CS 447-003 Networks and Data Communications
Spring 2024
Quiz #7 on March 19, 2024 (SOLUTIONS)

Your Last Three Digits: _____

(please do NOT write all of your student ID or your name)

Grade: _____

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(1) Define local area networks ("LANs") by answering the following issues:

    (a) Primary purpose: for offering <u>direct/physical connectivity</u> to each host computer (connectivity to any computer networks, such as LANs, WANs, the Internet, and/or intranets)

    (b) Size: <u>up to approximately 300 feet</u>

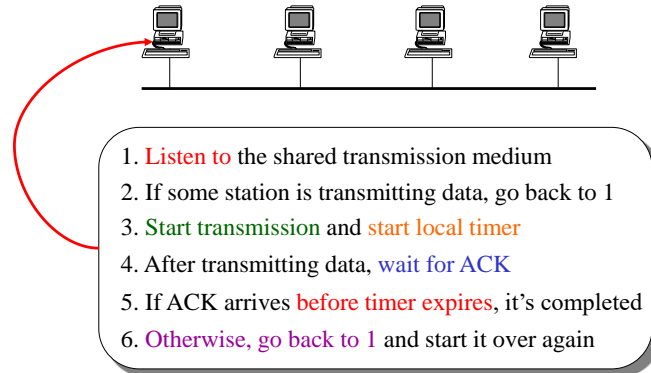   (c) Ownership: <u>single ownership</u> (individual owners, corporate, or organizations)

(2) What is the primary advantage of "switch" (compared to "repeaters")?

The primary advantages of switches are (any one of the followings):

- Switches do not broadcast, which eliminates unnecessary network traffic ("traffic localizer"). This property of switches prevents waste of network transmission bandwidth which may be wasted otherwise.

- Since switches can possibly set up multiple transmission paths inside of a switch, (network) transmission throughput at a switch is usually better (higher) than that of a repeater hub.

- Since switches will transmit (forward) network traffic (packets) only if its destination exists (if you are not a receiver, you will not see it), switches improve safety (security).

(3) Describe the procedure in CSMA contention-based MAC (the one used by IEEE 802.3 Ethernet).

IEEE-802.3 Ethernet Medium Access Control (Contention-based MAC)

1. Listen to the shared transmission medium
2. If some station is transmitting data, go back to 1
3. Start transmission and start local timer
4. After transmitting data, wait for ACK
5. If ACK arrives before timer expires, it's completed
6. Otherwise, go back to 1 and start it over again

(4) What particular problem in CSMA does CSMA/CD solve and how?

CSMA/CD eliminates the time (wasted time) a transmitting host needs to wait for its timer to expire before the transmitting host computer can starts its retransmission when a packet collision occurs.

Note 1: The essential (the required) concept for this question is "eliminate the unnecessary waiting time (before the timer expires) after a packet collision occurs". Not much credit just for saying "CSMA/CD detects packet collisions"

Note 2: Some people answered this question by "if multiple host computers have their packet to transmit and they listen to the transmission cable at the same time while some host computer is in the middle of the transmission, that situation will cause a packet collision(s) for sure". This problem is not what "CD" solves.

(5) What is the major problem in CSMA/CD?

The major problem CSMA/CD has is a guaranteed additional (another) packet collision *after two transmitting host computers detect their packet collision* and both of them start their re-transmission after their packet collision (almost) at the same timing (CSMA/CD adopted "BEB" for solving this problem).

Note 1: For decent (or full) credit, the underlined concept should be emphasized/mentioned/implied.

Note 2: Quite a few (but not all) answered this question by "if multiple host computers have their packet to transmit and they listen to the transmission cable at the same time while some host computer is in the middle of the transmission, that situation will cause a packet collision(s) for sure".

Although it is a problem, it is NOT a unique problem to CSMA/CD (we expect the same problem even to CSMA). Since it is not a problem unique (only) to CSMA/CD, that particular answer for this question is not appropriate (i.e., it is not the major problem of CSMA/CD).