

EL-GY 5373 Pop Quiz Four

Name: _____

Student ID: _____

I. Select ALL CORRECT answers for the following questions.

1. An ARP query packet is encapsulated in
 - a) a link-layer broadcast frame.
 - b) a link-layer frame addressed to a specific adapter.
 - c) an IP datagram.
 - d) a BPDU message for STP to form a spanning tree.
2. When a CSMA/CD frame arrives at a host, its encapsulation type is identified as IEEE 802.2/802.3 or Ethernet by
 - a) Checking the destination and source MAC addresses
 - b) Checking the value of the length field or the type field
 - c) Checking whether there are 802.2 LLC and 802.2 SNAP fields
 - d) None of the above
3. Ethernet doesn't provide which of the following to the network layer
 - a) reliable data transfer
 - b) error detection
 - c) IP routing
 - d) any of the above
4. For Ethernet, if an adapter (NIC) determines that a frame it has just received is addressed to a different adapter
 - a) it discards the frame without sending an error message to the network layer
 - b) it delivers the frame to the network layer, and lets the network layer decide what to do
 - c) it sends a NACK (not acknowledged frame) to the sending host
 - d) it discards the frame and sends an error message to the network layer
5. An Ethernet station de-multiplexes data from the following frames:
 - a) Frames addressed to the station's own (Ethernet hardware) address.
 - b) Frames that perform link layer functions with one or more specified Ethernet multicast addresses.
 - c) All frames with the Ethernet Broadcast address (all 1's).
 - d) All frames transferred through the shared medium that the station attaches to.
6. In the Ethernet CSMA/CD protocol, suppose a node constructs a frame and then senses the channel as busy. Then
 - a) the Ethernet adapter waits until it senses the channel idle and then begins to transmit the frame.
 - b) the Ethernet adapter enters exponential backoff.
 - c) the Ethernet adapter begins to transmit the frame.
 - d) none of the above

- II. Explain (with the help of diagrams) why Ethernet frame needs to maintain a minimum size? Note this size is associated to the frame transfer time to be at least twice longer than the maximum propagation time between any two Ethernet stations in network.

A: Maintaining a minimum frame size is required to detect Ethernet collision with CSMA/CD. To resolve a potential collision, the detection must be performed by the parties that experience the collision. In other words, the sending hosts can detect a potential collision by sensing the shared medium while they still transmit their own data.

Referring to the figure below, assume that the maximum propagation delay is a - observed between station A and station B as they are the farthest apart stations in this network. In the worst case, a collision may happen between A and B as B just starts to send data out before A's data signal arrives B. Then B may detect the collision right away and send the jamming signal instead of the data. However, B's signal takes another a time to reach A to make this collision now detectable by A. Thus, it takes $2a$ time for the collision detected by both A and B (why?). Such detection is possible only if both A and B ensure that the data transfer time is longer than $2a$. Note it's certainly possible that a collision may get detected quicker than $2a$ if it doesn't happen between A and B.

