Stepping Through OSPFv3

Objectives

Explain the process by which link-state routers learn about other networks.

Scenario

This class activity is designed for groups of three students. The objective is to review the Shortest Path First (SPF) routing process.

You will design and address a network, communicate the network address scheme and operation of network links to your group members, and compute the SPF.

Complete the steps as shown on the PDF for this class activity. If you have time, share your network design and Open Shortest Path First (OSPF) process with another group.

Resources

In preparation of this activity, you will need two different IPv6 network and cost numbers. The IPv6 network numbers must be chosen with the following format: 2002:DB8:AAAA:?::0/64, where**?** is a student-selected network number. You have two choices for *cost* – 10 (Fast Ethernet network), or 1 (Gigabit Ethernet network).

Bring your two IPv6 network and cost numbers to the group setting. One student in your group will act as the recorder, will draw three circles, and connect them on paper. Each circle will represent a student's router and the connecting lines will represent the networks and links to be agreed upon.

Each group member should follow Steps 1 to 4 (below) in the order listed. As the group progresses through the activity, you should keep personal notes about your own router, including information about neighbor adjacency, link-state advertisements, topology table entries, and the SPF algorithm.

Directions

Step 1:

a. Speak to the classmate to your left. Compare network and cost numbers brought to the group. Agree upon an IPv6 network, links, and cost numbers you would like to use between your two routers. Remember, you may only use 1 (Gigabit Ethernet) or 10 (Fast Ethernet) for cost. When you have agreed upon your network, link numbers, and determined the cost of the route, record the information on the paper graphic created by the recorder.

b. Complete the same process with the classmate to your right.

c. After speaking with both of your direct neighbors, you have agreed upon two networks with link addresses and the cost of the route. Record the information you agreed upon on the paper graphic.

Step 2:

a. Each student will speak only to their direct neighbors. They will share all of their IPv6 network and link numbers and the cost of the networks to which they are connected. Almost immediately, everyone in the group will know about all networks, their links, and the cost of the individual networks between neighbors.

b. Check with the group members to ascertain all group members have the same information with which to work for Step 3.

Step 3:

a. On your own paper, create a table listing possible paths to all other networks. Use the formula supplied with this chapter $n(n-1)/2$. You will have a total of four possible routes to list on your table.

b. On the table created in the Step 3 a., add a column with the headings, IPv6 Network Number and Cost.

c. Fill in the table with information you know about the networks on your group's topology.

Step 4:

a. Go back to the table created in Step 3.

b. Place a star by the lowest-cost routes to all other routers.

When these four steps are complete, you have established neighbor adjacencies, exchanged link-state advertisements, built a topology table, and created a routing table with the best cost to all other networks within your group or area.

If you have the time, refer to your topology table and build the network on real equipment or Packet Tracer. Use some or all of the commands listed below to prove OSPF's operation:

```
R1# show ipv6 interface brief
R1# show ipv6 protocols
R1# show ip protocols
R1# show ipv6 route
```

Reflection

1. Which OSPFv3 processing step is reviewed in Step 1 of this activity?

2. Which OSPFv3 processing step is reviewed in Step 2 of this activity?

3. Which process for OSPFv3 is reviewed in Step 3 of this activity?

4. Which process step for OSPFv3 is reviewed in Step 4 of this activity?