

# DVA D05 Simulation Exercises

February 11, 2008

The simulation and emulation exercises should be reported in a written report that is handed in. Exercise 0 need not be included into the written report. The relevant scripts should be included as appendixes in the report.

## Exercise 0

Do the exercises at <http://nslab.ee.ntu.edu.tw/courses/ns-tutorial/ntu-tutorial.html>

It is recommended that you do the exercises under Session 2 (not “Install ns”), and the two first under Session 4.

## Exercise 1

Set up a simulation between two end hosts that are connected using a single link. Set the bandwidth on the link to 10Gbps and the following parameters: segment size= 1500bytes, Round trip delay= 10,20,50,100,200 ms (half to get one-way delay), and loss rate=  $1 * 10^{-4}$ ,  $1 * 10^{-3}$ ,  $1 * 10^{-2}$ ,  $5 * 10^{-2}$ .

What are the achievable steady state throughput that you can achieve using the three different models TCP, SACK TCP and FullTCP?

## Exercise 2

We have previously examined the throughput when taking into consideration the effect of the underutilization during slow start. Use the FullTCP model and try to model the following as close as possible (including the assumptions made for the corresponding exercise in the TCP modeling lab).

- a.) transfer a 26312 bytes HTML page from a web server over a link which has an RTT of 55 ms, and an available throughput of 2Mbps, and no loss.
- b.) Now assume that the 5th packet gets lost. Use ErrorModel/List to achieve this. How long will the transfer take for this case?
- c.) How does these results relate to the results you got for the TCP modeling lab?

## Exercise 3

Create the topology below. Set all links to have capacity 5 Mbps and delay 10 ms. Now examine the steady state throughput for the set of long lived TCP flows.

- a.) Use Full TCP. What are the resulting rates for R1-S1, R2-S2, R3-S3, R4-S4?
- b.) How does these results relate to the results you got for the TCP modeling lab?

### Exercise 4 (Bonus exercise, not mandatory)

Consider again the hot-dog salesman in exercise 6 of the queuing theory exercises. Look at <http://www.dcs.shef.ac.uk/~gangu/p> and see if you can create a scenario that models incoming customers as packets incoming to a node, and the departure of customers who have got a hot-dog as the departure of a packet. Make a simulation run to determine the answers to questions a-c. Graph the queue length variation over time.

### Exercise 5 (Bonus exercise, not mandatory)

Do lab 7 “Send TCP data aggressively” at <http://nslab.ee.ntu.edu.tw/courses/ns-tutorial/ntu-tutorial.html>

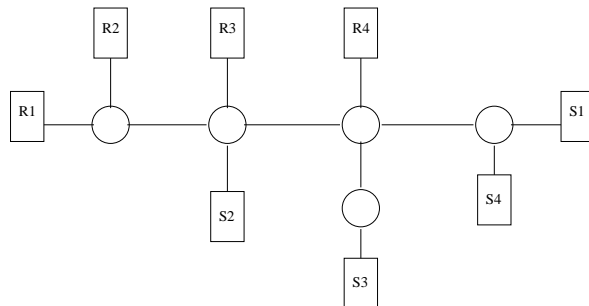


Figure 1: Example Topology