CSC2209
Computer Networks

TCP Vegas and TCP Nice

Stefan Saroiu
Computer Science
University of Toronto

TONS Presentation Today

- M. Ammar, from Georgia Tech in SF1105 from 2-3pm
  - Disruption tolerant networks
  - Class of mobile networks

TCP Vegas

Questions Today about TCP Vegas

- What Reno's problems is Vegas fixing?
- How is it fixing them?

TCP Vegas

- Pro-active approach to congestion detection
- Small queues at routers

TCP Vegas

- Early congestion detection using RTTs
- Additive decrease on early congestion
- Restrict # of packets maintained per flow at bottleneck router
- Small queues, yet good utilization

TCP Vegas Techniques

TCP Vegas Techniques

- More accurate RTT measurement/timeouts
- New retransmission
- Congestion avoidance mechanism
- Slow-start

RTT Measurement

- Reno: coarse-grained timer
- Vegas: fined-grained timer

- Better for calculating timeouts, could be more precise in timeout expiration, faster reaction to loss

Retransmissions

- Reno: when receiving 3 duplicate ACKs

- Vegas:
  - When receiving duplicate ACK, checks if timeout expired, and if so, retransmits
  - When receiving a non-duplicate ACK 1st/2nd after retransmission check if timeout expired and if so retransmits

Congestion window decrease

- Reno: possible to decrease the congestion window more than once during one RTT

- Vegas: in case of multiple segment loss and more than one fast retransmission, the congestion window is reduced only for the first fast retransmission

Congestion detection

- Reno: reactive: loss signals congestion

- Vegas: proactive: tries to detect incipient congestion by comparing the measured Xput to its notion of expected Xput

Algorithm

- baseRTT = minimum RTT
- windowSize = size of window in bytes
- Expected Xput = windowSize / baseRTT

- rttLen = # of bytes during last RTT
- RTT = average RTT of segments acknowledge during last RTT
- Actual Xput = rttLen / RTT

- Diff = expected - actual
- Two thresholds: α, β
- If diff < α, increase linearly; if diff > β, decrease linearly
- Otherwise do nothing

Slow-start modifications

- Reno: double congestion window size every RTT
- Vegas: double congestion window size every other RTT
  - In-between RTTs are used for computing actual Xput
  - When actual rate falls below expected rate, exit slow-start, enter linear-increase/linear-decrease

Problems

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- How would Reno and Vegas compete at the bottleneck router?
- Re-routing
- Old flows versus new flows

TCP Nice

TCP for Spare Network Capacity

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- Rate-limiting
- Off-peak hours
- TCP connection manager

- How do these compare with TCP Nice?

High-Level Question

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- New TCP idea comes along?
  - How are we going to evaluate it?
- Simulation?
- Emulation?
- Large-scale Internet measurement?