

- Q1 Frames arrive randomly at a 100-Mbps channel for transmission. If the channel is busy when a frame arrives, it waits its turn in a queue. Frame length is exponentially distributed with a mean of 10,000 bits/frame. For each of the following frame arrival rates, give the delay experienced by the average frame, including both queuing time and transmission time.
- (a) 90 frames/sec. (b) 900 frames/sec. (c) 9000 frames/sec.
- Q2 A group of N stations share a 56-kbps pure ALOHA channel. Each station outputs a 1000-bit frame on average once every 100 sec, even if the previous one has not yet been sent (e.g., the stations can buffer outgoing frames). What is the maximum value of N ? What is the role of error control in the data link layer? Compare it with transportation layer.
- Q3 A large population of ALOHA users manages to generate 50 requests/sec, including both originals and retransmissions. Time is slotted in units of 40 msec. (a) What is the chance of success on the first attempt? (b) What is the probability of exactly k collisions and then a success? (c) What is the expected number of transmission attempts needed?
- Q4 Explain bit-map protocol. How long does a station, s , have to wait in the worst case before it can start transmitting its frame over a LAN that uses the basic bit-map protocol?
- Q5 Explain binary count-down protocol. In the binary countdown protocol, explain how a lower-numbered station may be starved from sending a packet.
- Q6 Explain adaptive tree-walk protocol. Sixteen stations, numbered 1 through 16, are contending for the use of a shared channel by using the adaptive tree-walk protocol. If all the stations whose addresses are prime numbers suddenly become ready at once, how many bit slots are needed to resolve the contention?
- Q7 Consider five wireless stations, A, B, C, D, and E. Station A can communicate with all other stations. B can communicate with A, C and E. C can communicate with A, B and D. D can communicate with A, C and E. E can communicate A, D and B. (a) When A is sending to B, what other communications are possible? (b) When B is sending to A, what other communications are possible? (c) When B is sending to C, what other communications are possible?
- Q8 Ethernet frames must be at least 64 bytes long to ensure that the transmitter is still going in the event of a collision at the far end of the cable. Fast Ethernet has the same 64-byte minimum frame size but can get the bits out ten times faster. How is it possible to maintain the same minimum frame size?
- Q9 Describe the protocol used for Bluetooth connection. A disadvantage of Bluetooth's profiles is that they add significant complexity to the protocol. How can these profiles be an advantage from the perspective of the applications? Bluetooth device can be in two piconets at the same time. Is there any reason why one device cannot be the controller in both of them at the same time? What is the maximum size of the data field for a 3-slot Bluetooth frame at basic rate? Explain your answer. Compare physical layer protocols with the Bluetooth.
- Q10 What does fast Ethernet mean. Explain various types of fiber based fast Ethernet standards?