

ROUTERGODS CCNP ROUTE Class 3

OSPF Part 1

Resources

- Topology Used - Topology 11 with basic IP addressing - <http://www.routerlords.com/links/topologies/>
- Class notes - <http://www.routerlords.com/class-notes/>

Overview of what to expect on the CCNP ROUTE

- Multiple area ospf
- Need to know lsas
- E2 versus E1 routes
- Virtual-links

Task 1 - Starting OSPF (single-area)

1. Fire up basic OSPF on all routers, except R6 and R7
 - a. Notice the show ip protocols, neighbor, database and routing table
 - b. Show ip ospf process
 - c. debug ip packet
 - d. debug ip ospf packet
2. On R6 and R7, type debug ip ospf adj
 - a. start ospf
 - b. Notice the debug output
3. Go on R1, notice that R2's router ID is ugly..
 - a. Go on R2 and solve that problem (make the router ID the lo0 address)
4. Look at Hello timers - show ip ospf interfaces and debug eigrp packet???

Questions

- What multicast address does ospf use for hellos?
- How often does OSPF send hellos?
- Do you understand the field types in debug ip ospf packet?
- Is it better to use an exact wildcard mask versus a classful mask
- Is there another way of adding an interface to ospf?

Task 2 - Loopbacks

1. Look at the ospf database on R1
2. Add loopback interfaces with a /24 address on R2 and pop it into OSPF
3. Add loopback interfaces with a /32 address on R2 and pop it into OSPF
4. show ip ospf database
5. Verify by show ip route
6. Notice the mask on the loopbacks, change the network type and make the real mask appear in the routing table

Questions

- Why does OSPF advertise loopbacks as a /32 by default?
- What is the default metric/speed on a loopback?
- How do loopbacks show up in the OSPF database?

Task 3 - DR/BDR election

- Using priority, make R4 ALWAYS win the DR election on the R4-R3 and R4-R5 links
- Using priority, on R5, make the R5-R4 link never participate in the election

Questions

- What exactly does a DR or BDR do?
- What characteristics determine which router becomes the DR/BDR?
- If the DR fails and then returns a few minutes later, does it become the DR again?
- On an ethernet link, does it really matter who is the dr/bdr?
- What if you don't have a DR/BDR on an ethernet link?
- How do DRs/BDRs show up in the OSPF database?

Task 4 - Link costs

1. Go on R3 and look at show ip ospf interfaces and show ip ospf databases
2. Notice the OSPF cost on the interfaces
3. Change the bandwidth on one of R3's interfaces and notice the change
4. Now change the cost directly with ip ospf cost on the interface

Questions

- When you change the interface cost, which traffic direction are you affecting (inbound or outbound) ?
- What is the metric based off of? What is the default cost of a fast ethernet link?
- Can you make the routes go a different way? In the center triangle portion
- What are the advantages of changing the cost directly with the ip ospf cost command versus changing the bandwidth?

Extra Resources

- Cisco OSPF Command Ref - <http://bit.ly/4zDqYI>
- Packet Life OSPF Cheat Sheet - <http://media.packetlife.net/media/library/10/OSPF.pdf>
- RouterAlley - CCNP Routing Study Guide - <http://bit.ly/10kdNid>
- RouterAlley - OSPF Notes - <http://www.routeralley.com/ra/docs/ospf.pdf>

Debug IP OSPF Packet field descriptions

v version
t packet type 1=Hello 2=Data description 3=Link state request 4=Link state update 5= Link state
ack
l length
rid router id
aid area id
chk checksum
aut authentication type
auk authentication key
keyid MD5 key ID
seq sequence number

LSA Types

LSA Type 1

The LSA Type 1 or Router LSA is sent by every router within an area to describe the state of the each interface connected to the area.

LSA Type 2

The LSA Type 2 or Network LSA is sent by the Designated Router (DR) for a specific multi-access network and describes the set of routers attached to the network.

LSA Type 3 & 4

Both LSA Type 3 and 4 are considered Summary LSAs which are sent by the Area Border Router (ABR). An LSA Type 3 is used to describe the routes to the area's networks and an LSA Type 4 is used to describe the routes to Autonomous System Boundary Routers (ASBR). An LSA Type 3 is used when summarizing routes from one OSPF area to another.

LSA Type 5

The LSA Type 5 or Autonomous System External LSA is used by the ASBR to advertise routes that are external to the OSPF network. Unlike the other LSA's, this type is sent everywhere within the OSPF network regardless of area with the exception of stub networks.