158.235 Lab – Network Simulator

In this lab you will be introduced to the Graphical Network Simulator (GNS3) to configure Cisco routers and simulate a simple network. GNS3 allows the emulation using Cisco Internetwork Operating Systems (IOS) in a virtual environment on your computer. Dynamips is the core program that allows IOS emulation. GNS3 runs on top of Dynamips to create a more user friendly, graphical environment. GNS3 is an open source and free software available from https://www.gns3.com

So unlike drawing tools, which result in static network diagrams, GNS3 canvas is very much dynamic. You can configure your routers on your design canvas, and then download the configuration files and run directly on the Cisco routers. Moreover you can interface your virtual network within GNS3 to your real network via your network adapter. Of course you also do troubleshooting within GNS3 environment using tools such as Virtual PCs and wireshark.

To get started you will need to install the GNS3 software (refer to the online documentation for your specific platform)

Once the GNS3 has been installed you will then need to add Cisco router IOS image. For this you will need to extract the operating system image from a physical router. However there are sites, which offer the images for educational purposes. We will use the Cisco 3725 image.

Once you have added the IOS image, get some practice in creating a simple topology.

 At the end of the lab you should be able to create the following topology and configure the IP routes such that all the subnets can ping each other.
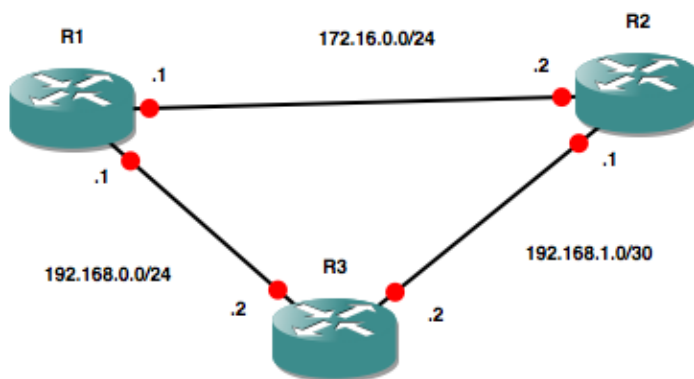
1. Drag the routers on to the canvas and connect them using Ethernet connection.
2. Label the subnets and interfaces as shown above
3. Start the routers one by one. If your CPU utilization runs high then you would need to do Idle PC.

Let us begin by setting up router 1
1. Start up the console for router 1. When prompted for setting up initial configuration, choose no
2. At the router prompt type enable to enter privilege EXEC mode

```
Router> en
```

3. Notice the prompt changes from router> to router#. Next we will display the running configurations

   ```
   Router# show run
   ```

   Question: How many interfaces does your router have?

4. Likewise you can check the startup configuration by typing

   ```
   Router# show start
   ```

5. After you making changes to your running configurations you can always save it as a startup configuration by typing either of the following commands

   ```
   Router# write mem
   ```
   or
   ```
   Router# copy run start
   ```

6. To start configurations type the following command. Notice the change in the prompt

   ```
   Router# configure terminal
   ```
   or
   ```
   Router# conf t
   ```

7. Change the hostname to R1 as follows

   ```
   R1(config)# hostname R1
   ```

8. To configure a particular interface, we use the **interface** command with the specific port interface as the argument, e.g. f0/0

   ```
   R1(config)# interface fastethernet0/0
   ```

   or

   ```
   R1(config)#  int f0/0
   ```

9. We assign an IP address to the interface as follows

   ```
   R1(config-if)# ip address 192.168.0.1 255.255.255.0
   ```

10. Start the interface

   ```
   R1(config-if)# no shutdown
   ```

   or

   ```
   R1(config-if)# no sh
   ```

11. Exit from configuration mode. Note the change in the prompt tells you where you are in configuration.

```
R1(config-if)# exit
R1(config)# exit
```

12. Use show run command to verify that your interface is up and running. Alternatively you can use

```
R1# show ip inter brief
```

13. At this point you should be able to ping from router 1 to 192.168.0.1

```
R1# ping 192.168.0.1
```

14. In similar manner configure the remaining interfaces on router 1, 2 and 3. Use ping to verify connectivity between the routers.

15. The routers once fully connected should be able to ping interfaces of directly connected routers. However the interfaces, which are not directly connected, will be inaccessible. To address this we need modify the routing table.

Configure **all** the routers using version 2 of Routing Information Protocol (RIP) to dynamically populate the routing tables.

For example the configuration commands on router 2 are as follows:

```
R2#conf t
R2(config)#router rip
R2(config-router)no auto-summary
R2(config-router)version 2
```

  //define the network, which is accessible through R2's interface

```
R2(config-router)#net 172.16.0.0
R2(config-router)#net 192.168.1.0

R2(config-router)#exit
R2(config t)exit
```

Deliverable

For each of your routers make sure to save your running configuration using the command

```
Router# write mem
```

Finally save the GNS3 project, i.e. the topology together with the startup configs.
Export the portable project (under File menu). Do not include any base image.
Zip the GNS3 project folder together with the portable project, and submit it on Stream. Make sure your submission is complete and has all the necessary files to run the simulation.