

CSC 435 Computer Networks
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Reading List for Exam 2 (on March 5th, 2020; in-class @ 6 PM; CLOSED NOTES)

Sample Questions for Module 3 - Physical Layer

- 1) What is the difference between the bit rate and baud rate and how they are related? If the baud rate of a signal is 4,000 and the number of signal levels used is 18, calculate the bit rate.
- 2) Why can't there be channels of infinite bandwidth? Explain.
- 3) With respect to the encoding criterion, what is the difference between the RS-232 standard and the Manchester encoding standard? Draw the waveform diagram to send the bit pattern 0 1 1 0 1 1 0 according to: (i) RS-232 standard and (ii) Manchester encoding.
- 4) Determine the transmission delay, propagation delay and the total delay incurred to transmit data of size 2000 characters using the RS-232 standard. Assume the channel bandwidth is 40000 bits/sec and length is 2×10^6 m. Assume the speed of the signal on the channel is 60% of the speed of light.
- 5) Consider the word 'ANT' with the ASCII values of 'A', 'N' and 'T' being 65, 78 and 84 respectively. How would this word be transmitted if the transmission order is:
 - a. Byte little-endian and bit big-endian
 - b. Byte little-endian and bit little-endian
 - c. Byte big-endian and bit big-endian
 - d. Byte big-endian and bit little-endian
- 6) Consider a modulator-demodulator hardware that uses amplitude modulation to encode and decode every cycle of a carrier wave of amplitude A. Draw the waveform diagram to show a modulated carrier wave that is used to transmit the bit sequence 01100111. Assume you are encoding using 4 different amplitude levels. Show clearly, the bit pair you are encoding for each of the 4 amplitude levels.
- 7) Consider a modulator-demodulator hardware that uses frequency modulation to encode and decode a carrier wave for every two cycles. Draw the waveform diagram to show a modulated carrier wave that is used to transmit the bit sequence 0 1 _ 1 _ 0. The _ indicates the channel is idle. Assume one bit is transferred per frequency level. Clearly indicate the number of cycles you are using to send bit 1 and bit 0.
- 8) Assume two computers are using TDM to take turns in sending 512 bytes of data packets over a shared channel that operates at 56 Kbps. If the hardware takes 50msec after one computer stops sending before the other can begin, how long it takes for each computer to send 1 MB of a file?
- 9) Use Code Division Multiplexing to transmit the data values 0 1 1 0 and 1 0 1 0 from two senders S1 and S2 respectively. The 2-bit Chip Sequence of S1 and S2 are 0 1 and 1 1 respectively.
 - a. Show the resulting signal values when the two above two data signals are transmitted simultaneously
 - b. Show how the receiver for the data signals sent by S1 and S2 are able to decode the data?

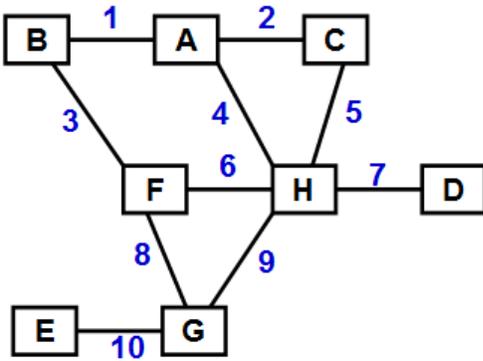
Sample Questions for Module 4 - LANs and Extended LANs

- 1) What is the difference between a logical topology and physical topology? Explain with an example.
- 2) Compute the minimum frame size required for an Ethernet channel of bandwidth 10Mbps and length 1500m.

- 3) Two Ethernet channels A and B are of the same length, but have bandwidths 10Kbps and 10Mbps respectively. Which channel will have a larger minimum frame size?
- 4) In an Ethernet channel, if the maximum possible backoff time during the first retransmission attempt is 10 milliseconds, compute the maximum possible backoff time during the 6th retransmission attempt?
- 5) Why there has to be a minimum and maximum frame size for an Ethernet network? Why there is no need for a minimum frame size in Wireless LANs?
- 6) Briefly explain the mechanism of collision detection in an Ethernet and derive an expression of the minimum frame size.
- 7) Do we ever use the Ethernet's binary exponential back-off algorithm in Wireless LANs? If so, when? If not why?
- 8) Briefly explain the RTS-CTS handshake mechanism in a Wireless LAN and how does it avoid collision?
- 9) Answer the following with respect to the differences between the networking devices listed below. For each column, indicate one of the highlighted answers in each cell for each device:

Device	In which layer the device operates? (1, 2 or 3)	The connected LANs are in the same or different collision domain?	The connected LANs are in the same or different broadcast domain?	The device has a MAC address: Yes or No?	The device has an IP address: Yes or No?	The device operates under the store and forward technique? Yes or No
Repeater						
Hub						
Bridge						
Switch						
Router						

- 10) Explain why it is necessary for each computer, attached to a bridged LAN, to send a frame after boot up? Why?
- 11) In an extended LAN comprising of several LANs connected through bridges, how do you identify the following:
 - (i) Root bridge
 - (ii) Root port for each bridge other than the root bridge
 - (iii) Designated port for each link/LAN
 - (iv) Blocked port for a bridge, if any.
- 12) Given the following extended LAN, identify the root switch, the root port for each switch other than the root switch, the designated port for each link/LAN and the blocked port, if any, for each switch?



- 13) How many ports are needed for a switch to emulate an extended LAN comprising 6 bridges?
- 14) How many bridges are needed for an extended LAN to emulate a 5-port switch?
- 15) Compare the throughput that would be typically obtained in a hub-based extended LAN vs. a switch-based extended LAN in: (i) Low traffic scenarios and (ii) Moderate-high traffic scenarios. Justify your answer for each of the two scenarios.
- 16) What is meant by "access" mode and "trunk" mode in the context of VLANs? Give an example for each.
- 17) Explain, with a simple example, the concept of "Router in a Stick" model for a network of VLANs.