

Laboratory 4: Open Shortest Path First (OSPF-1)

Objective:

- To configure and analyze the performance of OSPF
- To understand the routing table of each router created by OSPF (with area and without area)

Introduction

OSPF is one of the Intra-domain link state routing protocol. Each router knows the neighbor information (name and cost). The router distributes the routing table information to all other routers. In this way, they create a routing table to reach to any router.

In this Lab you have to create a project using OSPF with four scenarios. In first scenario (**start**), you will configure the router and OSPF parameter (cost and others) without any area and analyze the performance of OSPF. In second scenario (**area**), you will divide routers into different areas and observe the routing table in order from one router to another router. In third scenario (**failure**), find new path and the convergence time when one of the links is broken. Finally, in fourth scenario (**load_balance**) you have to create another scenario to test the load balance.

Create a project

First Scenario (start):

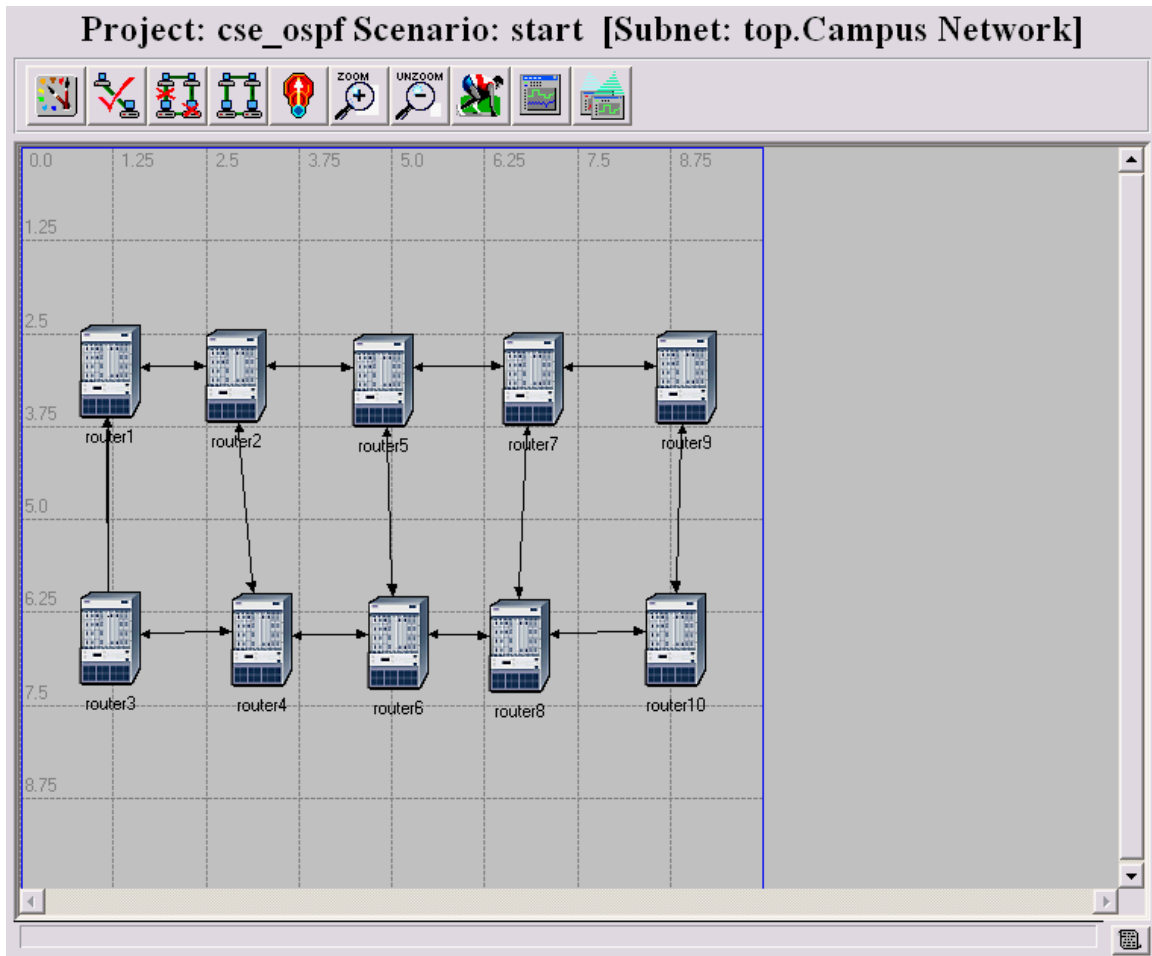
1. Create a project (cse_ospf) and first scenario (**start**).
2. Select **create empty scenario** and click next

3. Select **Network Scale: Campus**
Network Size: 10 mi x 10 mi
Model family: internet_toolbox and routers

Now you will see an empty workspace.

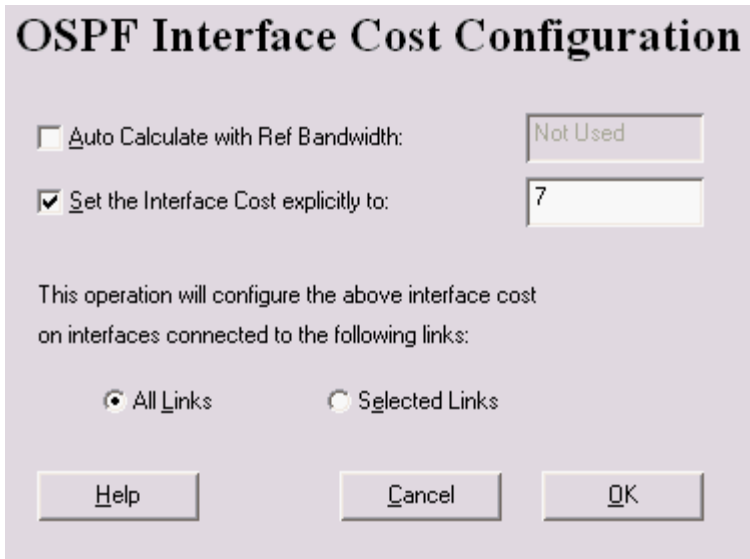


4. Click the object Palette and bring ethernet4_slip8_gtwy (one of the routers) object to workspace and change the name router1. Now make 9 copies of router1 and give router name router2.....router10. Connect the router using PPP-DS3 link in the following way



Configure Link Cost:

6. Select **Protocols/OSPF/Configure/Interface Cost. You will see the following window**



Now select the link between router1 and router2, router1 and router3, router3 and router4, router2 and router4. We want to set cost of **7** in the above links.

Similarly, set the link cost of 1 between router (2 to 5, 4 to 6, 5 to 6, 5 to 7, 6 to 8).

Finally, set the link cost of 3 between router (7 to 8, 7 to 9, 8 to 10, 9 to 10).

Configure OSPF Traffic Demand:

7. Select router 1 and router 4. Then Go to **Protocols/IP/Demand/Create Traffic Demand**. You will see the following window:

Create Traffic Demands

Direction

Full Mesh

From

From

Intensity

Packets/sec:

Bits/sec:

Duration (secs):

Color: Description:

Characterize Demands

Select From Router1 and set the color green.

Similarly, select router4 and router10 and set the traffic demand from router4 and color red.

Finally, Select router 7 and 8 and set the traffic demand from router7 and color sky blue.

8. Select **Protocols/IP/Routing/Configure Routing Protocols** and set the routing protocol OSPF:

Routing Protocol Configuration

Choose from the following routing protocols.
This operation will overwrite the existing configuration on selected IP interfaces.

<input type="checkbox"/> None	<input checked="" type="checkbox"/> OSPF
<input type="checkbox"/> BIP	<input type="checkbox"/> IS-IS
<input type="checkbox"/> IGRP	<input type="checkbox"/> EIGRP

Apply the above selection to subinterfaces

Apply the above selection to:

All interfaces (including loopback)

Interfaces across selected links

Visualize Routing Domains

9. Select Router1, Router4, and Router7 and then select **Protocols/IP/Routing/Export Routing Table for Selected Routers**.

10. Select **Protocols/IP/Addressing/Auto Assign IP Address**

The IP address will be assigned automatically.

Now save your project

Configure Simulation Parameters:

11. Click on the **Configure and Run** button from the menu. Now select the **Global Attributes** and change the following:

- * **IP Dynamic Routing Protocol: OSPF**

- * **IP Interface Addressing Mode: Auto Addressed/Export**

Run the Simulation:

12. Click the **RUN** button to run the simulation for **15 min** and collect statistics. Save the project

Collect the results:

Now we want to collect the router interface address which is allocated automatically.

11. Select **File/Model Files/Refresh Model Directories**.

12. Select **File/Open/Generic Data File**. Select a file named `cse_ospf_startip_addr` and you will see the following window:

```

Generic Data File: cse_ospf-start-ip_addresses
1
2 # Purpose:  Contains IP address information for all active
3 #           interfaces in the current network model.
4 #           (Created by exporting this information from the model.)
5
6
7 # Node Name: Campus Network.router1
8 #   Iface Name   Iface Index   IP Address      Subnet Mask     Connected Link
9 # -----
10 IF10             10            192.0.13.1     255.255.255.0  Campus Network.router1 <-> router1
11 IF11             11            192.0.12.2     255.255.255.0  Campus Network.router1 <-> router2
12 Loopback        12            192.0.23.1     255.255.255.0  Not connected to any link.
13
14
15 # Node Name: Campus Network.router2
16 #   Iface Name   Iface Index   IP Address      Subnet Mask     Connected Link
17 # -----
18 IF4              4             192.0.4.2      255.255.255.0  Campus Network.router2 <-> router4
19 IF10             10            192.0.12.1     255.255.255.0  Campus Network.router1 <-> router2
20 IF11             11            192.0.11.2     255.255.255.0  Campus Network.router2 <-> router5
21 Loopback        12            192.0.22.1     255.255.255.0  Not connected to any link.
22
23
24 # Node Name: Campus Network.router5
25 #   Iface Name   Iface Index   IP Address      Subnet Mask     Connected Link
26 # -----
27 IF4              4             192.0.3.2      255.255.255.0  Campus Network.router5 <-> router6
28 IF10             10            192.0.11.1     255.255.255.0  Campus Network.router2 <-> router5
29 IF11             11            192.0.10.2     255.255.255.0  Campus Network.router5 <-> router7
30 Loopback        12            192.0.21.1     255.255.255.0  Not connected to any link.
31
32
33 # Node Name: Campus Network.router7
34 #   Iface Name   Iface Index   IP Address      Subnet Mask     Connected Link
35 # -----
36 IF4              4             192.0.2.2      255.255.255.0  Campus Network.router7 <-> router8
37 IF10             10            192.0.10.1     255.255.255.0  Campus Network.router5 <-> router7
38 IF11             11            192.0.9.2      255.255.255.0  Campus Network.router7 <-> router9
39 Loopback        12            192.0.20.1     255.255.255.0  Not connected to any link.
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42 # Node Name: Campus Network.router9
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