1. What is the primary purpose of the Data Link Layer in the OSI model?

a) To establish end-to-end connections
b) To provide error-free transmission
c) To ensure reliable communication between adjacent network nodes
d) To route data packets across multiple networks

Answer: c) To ensure reliable communication between adjacent network nodes

Explanation: The Data Link Layer is responsible for providing reliable communication between adjacent nodes over a physical link, ensuring that data is transferred error-free and in the correct sequence.

2. Which service is NOT provided by the Data Link Layer?

a) Error detection and correction
b) Flow control
c) Network addressing
d) Framing

Answer: c) Network addressing

Explanation: Network addressing is a responsibility of the Network Layer (Layer 3) in the OSI model, not the Data Link Layer.

3. What does framing refer to in the Data Link Layer?

a) Establishing connections between network nodes

b) Detecting and correcting errors in transmitted data
c) Defining the structure of data frames for transmission
d) Managing the flow of data between sender and receiver

Answer: c) Defining the structure of data frames for transmission

Explanation: Framing involves encapsulating data into frames, including synchronization, delimitation, and error checking, to facilitate reliable transmission over the physical medium.

4. Which mechanism is used to regulate the rate of data transmission in the Data Link Layer?

a) Flow control
b) Error control
c) Address resolution
d) Packet switching

Answer: a) Flow control

Explanation: Flow control mechanisms regulate the flow of data between sender and receiver to ensure that the receiver can handle the incoming data without overflow.

5. What is the purpose of error control in the Data Link Layer?

a) To prevent unauthorized access to the network
b) To detect and correct errors that occur during data transmission
c) To establish connections between network nodes
d) To manage the flow of data between sender and receiver

Answer: b) To detect and correct errors that occur during data transmission

Explanation: Error control mechanisms detect and, in some cases, correct errors that may occur during the transmission of data frames over a network.

6. Which Data Link Layer protocol operates at the most basic level, transmitting one bit at a time?

a) Elementary Protocol
b) Hybrid ARQ
c) Selective Repeat
d) Sliding Window Protocol (1-bit)

Answer: d) Sliding Window Protocol (1-bit)

Explanation: The Sliding Window Protocol with a window size of 1 operates at the most basic level, transmitting one bit at a time.

7. Which protocol allows the receiver to request retransmission of a corrupted or lost frame, while the sender continues sending subsequent frames?

a) Go-Back-N
b) Selective Repeat
c) Hybrid ARQ
d) Elementary Protocol

Answer: a) Go-Back-N

Explanation: In Go-Back-N protocol, the receiver can request retransmission of corrupted or lost frames while the sender continues sending subsequent frames from the point of failure.

8. In which protocol does the sender only retransmit the specific frame that was corrupted or lost, rather than retransmitting multiple frames?

a) Go-Back-N
b) Selective Repeat
c) Hybrid ARQ
d) Sliding Window Protocol (1-bit)

Answer: b) Selective Repeat

Explanation: Selective Repeat protocol allows the sender to retransmit only the specific frame that was corrupted or lost, rather than retransmitting multiple frames.

9. Which protocol combines the advantages of both Go-Back-N and Selective Repeat by retransmitting only the lost frames and buffering received frames for out-of-sequence delivery?

a) Go-Back-N
b) Selective Repeat
c) Hybrid ARQ
d) Sliding Window Protocol (1-bit)

Answer: c) Hybrid ARQ

Explanation: Hybrid ARQ combines the advantages of both Go-Back-N and Selective Repeat

protocols by retransmitting only the lost frames and buffering received frames for out-of-sequence delivery.

10. How are protocols verified in terms of their functionality and correctness?

a) Through stress testing
b) By analyzing network performance
c) Using Finite State Machine Models and Petri net models
d) By conducting physical layer testing

Answer: c) Using Finite State Machine Models and Petri net models

Explanation: Protocols are verified for functionality and correctness through formal methods such as Finite State Machine Models and Petri net models, which allow for rigorous analysis of protocol behavior and properties.

11. Which protocol resolves IP addresses to MAC addresses in a local area network?

a) ARP
b) RARP
c) GARP
d) DHCP

Answer: a) ARP (Address Resolution Protocol)

Explanation: ARP resolves IP addresses to MAC addresses in a local area network by mapping IP addresses to corresponding MAC addresses.

12. Which protocol resolves MAC addresses to IP addresses in a local area network?

a) ARP
b) RARP
c) GARP
d) DHCP

Answer: b) RARP (Reverse Address Resolution Protocol)

Explanation: RARP resolves MAC addresses to IP addresses in a local area network by mapping MAC addresses to corresponding IP addresses.

13. Which protocol allows a device to determine its IP address dynamically from a DHCP server?

a) ARP
b) RARP
c) GARP
d) DHCP (Dynamic Host Configuration Protocol)

Answer: d) DHCP (Dynamic Host Configuration Protocol)

Explanation: DHCP allows a device to obtain its IP address dynamically from a DHCP server, along with other network configuration parameters.

14. Which protocol allows for dynamic reconfiguration of IP addresses in a cluster of network devices?

a) ARP
b) RARP
c) GARP (Generic Attribute Registration Protocol)
d) DHCP

Answer: c) GARP (Generic Attribute Registration Protocol)

Explanation: GARP allows for dynamic reconfiguration of IP addresses in a cluster of network devices, particularly in clustered computing environments.

15. Which protocol is used to discover the MAC address of devices on the same network segment?

a) ARP
b) RARP
c) GARP
d) DHCP

Answer: a) ARP (Address Resolution Protocol)

Explanation: ARP is used to discover the MAC address of devices on the same network segment by mapping IP addresses to corresponding MAC addresses.

16. What is the purpose of framing in the context of the Data Link Layer?

a) To provide network addressing
b) To regulate the flow of data
c) To detect and correct errors

d) To define the boundaries of data frames

Answer: d) To define the boundaries of data frames

Explanation: Framing involves defining the structure of data frames, including synchronization and delimitation, to facilitate their transmission over a network medium.

17. Which mechanism ensures that data is transmitted at an appropriate rate between sender and receiver in the Data Link Layer?

a) Flow control
b) Error control
c) Address resolution
d) Framing

Answer: a) Flow control

Explanation: Flow control mechanisms regulate the rate of data transmission between sender and receiver to prevent congestion and ensure efficient communication.

18. What is the primary function of error control in the Data Link Layer?

a) To prevent unauthorized access to the network
b) To detect and correct errors in transmitted data
c) To establish connections between network nodes
d) To manage the flow of data between sender and receiver

Answer: b) To detect and correct errors in transmitted data

Explanation: Error control mechanisms in the Data Link Layer detect and, if possible, correct errors that occur during the transmission of data frames over a network.

19. Which protocol allows the receiver to selectively request retransmission of only corrupted or lost frames?

a) Go-Back-N
b) Selective Repeat
c) Hybrid ARQ
d) Sliding Window Protocol (1-bit)

Answer: b) Selective Repeat

Explanation: Selective Repeat protocol allows the receiver to selectively request retransmission of only corrupted or lost frames, improving efficiency compared to Go-Back-N.

20. How are Data Link Layer protocols verified for functionality and correctness?

a) Through performance monitoring
b) By conducting physical layer testing
c) Using formal methods such as Finite State Machine Models and Petri net models
d) Through packet analysis

Answer: c) Using formal methods such as Finite State Machine Models and Petri net models

Explanation: Data Link Layer protocols are verified for functionality and correctness using formal methods such as Finite State Machine Models and Petri net models, which allow rigorous analysis of protocol behavior and properties.

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