Laboratory 6: Border Gateway Protocol (BGP)

Objective:

- To configure BGP for inter-AS routing
- To configure route redistribution for BGP and RIP

Introduction

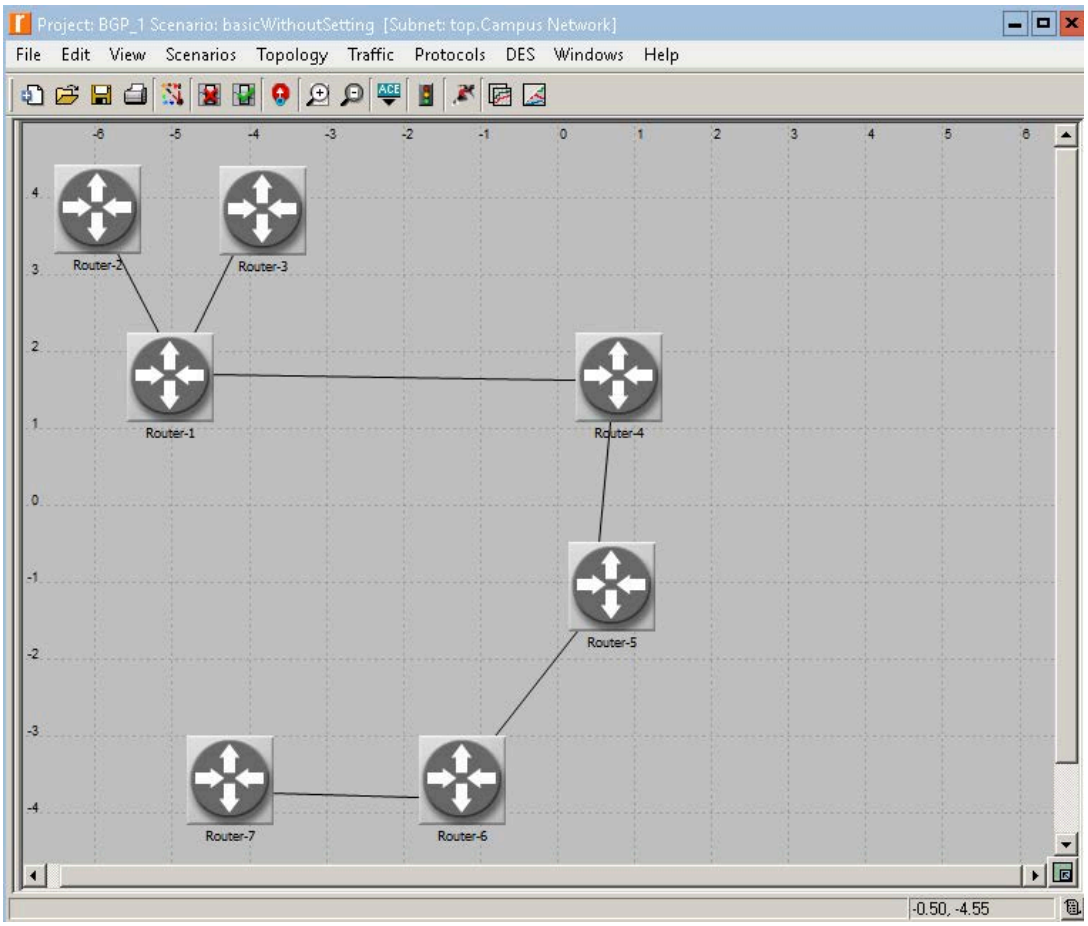
BGP is Inter-domain path vector routing protocol. Within an autonomous system, one router works as a border router one behalf of the entire autonomous system. The border router creates a routing table and exchanges it using reliable TCP connection. The border router within an autonomous system advertises the path to its neighbor AS. Each border router gets a set of path in order to reach another AS. The organization can choose any path based on their policies.

In this Lab you will create a project using BGP as inter-AS routing protocol and RIP as intra-AS routing protocol.

In this lab, the instructions are not as detailed as in previous labs. You should be able to create and configure a simulation project by yourself, and it will be tested in the lab exam.

Create the network

1. Create the following network



Network Scale:	Campus
Network Size:	10km × 10km
Router Model:	ethernet4_slip8_gtwy
Link Model:	PPP_DS3
IP Address:	IP address are automatically assigned

Set the autonomous system number

The autonomous system (AS) number of router 1, 2 and 3 is 1000.
The AS number of router 4 is 2000.
The AS number of router 5, 6 and 7 is 3000.

Hint: to set the AS number, go to the router's attributes and expand "IP routing parameters".

Configure routing protocols

1. **Intra-AS routing:**
   RIP is used for routing between router 1, 2 and 3 (within AS 1000).
   RIP is used for routing between router 5, 6 and 7 (within AS 3000).

   Hint: Select links and go to "protocol" -> "IP" -> "Routing" -> "Configure routing protocol"

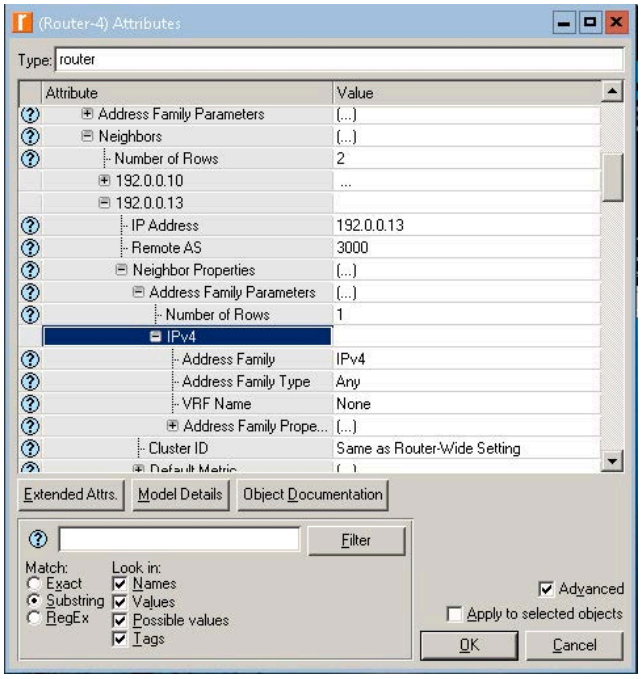
2. **Inter-AS routing:**
   BGP is used for routing between router 1, 4, and 5 (inter-AS routing).

   Hint: to enable BGP for router 1, 4 and 5, select the routers and go to “protocols”->”BGP”->”configure status”

3. **Configure neighbor information of BGP**

   Unlike RIP and OSPF, a router running BGP does not automatically discover its neighbors. To make routers exchange BGP routing information with their neighbors, the neighbor information of each router has to be configured **manually (only BGP neighbors)**.

Hint: to configure the neighbor information, go to the router’s attributes and expand “BGP parameters”. For each neighbor information record, you only need to set the “IP address” and “Remote AS” and add one row to "address family parameters" as IPv4.



4. **Above "neighbors" there is another "Address Family Parameters" in which you need to add one row as IPv4.**

   Hint: to configure the neighbor information, go to the router's attributes and expand "BGP parameters".

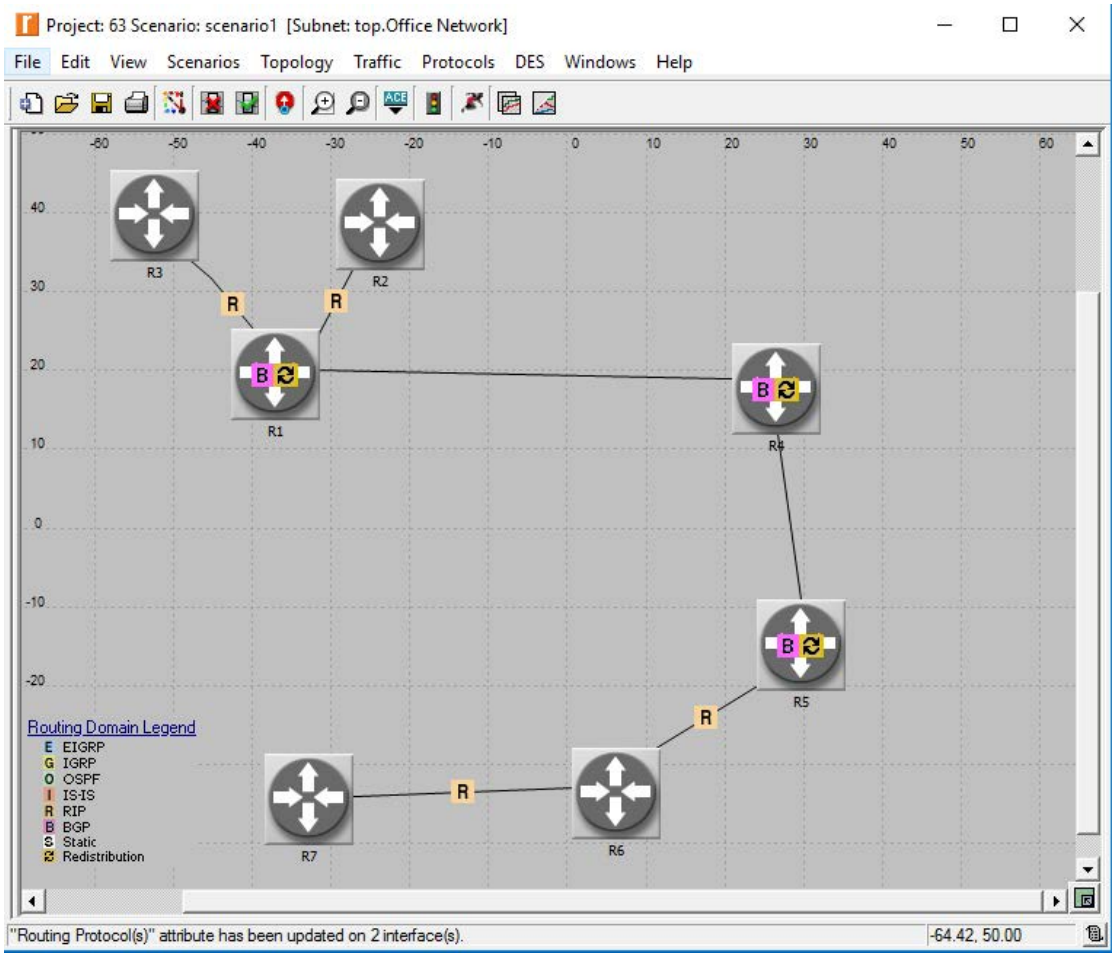
5. **Route redistribution**

   To make the routers inside a AS to learn the routes to the external routers (and vice versa), you need to make the border routers (router 1 and 5) redistribute routes between intra-AS (RIP) and inter-AS (BGP) protocols.

   Hint: to enable route redistribution, select each of those 2 routers, go to the router's attributes, expand "BGP parameter/Address Family Parameters/ Properties/ Redistribution" set RIP enabled with metric 2. Then expand "RIP Parameters/Pro.. Parameters/ IPv4.../Ridestribution" and enable BGP with metric 2. Also, in router 4, enable **"Directly Connected"** in BGP redistribution.

Running simulation

After finishing the routing protocol configuration, if you select one of RIP link and visualize the routing domains ("protocols"->"IP"->"routing"), the network will look like this:



Your scenario works if you see same legends as above. If you see ospf legend on links between router 4 and 5 or 1 and 4, select the link and go to IP/Routing configuraiton and set routing protocol as non. Now run the simulation and observe the routing tables to see if every router has learned the routes to all the other routers.