Network Simulation

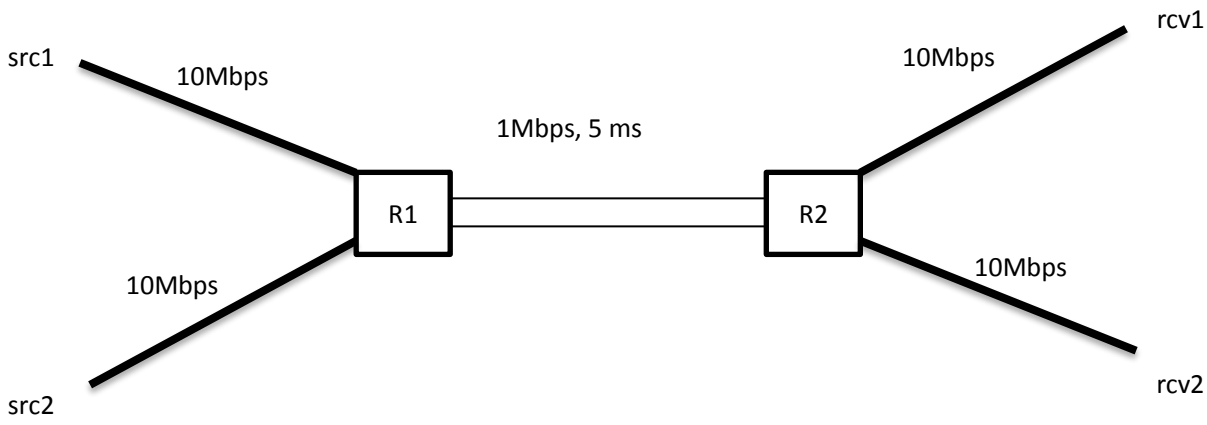
ECEN 602, Fall 2017

Due Dec. 6, 2017 NLT 5:00 pm

NS-2 Familiarization

Use the NS-2 simulator to build the following configuration:

- Two routers (R1, R2) connected with a 1 Mbps link and 5ms of latency
- Two senders (src1, src2) connected to R1 with 10 Mbps links
- Two receivers (rcv1, rcv2) connected to R2 with 10 Mbps links
- Application sender is FTP over TCP



Run 400s simulations for the following variable parameters:

TCP version = (TCP SACK | TCP VEGAS)

Case 1:

- src1-R1 and R2-rcv1 end-2-end delay = 5 ms
- src2-R1 and R2-rcv2 end-2-end delay = 12.5 ms

Case 2:

- src1-R1 and R2-rcv1 end-2-end delay = 5 ms
- src2-R1 and R2-rcv2 end-2-end delay = 20 ms

Case 3:

- src1-R1 and R2-rcv1 end-2-end delay = 5 ms
- src2-R1 and R2-rcv2 end-2-end delay = 27.5 ms

Note that in the cases above the end-to-end RTTs of the two sources are in the ratio 1:2, 1:3 and 1:4 respectively. This should give you 6 independent simulations, i.e., 2 TCP versions x 3 end-to-end delays.

(i) For each of the TCP flavors (VEGAS and SACK) simulate the three RTT cases and find the ratio of the average throughput of src1 to src2. Make two separate tables (one for each TCP flavor) showing the throughput for each test case.

(ii) Discuss the relationship between TCP throughput and RTT in light of your results in (i) above for each TCP flavor. Also compare and discuss the throughput performance of the two flavors of TCP for Case 1. Explain why one of the TCP flavors performs better than the other for Case 1. There is information about TCP Vegas in our textbook, pp. 523-530. RFC 6675 describes the current recommended TCP SACK operation, which is basically TCP RENO + SACK. I am not sure if ns-2 implements RFC 6675 or the earlier RFC 3517 that was made obsolete by RFC 6675, however.

Note: Run the simulations for 400 seconds, and ignore the first 100 seconds while measuring metrics.

The Supplementary References handout includes URL's with information about ns-2, and the TA will go over ns-2 in the recitation.

Usage Syntax:

tclsh ns2.tcl <TCP_flavor> <case_no>
example: tclsh ns2.tcl VEGAS 2

Submission Guidelines

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1. My expectation is that each team member will contribute equally to the network simulation assignment. Please include a statement in your **readme.txt** that describes the role of each team member in completing the assignment.

2. The report (**report.pdf**) should describe your test setup, procedure, results, tables for (i) above, and answers to the questions in (ii) above.
3. Make sure your code (**ns2.tcl**) takes command line arguments as mentioned above. Your code should display throughput on the terminal.
4. The **readme.txt** file should contain a summary of your code, architecture, usage, errata, etc.
5. When submitting, upload only these files: **report.pdf**, **ns2.tcl,** and **readme.txt**
6. Explanation of the submission procedure will be provided by the TA prior to the submission date.
7. Your source code (**ns2.tcl**) must be submitted separately to Turnitin.com using eCampus by 5:00 pm on the due date. Turnitin.com is plagiarism detection software that will compare your code to files on the Internet as well as your peers' code. Additional details on how to submit your code will be provided prior to the submission date.