Data Networks
Mini HW: Simulation With NS3 & GNS3
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Introduction

In this straightforward homework, you will get familiar with two powerful network simulators by installing them and assimilating useful commands to build and run relevant codes. This assignment paves the way for not getting stuck in these tools related errors, while you are supposed to focalize providing solutions for MAC and Network layers homework soon.

Part1: Getting Familiar With NS3

NS3 is a powerful simulation tool used for testing and analyzing various network protocols and scenarios. It is based on the C++ language and provides a predefined API to design a hypothetical network and modify the critical parameters. Moreover, it provides a python interface via bindings to its C++ API for those familiar with python. Therefore, a background in C or Python programming is needed for efficient use of the software.

Run your simulations

Install NS3, Wireshark, and NetAnim using the given documents (NetAnim is automatically installed during NS3 installation). If you have problem installing and running NetAnim, this link provides a good tutorial. Then download the attached codes and copy them into "<Ns3-Dir>/scratch/" folder. You can run these codes in Linux Terminal using:

```
cd <NS3-Dir>
./waf --run "scratch/code_name"
```

Run "code1.cc"

After running "code1.cc", the program creates a file named "animation.xml" in your NS3 directory which can be opened using NetAnim. You should open and play "animation.xml" with Netanim and prepare screenshots of NS3 outputs and NetAnim environment.
Put all of the screenshots in a folder named "code1-anim-screens".

Run "code2.cc"

After running "code2.cc", the program creates two .pcap files named "mini-hw-0-0.pcap" and "mini-hw-1-0.pcap" and also a file named "mini-hw.xml". Again open and play "mini-hw.xml" in NetAnim and provide screenshots of the animation.
Put all of the screenshots in a folder named "code2-anim-screens".

Also open each .pcap files in Wireshark and prepare screenshots of NS3 output and Wireshark environment. Put all of the screenshots in a folder named "code2-pcap-screens".

Part2: Getting Familiar With GNS3

GNS3 is another powerful, modern network simulator that you can find its comprehensive documentation here. Moreover, you can find many online tutorials covering what you need in your upcoming homework.

A simple simulation

After installation of GNS3 Create a new blank project then put the items in appropriate place, by dragging and dropping, in order to generate the topology shown in figure 1. You need to assign an IP address to each VPC in format 10.10.x.(11,12,...) that x is the last two digits of your student number, for this reason, use start button to get into the simulation, in the next stage assign an IP address to each VPC using command shown below:

```
ip <ip-address> 255.255.255.0
save
```
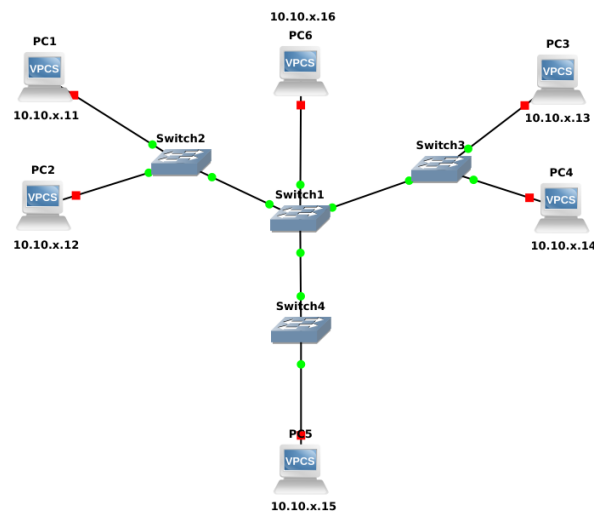

Figure 1: Topology should be used in this part

Now you can ping arbitrary VPC from any VPC using command shown below:

```
ping <ip-address>
```

Provide screenshots of:

- Assigning IP address to VPC5, VPC6
  Put the screenshot(s) in a folder named "Gns3-ip".

- Ping VPC3 from VPC2, VPC1 from VPC4
  Put the screenshot(s) in a folder named "Gns3-ping".

- Captured packets in VPC1, VPC3 interface with Wireshark
  Put the screenshot(s) in a folder named "Gns3-packets", also save some of the received packets as .pcap files and put them in the "Gns3-packets" folder.
  Note: You can use Wireshark's save option to save the received packets.

What Should I Do?

You should provide referred screenshots and .pcap files in separated folders with aforesaid names. Note that false naming makes the grading procedure difficult.

If you have any questions please don't hesitate to contact TAs!