Assignment #4

TCP+AQM (Continued), Binomial Congestion Control, Experiment Design
Due the Sunday Oct 8th, 11:55pm

Note: we are giving more time because this is a longer assignment (actually the old assgt 4 & 5 together).
Questions

- **Reno TCP vs. SACK TCP**
  - What’s the key difference between them?
  - What metrics are appropriate for measuring this difference?
  - Design a test scenario to show the difference.

- **TCP AIMD Congestion Control vs Binomial CC:**
  - What’s the key difference between them?
  - What metrics are appropriate for measuring this difference?
  - **Note**: In the next class, we will IMPLEMENT Binomial CCs in ns-2

- **RED vs. DropTail**
  - What’s the key difference?
  - Why RED drops packet randomly?
  - What’s the major effect if using RED instead of DropTail?
Questions

- Suppose a number of flows share a single droptail bottleneck

- If you change the following parameters, what do you expect?
  - Buffer size from 10 packets to 1000 packets;
  - Segment size from 100B to 1KB;
  - The number of flows from 3 to 10.

- Write down what do you expect?
Assignment #4

- Validate the experiment in Section 6.5 of tcp-sack paper
- Sample code at /home/net/ns/ns-2.26/tcl/test/test-sack
- Generate your own ns script based on the sample code

- Generate Sequence # vs. Time graph at the node src;
- Compute average throughput at dst.
Submission (for this part)

- Write ns2 script to measure TCP Reno/SACK performance difference.

- Submissions:
  - Ns2 simulation script;
  - All graphs and statistics.

- Due the **Sunday Oct 8th**, 11:55pm
Experiment Design

- Use ExpDesigner to evaluate the influence of several parameters on TCP performance
  - TCP Reno vs. SACK
  - Buffer Size: 50 vs. 500 pkts
  - Segment Size: 100 vs. 1000 bytes
  - Router AQM: DropTail vs. RED

- Suggested performance metrics:
  - goodput, queue length, bottleneck utilization
Code

- Download Tao’s ExpDesigner from the course web site:
  - [http://www.ecse.rpi.edu/Homepages/shivkuma/teaching/fall2003/class05/ed.tar](http://www.ecse.rpi.edu/Homepages/shivkuma/teaching/fall2003/class05/ed.tar)
  - Get-effects.pl is updated (already included in ed.tar)!

- How to use?
  - Untar it into your local machine;
  - Start farmer/worker using “start_system.sh” for only once;
  - Complete the ns-2 simulation script file tcp.tcl;
  - Then “./run”, you will get results for a performance metrics.
Binomial Congestion Control

- Implement any one binomial congestion control algorithm in ns-2
  - Find the c++ source file in ~/ns/ns-2.1b7/tcp.cc
  - Increase: `void TcpAgent::opencwnd()`
  - Decrease: `void TcpAgent::slowdown()`
  - Set the appropriate parameters from TCL script to use Binomial CC

- Performance matrices:
  - cwnd vs. time, or
  - throughput vs. time.
Multi Bottleneck Topology

- Using the following multiple bottleneck topology
- Generate your own ns script based on previous code
  - cwnd vs. time for the green flow
Graduate Students Only

- Browse the first 4 chapters of Tao Ye’s PhD Thesis (upto page 55):
- Summarize how he applies the ideas of experiment design to network management.
- Summarize key differences between various search algorithms he reviews; and between search/optimization and regression modeling done in traditional experiment design
Submission

- Submissions:
  - Ns2 simulation script;
  - All statistics from exp_designer;
  - Analysis (most important part).
  - Binomial CC: implementation code + graphs
  - Grad Students: reading/summaries from Tao’s thesis.

- Due the **Sunday Oct 8th**, 11:55pm