ECSE-4670: Computer Communication Networks (CCN)

Informal Quiz 1 (Solutions)

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- √ If peak rate = 5 Mbps, Avg rate = 1 Mbps and Service rate = 2 Mbps, multiplexing gain = 2.
- √ A hotel which is leasing a T-1 line (which can carry 24 phone calls at a time) to provide service for 200 customers is exploiting statistical multiplexing.
- √ An even parity bit value for the 8-bit string 01101010 is 0.
- √ The Hamming distance between two codewords can be calculated by XORing the code-words bit-by-bit and counting the number of 1s in the result.
- √ A sliding window protocol with window size N has utilization N-times that of a stop-and-wait protocol.
- √ A short link has a high α (t_{prop}/t_{trans}) and therefore, even a stop-and-wait flow control would be efficient on it: there is no need for complexity of larger windows.
- √ Go-back-N ARQ trades off a small loss in performance for simplicity, increased reliability and better use of sequence number space when compared to Selective-reject ARQ.

√ Statistical multiplexing is most useful when the peak rate is close to the average rate

√ The checksum field is the 16-bit two's complement of the one's complement sum of all 16-bit words in the header.

√ Transport protocols are minimally required because IP does not provide application multiplexing support

√ TCP provides packet-level reliability.

√ TCP is called "self-clocking" because the source sends traffic whenever it likes

√ TCP by default uses a selective retransmission policy

√ 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.

- √ The internet name space is organized in the same way as the address space: driven by topology & routing.
- √ The changing of either the IP address or the name leads to an update of DNS.
- √ A full mesh topology require O(N**2) links and O(N) interfaces per node.
- √ Internetworking involves solution of two key problems: heterogeneity and topology design.
- √ The reason circuit-switching does not use headers is because it sets up circuits a priori and infers all meta-data from timing.
- √ Reliability is a necessary function to be provided by transport layer protocols
- √ All DNS queries which are not found in the local cache go to the root servers
- √ Sequence numbers are required in stop-and-wait ARQ if the forward channel has bit-errors (only) and the reverse channel is perfectly reliable
- √ Loss of packets and/or acks in stop-and-wait ARQ necessitates timeouts in the design