

Network Simulation is done in ns-3 in this lab.

In first.cc file, two nodes are set to transfer data at a rate of 5Mbps, and transmission delay is 2ms. IP addresses are 10.1.1.0 and 255.255.255.0. UdpEchoServer is on port 9. The packet size is 1024 Bytes.

To output the .xml file for NetAnim, the codes as the following are added to first.cc:

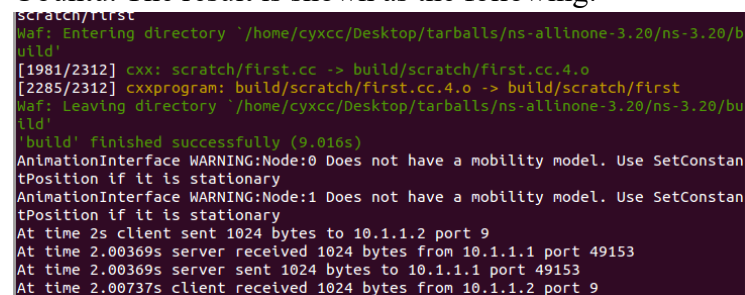
```
AnimationInterface anim ("first.xml");
Anim.SetConstantPosition (nodes.Get(0), 1.0, 2.0);
Anim.SetConstantPosition (nodes.Get(1), 2.0, 3.0);
```

The coordinates of the two nodes are set. One is 1.0 on x, 2.0 on y. The other is 2.0 on x, 3.0 on y.

To enable ASCII and pcap tracing, the codes as the following are added to create .tr file and pcap file:

```
AsciiTraceHelper ascii;
pointToPoint.EnableAsciiAll (ascii.CreateFileStream("first.tr"));
pointToPoint.EnablePcapAll("first");
```

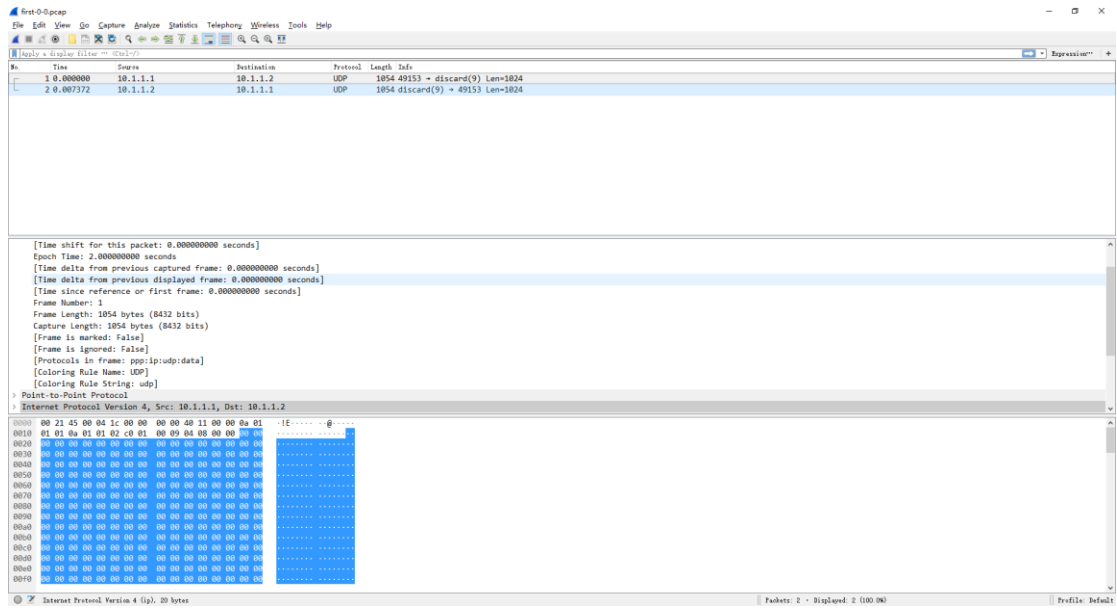
Then to simulate first.cc, the command `./waf --run scratch/first` is implemented in Ubuntu. The result is shown as the following:



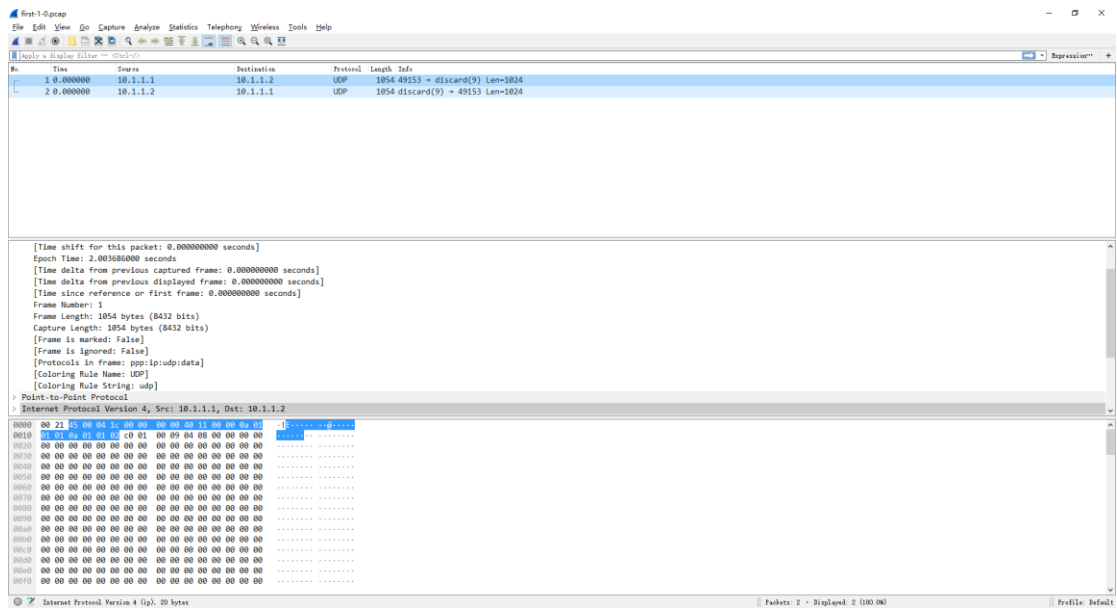
```
scratch/first
Waf: Entering directory `/home/cyxcc/Desktop/tarballs/ns-allinone-3.20/ns-3.20/build'
[1981/2312] cxx: scratch/first.cc -> build/scratch/first.cc.4.o
[2285/2312] cxxprogram: build/scratch/first.cc.4.o -> build/scratch/first
Waf: Leaving directory `/home/cyxcc/Desktop/tarballs/ns-allinone-3.20/ns-3.20/build'
'build' finished successfully (9.016s)
AnimationInterface WARNING:Node:0 Does not have a mobility model. Use SetConstantPosition if it is stationary
AnimationInterface WARNING:Node:1 Does not have a mobility model. Use SetConstantPosition if it is stationary
At time 2s client sent 1024 bytes to 10.1.1.2 port 9
At time 2.00369s server received 1024 bytes from 10.1.1.1 port 49153
At time 2.00369s server sent 1024 bytes to 10.1.1.1 port 49153
At time 2.00737s client received 1024 bytes from 10.1.1.2 port 9
```

The screenshots of pcap tracing in WireShark of the two nodes are shown as:

Node 1:



## Node 0:



Other files such as flow diagrams, output files are in the corresponding folders.