ECSE-4690: Experimental Networking

Informal Quiz: TCP

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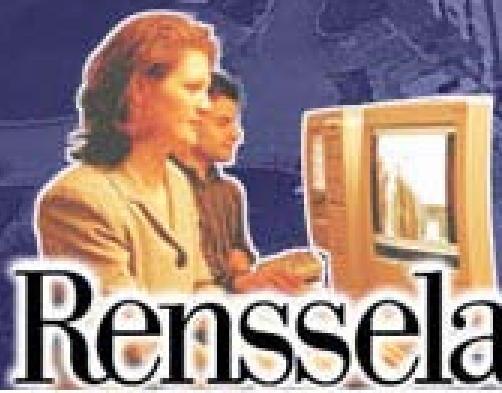

Rensselaer

RSVP

TCP

- ❑ ❑ TCP can re-assemble IP fragments
- ❑ ❑ Path-MTU refers to the procedure of finding the minimum MTU of the path to reduce the probability of fragmentation.
- ❑ ❑ The IP header checksum field is the 16-bit two's complement of the one's complement sum of all 16-bit words in the header.
- ❑ ❑ TCP provides reliability only at a packet-level.
- ❑ ❑ Transport protocols are minimally required because IP does not provide application multiplexing support
- ❑ ❑ TCP is called "self-clocking" because the source sends traffic whenever it likes
- ❑ ❑ TCP by default uses a selective retransmission policy
- ❑ ❑ The RTT estimation algorithm in current can only tolerate variances of upto 30%
- ❑ ❑ The TCP congestion control algorithm is stable because it detects congestion reliably and its rate of window decrease is faster than its rate of window increase
- ❑ ❑ TCP's use of cumulative acks reduces the need for any timeout/retransmission of acks
- ❑ ❑ Delayed-acks are good for bulk traffic, but bad for interactive traffic.
- ❑ ❑ A two-way handshake is sufficient for the robust setup of a half-duplex connection, but a three-way handshake is necessary for the robust setup of a full-duplex connection

TCP

- If timeouts are not used, burst packet or ack-losses cannot be recovered from
- A duplicate ack gives the same information as a NAK, but it presumes the notion of a sequence number
- Sequence numbers allow the detection of duplicate packets, but the sequence number space must be sized sufficiently large compared to the window size depending upon the retransmission algorithm (go-back-N or selective-repeat) used.
- In a lossless network, window-based transmission can achieve full utilization
- TCP sets its RTO to an average RTT measure + 4*mean deviation of RTT, based upon Chebyshev's theorem
- Retransmission ambiguity would not occur if timestamps were used on packets.
- Self-clocking of TCP can be a liability in asymmetric networks where the reverse path can artifically constrain the forward path.
- Self-clocking can also lead to burstiness if the reverse path is congested, and/or the receiver uses a delay-ack time to suppress ACKs.
- The end-to-end congestion control model is the only one that can guarantee avoidance of congestion collapse.
- In equilibrium, TCP attempts to conserve packets and operate at high utilization.
- TCP does not guarantee low queueing delays because it depends upon packet loss for congestion detection

TCP/Congestion Control

- ❑ ❑ Fast retransmit refers to the procedure of using three duplicate acks to infer packet loss
- ❑ ❑ TCP Tahoe sets its window to 1 after every loss detection
- ❑ ❑ TCP Reno may timeout quickly in a multiple packet loss scenario
- ❑ ❑ TCP SACK uses selective retransmit, and like NewReno, it does not reduce its window more than once per window of packets
- ❑ ❑ With a 28kbps reverse link, 1500 byte packets are regular TCP behavior, the forward link throughput is at most around 2 Mbps
- ❑ ❑ FIFO+droptail provides service isolation among the participating TCP flows
- ❑ ❑ Synchronization occurs because DropTail leads to bursty and correlated packet losses amongst flows; and flows react to same events
- ❑ ❑ Dropping packets early has the risk that transient burstiness may be mistaken for true overload (demand > capacity)
- ❑ ❑ RED determines random drop probability by comparing the average queue size to a max and min thresholds
- ❑ ❑ Random dropping/marking with a bias in RED helps break synchronization