CSC 435/524 Computer Networks
Question Bank on Module 4: LANs, Extended LANs and VLANs

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1) What are the IEEE Identifiers for the following standards:
   a. Ethernet
   b. Token ring
   c. Wi-Fi
   d. Personal area networks
   e. Broadband wireless access

2) What is the difference between a logical topology and physical topology? Explain with an example.

3) What is the fundamental difference between the following LAN technologies? Explain.
   a. Ethernet and Wireless LAN
   b. Ethernet and Token ring

4) Compute the minimum frame size required for an Ethernet channel of bandwidth 10Mbps and length 1500m.

5) 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?

6) 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?

7) Why there has to be a minimum and maximum frame size for an Ethernet network?

8) Briefly explain the mechanism of collision detection in an Ethernet and derive an expression of the minimum frame size.

9) Why there is no need for a minimum frame size in Wireless LANs?

10) Do we ever use the Ethernet's binary exponential back-off algorithm in Wireless LANs? If so, when? If not why?

11) What are the hidden and exposed terminal problems in a Wireless LAN? What are the solutions to these problems?

12) Briefly explain the RTS-CTS handshake mechanism in a Wireless LAN and how does it avoids collision?

13) What is the difference between each of the following networking devices (also, at what layer they operate)?
   a. Repeater
   b. Hub
   c. Bridge
   d. Switch

14) Explain why it is necessary for each computer, attached to a bridged LAN, to send a frame after boot up? Why?

15) In an extended LAN comprising of several LANs connected through bridges, how do you identify the root bridge for the extended LAN and the designated bridge for each LAN? How would you break any tie?

16) Consider a hub-based extended LAN and a switch-based extended LAN? Each of these extended LANs has 10 LANs, each LAN of bandwidth 10 Mbps. What is the maximum possible data rate of the hub-based extended LAN and the switch-based extended LAN?

17) How many ports are needed for a switch to emulate an extended LAN comprising 6 bridges?

18) How many bridges are needed for an extended LAN to emulate a 5-port switch?

19) 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.

20) What is the relationship between a subnet and VLAN? What devices you need to communicate from one VLAN to another VLAN? Why?

21) What is meant by "access" mode and "trunk" mode in the context of VLANs? Give an example for each.

22) Explain, with a simple example, the concept of "Router in a Stick" model for a network of VLANs.

23) In the context of connecting computers and networking devices using cables, explain when would you need a crossover cable and when would you need a straight-through cable? Why?

24) Identify whether you would need a crossover or straight-through cable to connect the following with each other:
   a. PC to Router
   b. Switch to Router
   c. Switch to Switch
   d. Printer to Switch