Exercise 4

INET Framework (2.6) Introduction

The question we want to answer in this exercise is the following: You want to upload a large file via FTP to a server. Which throughput can you achieve over a connection with 200 ms delay, a transmission rate of 1 Mbps and a bit error rate (BER) of 10^{-7}?
As TCP is very complex, it is difficult to calculate the answer analytically, and therefore we will use a simulation model to answer the question.

The INET framework version 2.6 needs to be downloaded manually[1], extracted and imported as OMNeT++ project. Make sure **not** to use the INET version 3.x which is installed by the OMNeT++ built-in installer on request. For this and the following exercises, we assume that you have a running OMNeT++ installation and you have imported and compiled the INET framework version 2.6.

Create a new project. In order to use the INET framework for your project, set a reference to the INET framework in the properties of your new project. Make sure both the INET framework and your project are set up to the same build configuration. You can check/change this by setting the active built configuration either to gcc-debug or to gcc-release.

Create a simple network as shown in Figure 1. For the client and server, use the StandardHost module. Use PPP for the link layer and configure the channel parameters as given above. For measuring throughput, a hook with a throughput meter has to be configured for the PPP interface. To configure the modules correctly, use the provided excerpt of the omnetpp.ini at the end of this exercise sheet. For the FTP file transfer use the TCPSessionApp and TCPSinkApp. Have a look at the corresponding .ned files for their configuration.
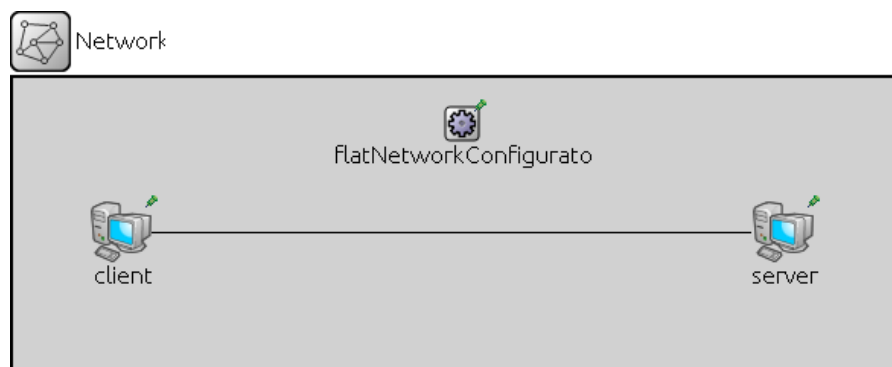

Figure 1: Network

Analyze the measured throughput for the given parameters. How does the throughput behave when you change the given network parameters (delay, bit error rate, transmission rate)?

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[1] http://omnetpp.org/download/contrib/models/inet-2.6-src.tgz

Hint: To check the version of your INET framework, have a look at the version file in the INET root directory.

omnetpp.ini (excerpt)

```ini
[General]
network = your_network
sim-time-limit = ${simtime=10}s
repeat = 1
**.networkConfiguratorModule = ""

**.ppp[*].numInputHooks = 1
**.ppp[*].inputHook[0].typename = "ThruputMeter"
**.ppp[*].inputHook[0].maxInterval = 1s
**.ppp[*].inputHook[0].batchSize = 10000
**.ppp[*].inputHook[0].**.vector-recording = true

**.vector-recording = false

# Client settings
**.client.numTcpApps = 1
**.client.tcpApp[0].typename = "TCPSessionApp"
# [...]

# Server settings
**.server.numTcpApps = 1
**.server.tcpApp[0].typename = "TCPSinkApp"
# [...]

# TCP settings
**.tcpType = "TCP"
**.tcp.mss = 1460
**.tcp.advertisedWindow = 22*this.mss
```