

Sample Midterm Questions

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1. A transcontinental channel with a one-way latency of 30 ms and a bandwidth of 10 Mbps can hold how many Megabits (Mb) at a given instant?
2. Let's say you have a sender, a receiver, a one-way latency of 30 ms, and the bandwidth is 10 Mbps. Let's say the receiver tells the sender to stop transmitting. The receiver may receive up to how many megabits (Mb) of data from the sender before the sender stops transmitting?
3. What is the wavelength, in kilometers (km), when a 700 Hz wave travels through copper? Assume speed of light through copper is $(2/3) * 3 * 10^8$ m/s.

Round your answer to one decimal place.

4. What is the NRZ encoding of the below stream?



For questions 5 to 7, consider a 3 Mbps link with a 75 ms round trip time (RTT). The three questions are related to each other.

5. What is the delay x bandwidth product? Provide your answer in kilobits (Kb).
6. Assuming a frame size of 2 KB and the network uses the Stop and Wait Protocol, what is the maximum sending rate? Assume $2 \text{ KB} = 2 \times 1,000 \text{ bytes} = 2,000 \text{ bytes}$. Provide your answer in bps and round to the nearest whole number.
7. Continuing from question 6, what fraction of the link's total capacity is being used in this network using the Stop and Wait Protocol?
Provide your answer as a percentage, rounded to the nearest decimal.

8. Suppose you are designing a sliding window protocol for a 1-Mbps point-to-point link to the stationary satellite revolving around the Earth at an altitude of 3×10^4 km. Assuming that each frame carries 1 KB of data, what is the minimum number of bits you need for the sequence number in the following cases?

Assume the speed of light is 3×10^8 m/s and assume 1 KB = 1,000 bytes.

a. RWS=1

b. RWS=SWS

RWS stands for receiving window size.

SWS stands for sending window size.