**MAC Layer**

1. Một nhóm N trạm cùng chia sẻ một kênh pure ALOHA 56 kbps. Trung bình mỗi trạm phát đi 1000 bits mỗi 100 giây. Tính số trạm tối đa ?

2. Consider the delay of pure ALOHA versus slotted ALOHA at low load. Which one is less? Explain your answer.

4. Ten thousand airline reservation stations are competing for the use of a single slotted ALOHA channel. The average station makes 18 requests/hour. A slot is 125 µsec. What is the approximate total channel load?

5. 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?

6. Measurements of a slotted ALOHA channel with an infinite number of users show that 10 percent of the slots are idle (rỗi).

(a) What is the channel load, G?

(b) What is the throughput?

(c) Is the channel underloaded or overloaded?

8. 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

(a) the basic bit-map protocol?

(b) Mok and Ward's protocol with permuting virtual station numbers?

9. What is the baud rate of the standard 10-Mbps Ethernet?

10. A 1-km-long, 10-Mbps CSMA/CD LAN (not 802.3) has a propagation speed of 200 m/µsec. Repeaters are not allowed in this system. Data frames are 256 bits long, including 32 bits of header, checksum, and other overhead. The first bit slot after a successful transmission is reserved for the receiver to capture the channel in order to send a 32-bit acknowledgement frame. What is the effective data rate, excluding overhead, assuming that there are no collisions?

11. Consider building a CSMA/CD network running at 1 Gbps over a 1-km cable with no repeaters. The signal speed in the cable is 200,000 km/sec. What is the minimum frame size?

12. An IP packet to be transmitted by Ethernet is 60 bytes long, including all its headers. If LLC is not in use, is padding needed in the Ethernet frame, and if so, how many bytes?

13. 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?

14. Some books quote the maximum size of an Ethernet frame as 1518 bytes instead of 1500 bytes. Are they wrong? Explain your answer.

15. The 1000Base-SX specification states that the clock shall run at 1250 MHz, even though gigabit Ethernet is only supposed to deliver 1 Gbps. Is this higher speed to provide for an extra margin of safety? If not, what is going on here?

16. How many frames per second can gigabit Ethernet handle? Think carefully and take into account all the relevant cases. Hint: the fact that it is gigabit Ethernet matters.

17. Name two networks that allow frames to be packed back-to-back. Why is this feature worth having?