Midterm: Networking 2021

Select four problems from the following and solve the midterm quiz. Submit per dropbox. Only pdf submissions.

Problem 1:

An RG-58AU coaxial cable has an attenuation of 6.1 dB per 100 feet. What is the attenuation at 100 meters?

Problem 2:

Your signal is 300 milliwatts and the noise level is 2 micro-watts. What is the signal-to-noise ratio? If this is over a channel of 10 MHz, what is the maximum bandwidth in bps?

Problem 3:

A satellite has an altitude of 4500 km. What is the roundtrip time of a signal? Assume we can sustain a bandwidth of 100Mbps to connect two earth stations A and B with each other using a satellite link. We are using "Jumbo" frames of 100Kbits. How much of the channel is utilized if we use a data link protocol that acknowledges each frame (ARQ)? Show all your work.

Comment: This suggests that long-haul data link layers need something like a selective repeat protocol with cumulative acknowledgments and very large frames.

Problem 4:

We are using the Hamming 15/11 code. We received the message
$$(1,0,1,0,1,0,1,0,1,1,1,1,1,0,0).$$
What happens next? What is the presumed original message?

Problem 5:

A Low Density Parity Check (LDPC) code has a minimum Hamming distance between code words of 51. How many errors can it correct (correctly)?

Problem 6:

Assume a switched ethernet with full duplex connections between a station and the switch (as well as between switches). Does the CSMA/CD protocol make any sense?

Problem 7:

The following diagram gives a network of Ethernet bridges. Calculate the spanning tree generated by the spanning tree protocol. Recall that the root is the bridge with the lowest ID and that ties are resolved in favor of the lowest ID. The ID is given by the number inside the hexagon representing a bridge. (In reality, the ID are the MAC addresses consisting of six bytes.