

CS2022 ASSIGNMENT 11 (Due Date: Dec 2, 2022)

Instructions: You have to answer all of them.

Question 1

- (a) In the lecture, it was mentioned that the distance a radio signal (i.e. electromagnetic (EM) wave) can be transmitted depends on the frequency of the radio signal. If its frequency is higher, the transmission distance is longer. In this regard, the frequency of a carrier signal has to be very high. Search over the Google for the carrier frequencies of the radio signal in a WiFi network. [Hint: Roughly speaking, there are two frequencies.]
- (b) What is the range of EM wave frequencies of visible light? Are the carrier frequencies of the carrier signal in a WiFi network lower than a light wave frequency?
- (c) State a possible reason why the carrier frequency of a WiFi network is not set to be higher than light frequency. [Hint: Search over Google for a reason.]

Question 2

- (a) While a bit stream is transmitted via a wireless medium, the radio signal must be corrupted by channel noise. What are the possible causes for the channel noise?
- (b) In the presence of channel noise, the bit stream reconstructed from the received radio signal might be erroneous. That is to say, some bits are not correctly recovered. Bit error rate (BER) is one measure for the effect of the channel noise. BER is defined as the probability that a bit of data transmitting via the wireless medium to the destination device will be erroneous.

Sender	Receiver	Error
0	0	No
0	1	Yes
1	0	Yes
1	1	No

$$BER = P\{R = 1|S = 0\} + P\{R = 0|S = 1\}.$$

In other words, BER refers to the probability that a bit of data received is different from the bit of data transmitted from the sender.

Suppose the BER of a channel is 0.0001 and a packet of size 64000 bytes has been transmitted from a sender. What is the expected number of erroneous bits appearing in the receiver side?

- (c) Describe the reason(s) why circuit switching is not preferred as a switching method for data communication in the Internet. Instead packet switching is preferred.
- (d) State the usages of the MAC address, IP address, PORT ID, session number in data communication over the Internet.

Question 3

Submit the answers in Question 1 and Question 2 in form of an HTML file. The following is a sample code for you.

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<html>
<header>
<title>CS2022Fall Assignment 11</title>
</header>

<body>
<center><h1>Assignment 11</h1></center>
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</body>
</html>
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