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):

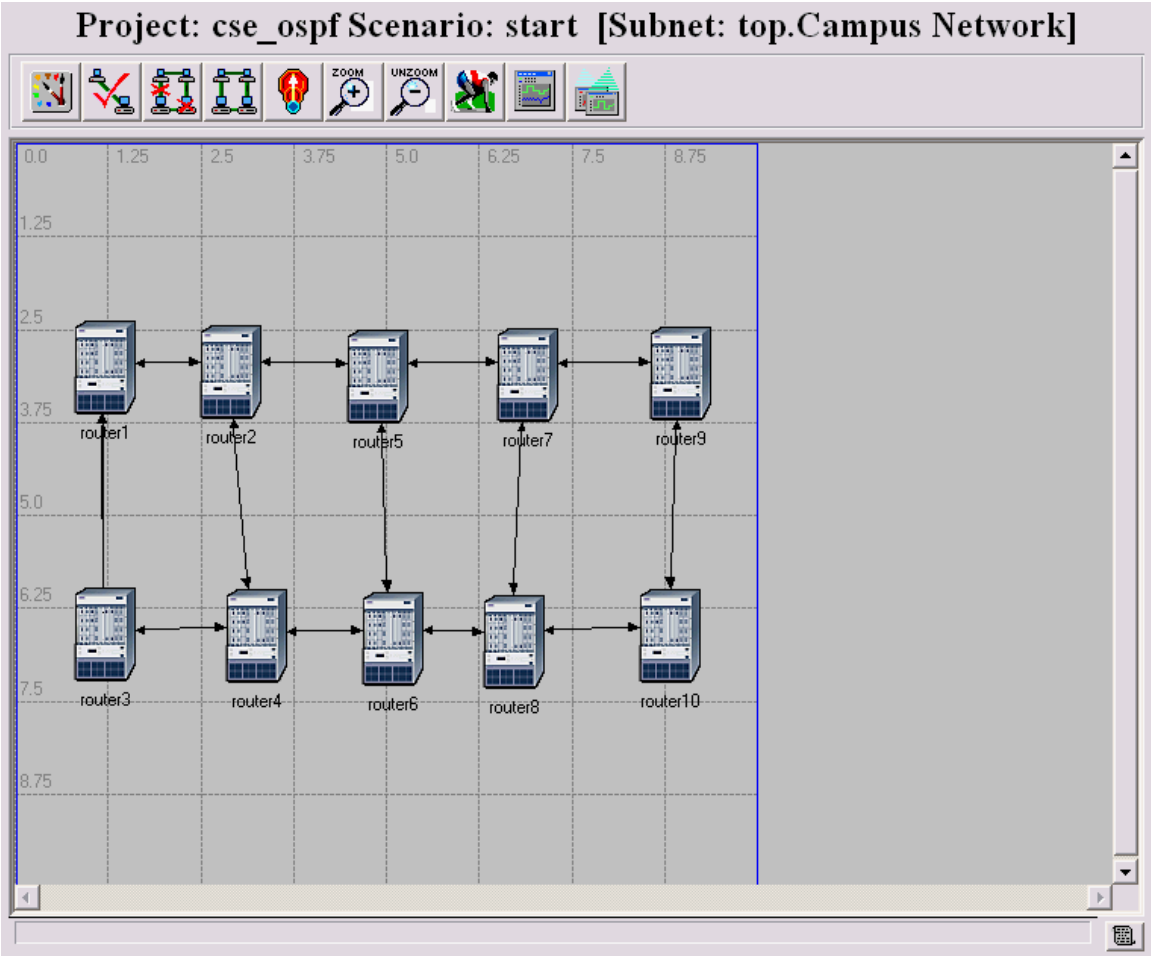
1. Create a project (cse_**ospf**) and first scenario (**start**).

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.

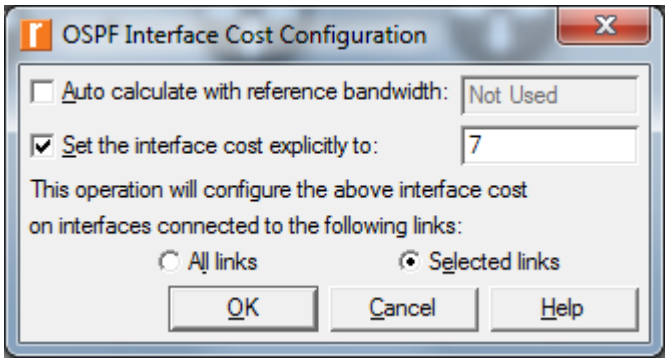
4. Click the object Palette and bring ethernet4_slip8_gtwy (one of the routers) object to workspace and change the name router1. Now make 9 copies of router1 and give router name router2…….router10. Connect the router using PPP_DS3 link in the following way



Configure Link Cost:

6. 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.

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



Chose Selected links, and set the interface cost as 7.

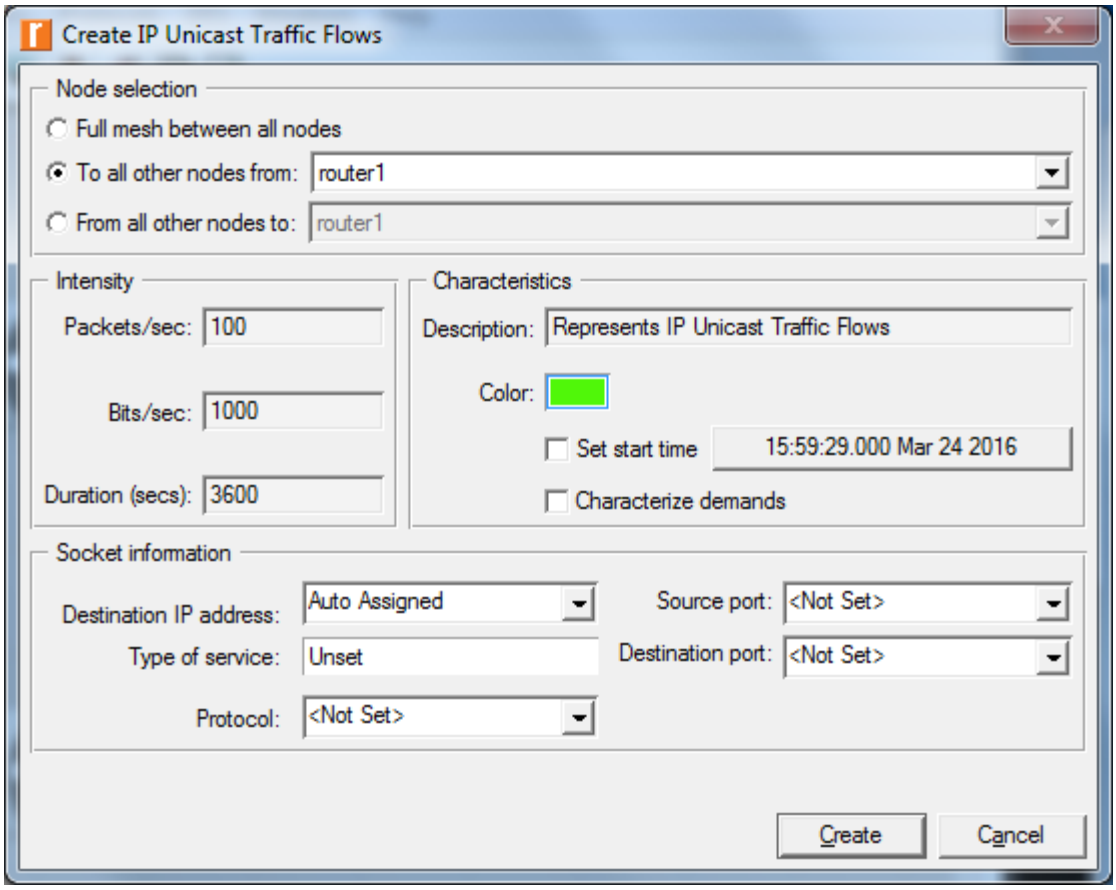
Similarly, set the link cost of 1 between router (2 to 5, 4 to 6, 5 to 6, 5 to 7, 6 to 8).

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

7. Right click on one of the routers and **select similar nodes.** Go to **Protocols/IP/Interfaces/Create Loopback Interface**. Check **All Routers** and **Configure Routing Protocols**, press OK and choose OSPF only in next dialog box.

Configure OSPF Traffic Demand:

8. Select router 1 and router 4. Then Go to **Traffic/Create Traffic Flow/IP Unicast**… You will see the following window:

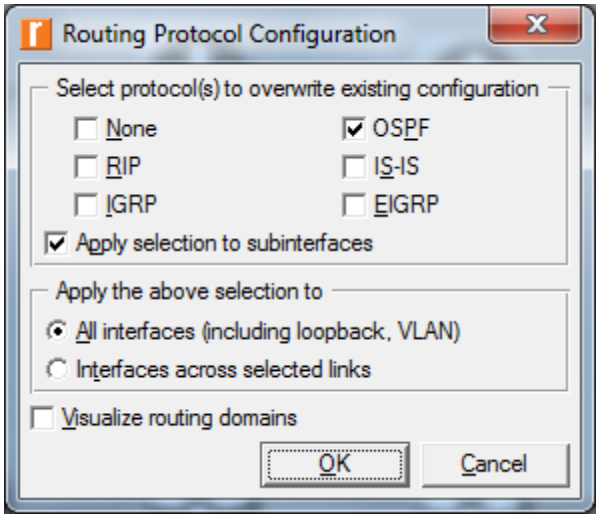


Select From Router1 and set the color green.

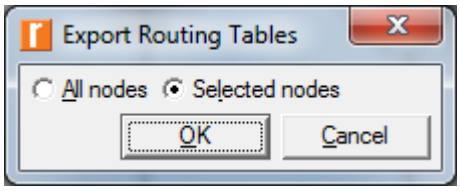
Similarly, select router4 and router10 and set the traffic demand from router4 and color red.

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

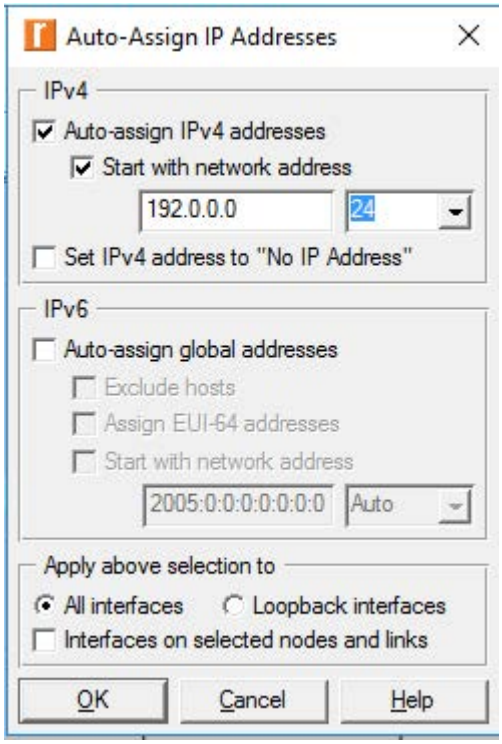
9. Select **Protocols/IP/Routing/Configure Routing Protocols** and set the routing protocol OSPF as follow:



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



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



The IP address will be assigned automatically.

Now save your project

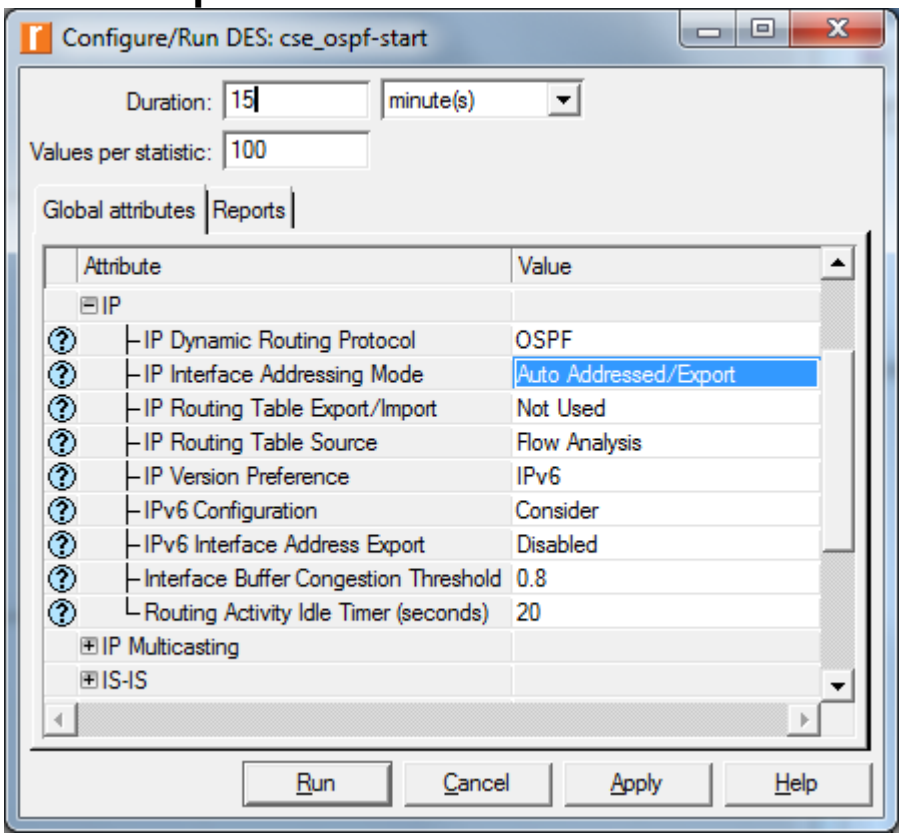
Configure Simulation Parameters:

12. Click on the **Configure and Run** button from the menu. Set Duration as 15 minutes

Now select the **Global Attributes** and change the following:

*** IP Dynamic Routing Protocol: OSPF**

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



Run the Simulation:

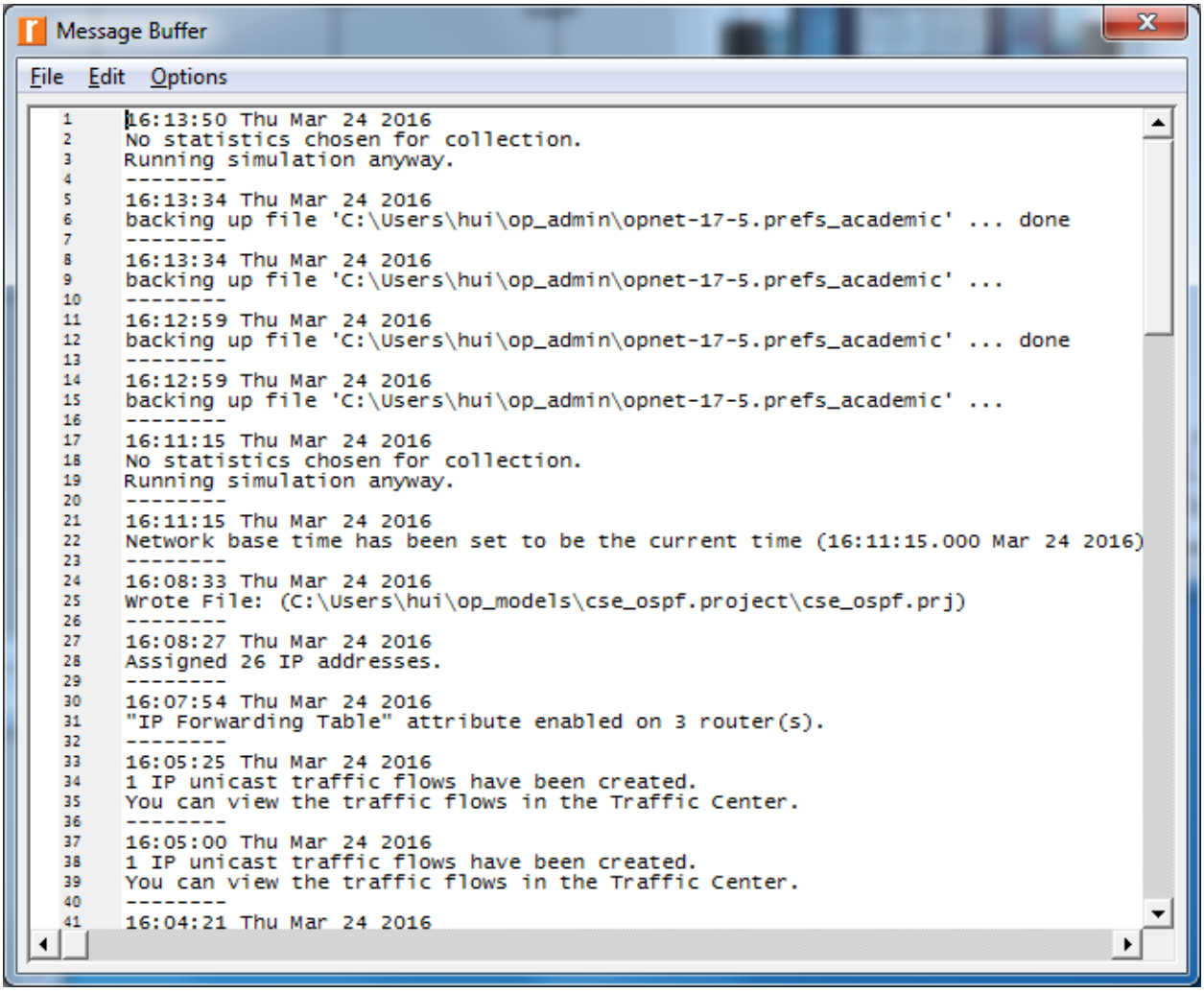
13. Click the **RUN** button to run the simulation for **15 min and** collect statistics. Save the project

Collect the results:

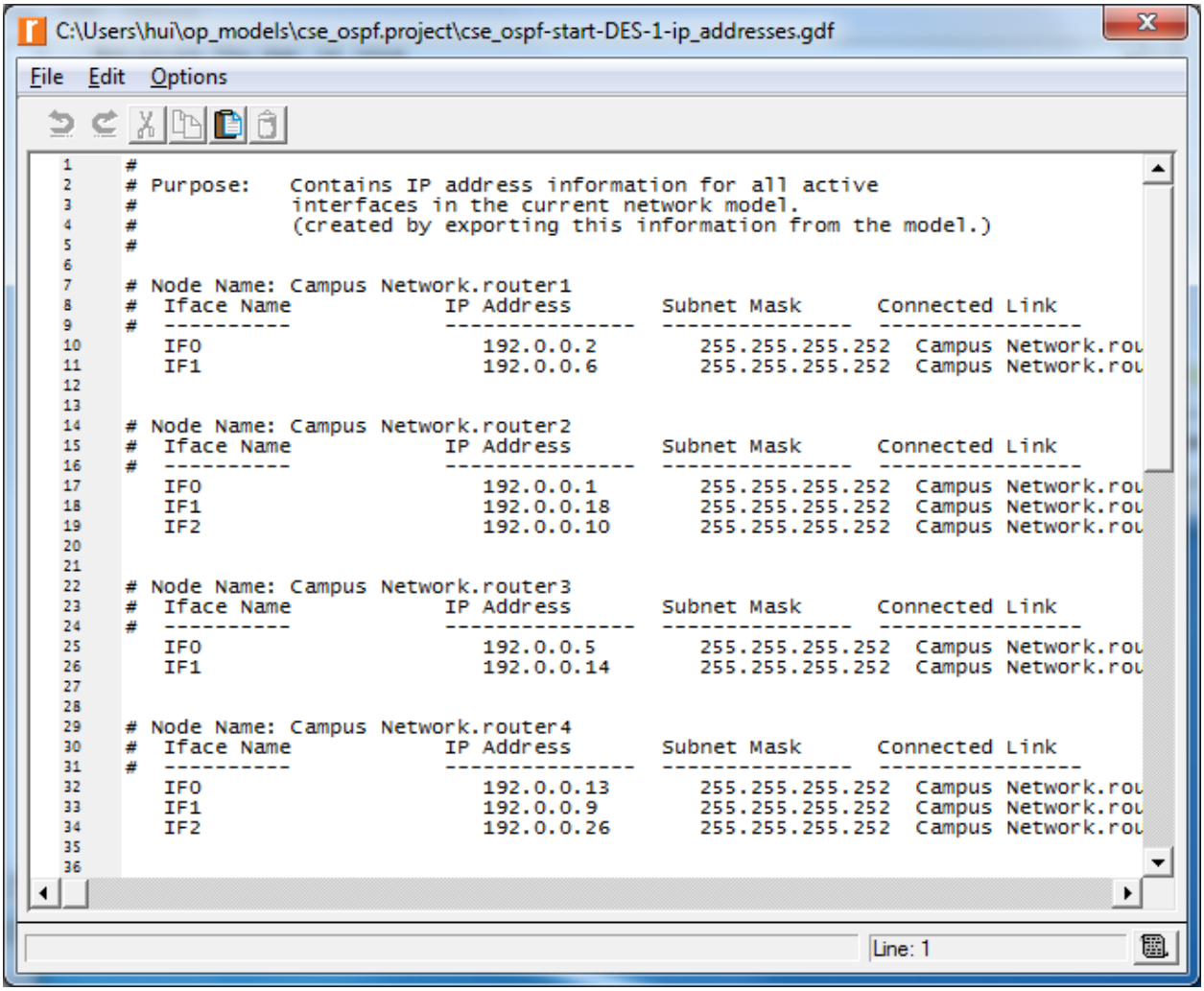
Now we want to collect the router interface address which is allocated automatically.

14. Select **File/Manage Model Files/Refresh Model Directories.**

15. Click the button on the right-bottom corner, open message buffer window



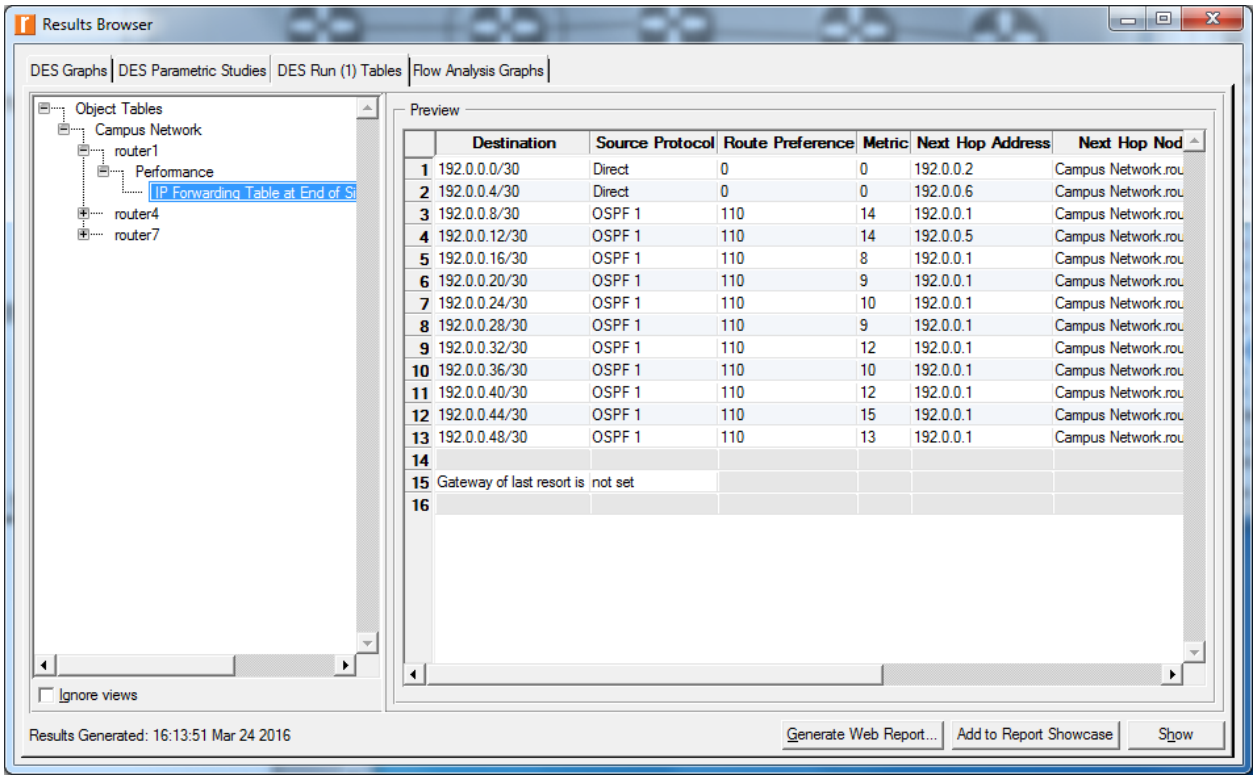
Select **File/Open** Select a file named cse_ospf_startip_addr in your project directory and you will see the following window:



Task1:

Write down all the router interface address and link cost.

16. Select **DES/Results/View Results**



Observe all routers routing table and try to understand all information.

14. Go to **Protocols/IP/Demands/Display Routes for...** and explore the IP traffic flows you have created before and set the **Display** to yes. Try to explain the flows' path. You can discuss with tutor.

Save this project in order to complete Lab5 tasks.