GNS3 Virtual Machine Instructions

Roberto Bonafiglia
Requirements

The VM for the networking labs @ Politecnico di Torino requires the Virtual Box software running on your PC. This software is available for most operating systems; downloading instructions are available at https://www.virtualbox.org/wiki/Downloads.

Setting up the VM

1. Download the VM from https://owncloud.ipv6.polito.it/index.php/s/vk2NVyynPgrmQr9 (work only inside POLITO)
2. Launch VirtualBox and select File->Import Appliance...
3. On the new window select the file downloaded before and continue until it requires to import the VM. Although at that point you will be asked to configure other parameters, they have already been configured so you can simply confirm them all.
4. After the import operation the VM is ready to run. The new VM will appear in the VM list on the main Virtual Box window, and it can be started by double-click on it.
5. The VM is based on an Ubuntu 16.04; the login username is gns3 and the password is courseVM.

Using GNS3

1. Open the terminal and type gns3.
2. From the new window is possible to create a new project or open an existing one.

3. The icon allows to browse all the available routers. However, please note that all the exercises will require only:
• a Cisco 2691 router, when an L3 device is needed\footnote{Note that any other router model will not work because the IOS image is not available in the VM.};
• the Ethernet switch that emulates a LAN.
Simulate your first topology

Now we can try to create a simple network topology with two routers directly connected through a link, as depicted in the Figure. First of all we need to create our topology. Go to the Device Library and drag and drop the Cisco 2691 router to the network window. After inserting the routers we need to create a link that connects the two devices together. To do this select the button and select the first router as the source device and a pop-up appears like the one depicted on the Figure with the list of the network devices.

Select a network adapter from the menu option (e.g., FastEthernet0/0), the red icon means that the interface is not used when it is selected it will signed with a green one, after the interface selection click the second device to connect and do the same operation. Now that the two routers are connected they will be linked and we just need to activate the virtual machines associated to the routers, which translates into the “start topology” command. Routers can be configured through the “console” only when they are active, i.e., their associated virtual machine is up and running.

For starting the topology (which is required in order to enable the console), we can press button.

GNS3 uses different icons to show the status of the router. For instance, a router that is switched off is shown with a red icon, while an active router is shown with the green icon. When the router is active, we can open the associated console window and configure the device with a double click on
the icon. To configure our topology, open the console of the router R1 and press the Enter key on your keyboard a couple of times; this is a known problem, as sometimes the router prompt does not appear if you do not press Enter. If everything is ok, after some seconds you should see the following prompt on the console:

R1#

You will configure the machines manually. You need now to:

• Enter in **privileged-mode** of the router using the command `enable`;
• Enter in **configuration mode** using the command `configure terminal`.

Now we need to select the interface we want to configure. To do that we need to use the command **interface FastEthernet x/y** where “x” is the number of the slot you chose before, and “y” is the number of the interface (within that slot) you used. You can also use the shortcut “in fa x/y”. For instance, as we choose the slot 0 and interface 0, we write the command `interface FastEthernet 0/0`. Now we will configure the IP address with the following commands:

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip address 192.168.0.1 255.255.255.0</td>
<td>Configure the IP address 192.168.0.1/24 on the selected interface. This address will become immediately active.</td>
</tr>
<tr>
<td>no shutdown</td>
<td>Turn on the interface. Some interfaces of the router are turned off by default, hence it is always better to type this command although this may not be always needed.</td>
</tr>
<tr>
<td>end</td>
<td>Exit from the configuration mode.</td>
</tr>
</tbody>
</table>

Obviously, a similar configuration must be repeated on the second router. On the console of R1 you can apply do the same commands, just changing the IP address into 192.168.0.2.

Here a brief summary of all the commands you typed in order to configure the address on the router, where the last digit of the IP address (written as “z”) will be the actual IP address of the router:

```
enable
configure terminal
    interface FastEthernet0/0
    ip address 192.168.0.z 255.255.255.0
    no shutdown
    end
```

You have now configured the interfaces on the link.

**Verify that the network operates correctly**

Now that you finished your configuration you can use the `ping` command in order to generate a stream of 5 ICMP Echo Request and ICMP Echo Reply to verify that the network topology works and that routers can exchange traffic between them. Open the console of the router R1. Assuming that the configuration of the router is the one suggested in previous section, you just need to use the command below to ping the router R2.

```
ping 192.168.0.2
```

\(^2\)Notice that you can also use shortcuts such “ena” and “conf t” for those commands.
You should see a similar text appearing on each console:

```
Router# ping 192.168.0.2
Sending 5, 100-byte ICMP Echos to 192.168.0.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 4/4/20 ms
Router#
```

Please note that Cisco routers tend to miss the first reply to the `ping` command, while the remaining four are received correctly. A missing answer is shown with the dot sign “.”, while a successful answer is shown with the exclamation mark (“!”). Therefore, if you type the `ping` command for the first time and the first (or, in some cases, the first two) answers are missing, nothing is wrong on your side. Vice versa, if all the five answers are negative, something is wrong in your configuration.

**Make your first capture**

Now we can try to capture the traffic generated by the `ping` command.

Right click on the link and select from which interface you start the capture and press `ok`. This will start capturing the traffic generated on that link opening a new Wireshark window.

Now come back to the router R1 and type again the `ping` command as we saw before.

On the Wireshark window you will see the stream of packet generated between the two routers, i.e., most likely 5 ICMP Echo Requests and 5 ICMP Echo Replies. Some additional traffic may be present, which is generated by some protocols active on the router and that are used to exchange some data on the network. For instance, the Cisco Discovery Protocol (CDP) is active by default on a Cisco device and it is used to discovery the capabilities (e.g., installed hardware, software version, etc.) of the devices present on the network.