TD NET1 : Part 2

Goal:

The main goal of this workshop to make clear de utility and use of layer 1 and 2 of the OSI model.

First part

1. Which of the following is/are true about Ethernet:
    a. CRC error detection, as used in Ethernet, cannot always detect if there is a frame error.
    b. In the Ethernet CSMA/CD protocol, suppose that an adapter constructs a frame to send and then senses that the channel is busy. The adapter then enters exponential back-off.
    c. Entries in an Ethernet bridge table must be configured by a network administrator.
    d. An Ethernet adapter always passes all non-corrupt frames that it receives up to the network layer.

2. In the context of ALOHA, what does "CSMA" stand for?
    a. Collision Sensing Multiple Access
    b. Carrier Sense Multiple Access
    c. Centralized Synchronization Multiple Access
    d. Continuous Slot Multiple Access

3. Which of the following is/are true about a communications channel that uses time division multiplexing?
    a. There may be times when the channel is idle, even if a sender has data to send on the channel.
    b. The channel requires the sender's and receiver's clocks to be closely synchronized.
    c. Data in the channel could experience variable delays due to queuing.
    d. In times of high utilization, a sender could be completely denied access to the channel.

4. Which of the following is a key characteristic of the original ALOHA protocol?
    a. It uses a slotted time division for transmission.
    b. It relies on carrier sensing before transmission.

c. It operates in a full-duplex mode.
d. It guarantees collision-free communication.

5. In slotted ALOHA, what is the advantage of dividing time into discrete slots?
    a. It eliminates the need for acknowledgments.
    b. It ensures that all stations transmit simultaneously.
    c. It simplifies the collision detection process.
    d. It reduces the chances of collisions.

6. What is the primary drawback of the original ALOHA protocol?
    a. It has high collision rates.
    b. It is too complex to implement.
    c. It requires expensive hardware.
    d. It is not compatible with modern networks.

7. Which of the following are true about Ethernet networks?

    a. Ethernet frames have a minimum size to ensure good utilization of the network (i.e., senders could otherwise have a large overhead to send a small piece of data).
    b. Bridges provide greater scalability for Ethernet networks than hubs.
    c. Hosts on different segments of a switched Ethernet network will only see packets to hosts on their segments or to the broadcast address.
    d. When an Ethernet sender detects that the media is idle, it sends a jam signal onto the media to tell other devices not to transmit, and then it sends its packet.
8. What is FDMA in the context of networking?
    a. Frequency Domain Multiple Access
    b. Frequency Division Multiple Access
    c. Fast Data Management Algorithm
    d. Frequency Data Modulation Approach

9. In FDMA, how are multiple users allocated to the available frequency spectrum?
    a. Users share the same frequency simultaneously.
    b. Users take turns transmitting on the same frequency.
    c. Users transmit on different frequencies simultaneously.
    d. Users use a different modulation technique.

10. Which of the following is an application where FDMA is commonly used?
    a. Ethernet LANs
    b. Satellite communication
    c. Bluetooth devices
    d. Fiber optic networks

11. What happens if a user in an FDMA system wants to transmit data but all frequency channels are occupied?
    a. The user waits until a frequency becomes available.
    b. The user's data is dropped.
    c. The user switches to a different modulation scheme.
    d. The user can transmit on any channel simultaneously.

12. What is the primary limitation of FDMA compared to other multiple access techniques like CDMA?
    a. Inefficiency in utilizing available bandwidth
    b. Limited scalability for a large number of users
    c. Complexity in managing time slots
    d. Difficulty in handling varying data rates

13. What does TDMA stand for?
    a. Time Division Multiple Allocation
    b. Time Division Multiple Access
    c. Time Division Multiplexing Access
    d. Time Domain Multiple Allocation

14. In a TDMA system with a frame duration of 10 milliseconds, if each user is allocated a time slot of 2 milliseconds, how many users can share the channel in one frame?

    a. 2 users
    b. 4 users
    c. 5 users
    d. 10 users

15. What is the primary advantage of TDMA over other access methods like CSMA?
    a. Higher throughput
    b. Lower latency
    c. Simplicity of implementation
    d. Support for longer distances

16. TDMA is commonly used in which type of communication systems?
    a. Satellite communication
    b. Ethernet networks
    c. Cellular networks
    d. Fiber optic networks

17. TDMA is commonly used in which generation of cellular networks?
    a. 1G
    b. 2G

c. 3G
d. 4G

18. In TDMA, how is a collision between users avoided?
    a. Users listen for a clear channel before transmitting.
    b. Users transmit simultaneously and resolve collisions at the receiver.
    c. Collisions are allowed, and error correction is used to recover data.
    d. Collision avoidance is not a concern in TDMA.

19. Which of the following link protocols best describes Ethernet?
    a. Frequency-division multiple access (FDMA)
    b. Time-division multiple access (TDMA)
    c. Token-passing
    d. Carrier sense multiple access (CSMA)

20. What is the primary function of a network hub?
    a. Routing data packets
    b. Amplifying and regenerating signals
    c. Filtering traffic based on MAC addresses
    d. Providing wireless connectivity
21. Which of the following best describes the behavior of a hub in a network?
    a. It intelligently forwards data packets to the appropriate destination.
    b. It broadcasts data to all connected devices on the network.
    c. It filters and manages network traffic based on IP addresses.
    d. It creates a secure and isolated network segment.
22. In a hub-based network, when one device sends data, how do other devices on the same hub react?
    a. They all receive the data but only the intended recipient processes it.
    b. They each generate their own collision detection signals.
    c. They drop the data unless it is explicitly addressed to them.
    d. They send an acknowledgment back to the sender.

23. Which of the following is a disadvantage of using hubs in a network?
    a. Improved network performance
    b. Enhanced security
    c. Increased network efficiency
    d. Limited collision detection and increased network congestion
24. Which device can help to reduce collision domains in a network and improve overall performance compared to a hub?
    a. Switch
    b. Router
    c. Modem
    d. Repeater
25. What is a network switch primarily used for?

a. Connecting devices wirelessly
b. Filtering traffic between different network segments
c. Translating between IP addresses and MAC addresses
d. Converting analog signals to digital signals

26. What is the primary function of a MAC address table in a switch?
    a. Translating IP addresses to domain names
    b. Storing the switch's IP address
    c. Maintaining a list of connected devices and their MAC addresses
    d. Managing VLAN configurations
27. Which feature allows a switch to divide a broadcast domain into smaller segments?
    a. IP addressing
    b. Subnetting
    c. VLANs
    d. DHCP
28. What does MAC stand for in MAC addressing?
    a. Media Access Control
    b. Memory Access Control
    c. Message Authentication Code
    d. Maximum Address Control
29. How long is a MAC address in bits?
    a. 16 bits
    b. 32 bits
    c. 48 bits
    d. 64 bits
30. In a MAC address like "00:1A:2B:3C:4D:5E," which part represents the OUI?
    a. 00:1A:2B
    b. 3C:4D:5E
    c. 00
    d. 5E

Second part

1. Running tcpdump (or wireshark) as root on your own computer will allow you to see some traffic that was neither sent nor received by you. Assume the switches already know how to forward traffic to each MAC address, so that all unicast traffic is delivered without trigging any flooding. List two things that your packet monitor could discover about other users on your LAN.
2. Some implementations of ARP process an ARP reply (by updating the local ARP cache) even when there are no ARP requests pending. Suppose a rogue computer sends an unsolicited ARP reply message, with its own MAC address and the IP address of the LAN gateway router, to another host on the LAN. What will happen when this host (i.e., the host who believed the bogus ARP reply) transmits an IP packet destined to an external Internet address?

3. Ethernet bridging relies heavily on flooding. For example, broadcast traffic is flooded. List two protocols that generate broadcast traffic, and explain why broadcasting is done.
4. Do the switches learn the network topology (connecting the switches), like routers do in a link-state protocol? Does each pair of switches communicate over a shortest path, like routers do in link-state protocols?
5. Why are acknowledgments used in 802.11 but not in wired Ethernet?