Loughborough University

[NETWORK MODELLING AND PERFORMANCE]

[COP512]

Feb. 2018

Deliverables from Practical Lab work (NS-2)

Specification:	In this section of the coursework, you need to complete one deliverable. Deliverable 1: You need to create simulation scripts and run the simulation using NS-2 network simulator per network topology and configuration required. Full details attached below.
Method(s) of Presentation:	1. A report including diagrams and graphs with explanation for Deliverable 1. 2. The simulation scripts, results and analysis to prove that you have picked up NS-2 simulation basic skills. 3. A hard copy of the source code (i.e. NS-2 TCL simulation scripts) and report. 4. A disk or CD including all source codes, NAM trace files and report.
Assessment Guidelines:	Total: 30% for NS-2. Deliverable 1: 30%. Plagiarism will receive no mark.

NS-2 Simulation

Deliverable 1: [30%]

In deliverable 1, you are to develop two NS-2 simulations written in TCL script to analyse the performance of two different queue management schemes; DropTail and RED (Random Early Detection). Performance is analysed based on throughput and queue size observed in the simulation.

You need to create two simulation scenarios for a wired network with a dumbbell topology that consists of eight edge nodes (node N1 to N8) and two routers (R1 and R2).

- Nodes N1, N2, N3 and N4 are connected to router R1 with full duplex links.
- Nodes N5, N6, N7 and N8 are connected to router R2 with full duplex links.
- Router R1 and router R2 are connected with a full duplex link.

Please refer to Table 1 for link configuration.

The network topology and network configuration are the same for both scenarios except that a different queue management scheme is used at the routers in the scripts. Use the DropTail queue management scheme for both routers in scenario 1 and use RED in scenario 2. Set the maximum queue size for both scenarios to 30.

FTP over TCP-NewReno sources are attached to nodes N1, N2, N3 and N4 so that node N1 can send packets to N5, N2 can send packets to N6, N3 can send packets to N7 and N4 can send packets to N8 (packet size 1000 bytes) via router R1 and router R2. The traffic of all FTPs starts at time 0.0s. The simulation needs to be run for 50 seconds.

Table 1: Network Link Configuration

Source	Destination	Bandwidth (Mbps)	Propagation Delay (ms)	Queue Management Scheme
N1	R1	30	1	DropTail
N2	R1	75	0.4	DropTail
N3	R1	40	1.2	DropTail
N4	R1	65	1.6	DropTail
R2	N5	55	1.8	DropTail
R2	N6	70	0.5	DropTail
R2	N7	80	2.5	DropTail
R2	N8	95	2.9	DropTail
R1	R2	75	3.1	DropTail/RED

A diagram showing the network topology should be captured from NAM visualiser and included into the report. NAM traces captured in the simulations should also be included for the submission.

You need to capture throughput, and current queue size between link R1 and R2 in the simulation and present the simulation results in a graph plotted via xgraph.

You need to analyse the performance metrics obtained, and compare the performance of DropTail against RED. Conclude from the simulation results to show which queue scheme gives better performance and briefly explain the reasons.

The marking scheme is as shown below:

- **a.** Brief explanation of DropTail and RED queue management schemes. [4%]
- **b.** Network topology diagram from NAM visualiser and NAM traces. [6%]
- **c.** Link configurations as shown in simulation scripts. [5%]
- **d.** Graphs showing throughput, and current queue size of the bottleneck link between the routers. [6%]
- **e.** Analysis of RED and DropTail performance based on throughput and queue size observed from simulation results. [9%]

Method of presentation:

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2. The simulation scripts, results and analysis to prove that you have picked up NS-2 simulation basic skills.
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Assessment:

Total: 30% for NS-2. Deliverable 1: 30%.