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# 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

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- 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?

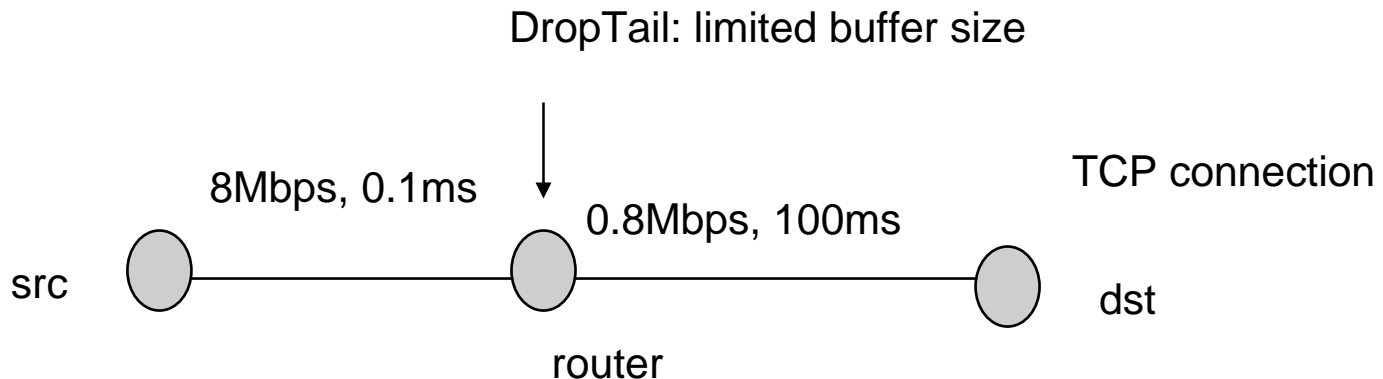
# Questions

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- 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)

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- 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

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- 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

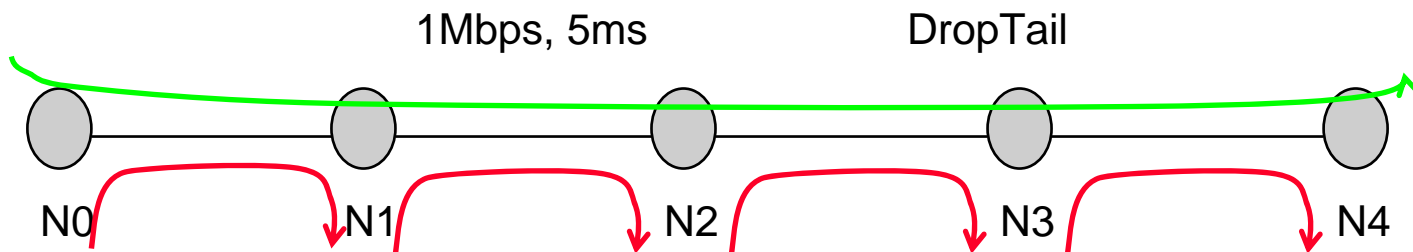
- Download Tao's ExpDesigner from the course web site:
  - <http://www.ecse.rpi.edu/Homepages/shivkuma/teaching/fall2003/class05/ed.tar>
  - Get-effects.pl is updated (already included in ed.tar)!
- How to use?
  - Untar it into your local machine;
  - Start farmer/worker using "start\_system.sh" for only once;
  - Complete the ns-2 simulation script file tcp.tcl;
  - Then "./run", you will get results for a performance matrices.

# 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::openwnd()`
  - Decrease: `void TcpAgent::slowdown()`
  - Set the appropriate parameters from TCL script to use Binomial CC
- Performance metrics:
  - 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

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- Browse the first 4 chapters of Tao Ye's PhD Thesis (upto page 55):
- <http://www.ecse.rpi.edu/Homepages/shivkuma/research/papers/tao-phd-thesis.pdf>
- 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

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- 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