.779
local adjacency fe80::250:56ff:fe9e:962
Prefix Len 128, traffic index 0, precedence n/a, priority 1
gateway array (0xa0d4a220) reference count 8, flags 0x0, source rib (6), 0 backups
    [9 type 3 flags 0x8081 (0xa0e0b8fc) ext 0x0 (0x0)]
LW-LDI[type=3, refc=1, ptr=0xa0ec17e8, sh-ldi=0xa0e0b8fc]
via fe80::250:56ff:fe9e:962, GigabitEthernet0/0/0.519 , 7 dependencies, weight 0, class 0 [flags 0x0]
  path-idx 0 NHID 0x0 [0xa15842c4 0x0]
  next hop fe80::250:56ff:fe9e:962
  tx adjacency
via fe80::250:56ff:fe9e:5cec, GigabitEthernet0/0/0.619 , 7 dependencies, weight 0, class 0 [flags 0x0]
  path-idx 1 NHID 0x0 [0xa1584248 0x0]
  next hop fe80::250:56ff:fe9e:5cec
  tx adjacency

Load distribution: 0 1 (refcount 9)

Hash  OK  Interface          Address
0     Y   GigabitEthernet0/0/0.519 fe80::250:56ff:fe9e:962
1     Y   GigabitEthernet0/0/0.619 fe80::250:56ff:fe9e:5cec

```

The hash function can be tested by providing inputs as shown below:

```

RP/0/0/CPU0:XR1#show cef ipv6 exact-route 2001::20:20:20:20 2001::1:1:1:1 protocol icmp ingress-interface GigabitEthernet0/0/0.1920
Tue Apr 21 22:19:54.073 UTC
2001::1:1:1:1/128 , version 348, internal 0x4000001 0x0 (ptr 0xa0ef6a74) [1], 0x0 (0xa0ec17e8), 0x0 (0x0)
Updated Apr 21 22:08:42.779
local adjacency fe80::250:56ff:fe9e:962
Prefix Len 128, traffic index 0, precedence n/a, priority 1
via GigabitEthernet0/0/0.519
via fe80::250:56ff:fe9e:962, GigabitEthernet0/0/0.519 , 7 dependencies, weight 0, class 0 [flags 0x0]
  path-idx 0 NHID 0x0 [0xa15842c4 0x0]
  next hop fe80::250:56ff:fe9e:962
  tx adjacency

```

Note that the output of the hash function changes as the inputs change:

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```
RP/0/0/CPU0:XR1#show cef ipv6 exact-route 2FF1::100:1:1 2001::1:1:1:1
Tue Apr 21 22:22:48.671 UTC
2001::1:1:1:1/128, version 348, internal 0x4000001 0x0 (ptr 0xa0ef6a74) [1], 0x0 (0xa0ec17e8), 0x0 (0x0)
Updated Apr 21 22:08:42.779
local adjacency fe80::250:56ff:fe9e:5cec
Prefix Len 128, traffic index 0, precedence n/a, priority 1
  via GigabitEthernet0/0/0/0.619
  via fe80::250:56ff:fe9e:5cec, GigabitEthernet0/0/0/0.619, 7 dependencies, weight 0, class 0 [flags 0x0]
  path-idx 1 NHID 0x0 [0xa1584248 0x0]
  next hop fe80::250:56ff:fe9e:5cec
  tx adjacency
```

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