

Introduction to Routers

TEL-335
Week 5 – Interior Routing with
OSPF

Last Week: Brief Review

- Dynamic Routing Protocols:
 - Dynamic routing protocols allow routers to communicate routing information to each other
 - Remember from previous classes the key ingredients to a routing table:
 - IP network and subnet mask (if classless)
 - Metric(s)
 - Direction

Review (cont.)

- Last week we saw how RIPv2 added some much-needed improvements to RIPv1
- There were still some potential issues that wouldn't work for some networks
 - 15-hop limit
 - Slow convergence time
 - Inefficient update process (updates sent every 30 seconds even if no new information)
 - Updates sent to all routers in the network; no hierarchy
 - Default classful behavior

Link-State Routing and OSPF

- This week we'll look at link-state routing protocols, which address these issues
- We'll focus specifically on open shortest path first (OSPF)
- Link-State protocols are very different from distance vector protocols.

Link-State: Basic Operation

- OSPF-speaking routers send Hello packets out all OSPF-enabled interfaces.
- If two routers sharing a common data link agree on certain parameters specified in their respective Hello packets, they will become neighbors.
- Adjacencies, which may be thought of as virtual point-to-point links, are formed between some neighbors.
- OSPF defines several network types and several router types.
- The establishment of an adjacency is determined by the types of routers exchanging Hellos and the type of network over which the Hellos are exchanged.

Link-State: Basic Operation

- Each router sends link state advertisements (LSAs) over all adjacencies.
- The LSAs describe all of the router's links, or interfaces, and the state of the links.
- These links may be to stub networks (networks with no other router attached), to other OSPF routers, to networks in other areas, or to external networks (networks learned from another routing process).
- Because of the varying types of link state information, OSPF defines multiple LSA types.

Link-State: Basic Operation

- Each router receiving an LSA from a neighbor records the LSA in a link state database and sends a copy of the LSA to all of its other neighbors.
- By flooding LSAs throughout an area, all routers will build identical link state databases.

Link-State: Basic Operation

- When the databases are complete, each router uses the SPF algorithm to calculate a loop-free graph describing the shortest (lowest cost) path to every known destination, with itself as the root.
 - This graph is the SPF tree.
- Each router builds its route table from its SPF tree.

LAB!
