

# OSPFv3

Almost everything works the same as OSPFv2

## Agenda

- **Midterm**: Confirming the date of Wed Nov 2<sup>nd</sup> during regular class time. Please block off time in the preceding hour so you can start early.
- **Final Exams**: Theory exam (Dec 13) and Lab exam (TBD)
- New material:
  - How routing table and packet forwarding decisions are made
  - OSPFv3 - cover entire slide deck
- Next lecture: Intro to ACLs; brief review of 1<sup>st</sup> half of course

## Assignments and Lab work

- Lab 7 pre-lab: due **before** your lab session this week.
- Lab 7: Multi-area OSPFv3 (the IPv6 version of Lab 5)
- Lab 7 post-lab: due **before** your lab *after* the break week
- Readings: OSPFv3 slide deck posted on course site  
The free chapter available from Cisco Press is also highly recommended.

## References

- OSPFv3 (free chapter) <https://www.ciscopress.com/articles/article.asp?p=2294214&seqNum=4>
- OSFP Design guide (free) <https://www.ciscopress.com/articles/article.asp?p=1763921&seqNum=6>

## Date for NET2000 SBA

Here's the exam schedule as published by Carleton. We'll need to choose a date for the SBA in order to book T108. We can pick any day shown with a number, which leaves 7 choices.

Sun	Mon	Tue	Wed	Thu	Fri	Sat
Dec					<b>Last Day of classes</b>	10 <sup>th</sup>
Dec	12 <sup>th</sup> (Best option)	13 <sup>th</sup> 2pm NET2000	14 <sup>th</sup> 2pm NET2010	15 <sup>th</sup> 2pm NET2008	16 <sup>th</sup>	17 <sup>th</sup>
Dec	19 <sup>th</sup> 9am BIT2001	20 <sup>th</sup>	21 <sup>st</sup>	22 <sup>nd</sup>	CCDP2004 – No Exam (Please confirm!)	

The date should be decided asap in order to ensure that T108 is available.

## How the Routing Table Manager (RTM) chooses the *best* route

- The RTM collects routes from **all** protocols, dynamic and static, for inclusion in the routing table.
- There's only competition when the exact same route (same subnet **and** same mask) is available from multiple protocols; the choice is made purely on the basis of preference (aka Cisco's "Admin Distance" or AD).
- Although it may seem counter-intuitive, there's no conflict in having less specific routes which *seem* to duplicate (and incorporate) more specific routes.
- Complete info on the source of the route is kept, but only for the next moment when protocols offer new options possibly competing with existing routes.
- The metric is used only when comparing a new option for the exact same route from the very same protocol.
- In the main routing table, we see the preference (aka Cisco's Admin Distance) but that isn't a determinant when choosing how to forward a packet.

## What is the *Best* Route for Forwarding a Packet?

One simple rule is all it takes: Always use the most specific route in the table.  
(Any other consideration is simply a distraction or an attempt to trick you.)

## Sample Routing Table

Yes, it's a bit contrived: there's 5 routing protocols, static, and dialer routes, and all running off 8 interfaces, but it still serves the purpose of showing possible scenarios.

Barring any word-processing mistakes, the table below is completely valid and there are no conflicts or problems.

```
R1#sh ip route
```

```
Codes:L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
```

```
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
```

```
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
```

```
Gateway of last resort is 42.0.1.2 to network 0.0.0.0
```

```
O*E2 0.0.0.0/0 [110/1] via 42.0.1.2, 00:00:04, FastEthernet0/1
```

```
C 10.10.10.1/32 is directly connected, Loopback0
```

```
O IA 10.10.10.0/24 [110/1001] via 42.0.1.2, 00:00:24, FastEthernet0/1
```

```
P 12.12.12.10 is directly connected, Dialer1
```

```
C 42.0.1.0/24 is directly connected, FastEthernet0/1
```

```
L 42.0.1.1/32 is directly connected, FastEthernet0/1
```

```
[... additional directly Conected routes and Local IP routes omitted ...]
```

```
P 100.100.0.0/28 [200/0] via 12.12.12.10, Dialer1
```

```
S 100.128.0.0/9 [1/0] via 42.0.2.2, FastEthernet0/2
```

```
i L1 100.128.0.0/12 [115/20] via 42.0.3.2, 00:00:26, FastEthernet0/3
```

```
O IA 100.128.0.0/16 [110/1001] via 42.0.4.2, 00:00:20, FastEthernet0/4
```

```
O 100.128.0.0/18 [110/1001] via 42.0.5.2, 00:07:24, FastEthernet0/5
```

```
B 100.128.0.0/20 [200/0] via 42.0.1.2, 00:31:07
```

```
B 100.128.0.0/22 [20/0] via 42.0.1.2, 00:29:45
```

```
R 100.128.0.0/24 [120/1] via 42.0.6.2, 00:00:15, FastEthernet0/6
```

```
D 100.128.0.0/26 [90/156160] via 42.0.7.2, 00:01:23, FastEthernet0/7
```

## OSPFv3: Key config commands

	CLI context	Config Command	Show command
0	#	<b>ipv6 unicast-routing</b> interfaces have at least 1 IPv6 addr	ALWAYS needed!!!
1	# <b>ipv6</b> router ospf {p-ID}	router-ID x.x.x.x !Still 32 bits!	show <b>ipv6</b> protocols (+)
2		auto-cost reference-bandwidth {X}	show <b>ipv6</b> ospf
3		passive-interface {i/f name}	show <b>ipv6</b> protocols
4	(# ) # <b>ipv6</b> router ospf {p-ID}	<b>ipv6</b> route ::/0 {ipv6-nextHop} default-information originate  clear <b>ipv6</b> ospf {p-ID} process	show <b>ipv6</b> route ospf
5	# interface {int-name}	<b>ipv6</b> ospf {proc-ID} area {X}	show <b>ipv6</b> ospf interface [i/f-name] [brief]
6		<b>ipv6</b> ospf cost {value}	"
7		<b>ipv6</b> ospf priority {0-255}	"
8		<b>ipv6</b> ospf hello-interval {secs}	"
9		<b>ipv6</b> ospf dead-interval {secs}	"
10		<b>ipv6</b> ospf network point-to-point	"

Also: show **ipv6** ospf neighbor (neighbours) show **ipv6** ospf database (LSDB)

Generic: show **ipv6** route [ospf]

To be clear, here's a list of things that *do not change* going from OSPFv2 to OSPFv3:

Item	Changes?
0	Added; needed for <i>any</i> IPv6
1	Extra <b>ipv6</b>
2	<b>NO changes</b>
3	<b>NO changes</b>
4	<b>NO changes</b>
5	Just ip --> <b>ipv6</b>
6	Just ip --> <b>ipv6</b>
7	Just ip --> <b>ipv6</b>
8	Just ip --> <b>ipv6</b>
9	Just ip --> <b>ipv6</b>
10	Just ip --> <b>ipv6</b>

- Process ID is still a plain number in the range 1-65535.
- Router ID is still a plain, 32-bit number, still most conveniently written in dotted-quad decimal format.
- Area numbers are still the same 32-bit values: 0-4294967295.
- Reference bandwidth is the same units, specified the same way.
- Costs are still calculated (or assigned) the same way.
- DR/BDR priorities are still the same values: 0-255.
- Hello/Dead intervals still use the same range, in secs.
- ALL the same "must-match" items for neighbouring still apply!

**ALL** commands except one are identical, with "ipv6" replacing "ip".

But please remember that IPv4 and IPv6 are still **DIFFERENT** and **completely separate!**

- areas are completely separate for OSPFv2 and OSPFv3
- values for process ID, router ID, reference bandwidth, costs, DR priority, Hello & dead intervals are all **completely separate!**