

Ethernet Concepts

Purpose of the Physical Layer

1. What is the primary function of the Physical Layer in the OSI model?

- a) Providing encryption and security for data transmission
- b) Establishing, maintaining, and terminating network connections
- c) Defining the physical means of sending data, including electrical signals and hardware
- d) Routing packets between devices on different networks

Answer: c) Defining the physical means of sending data, including electrical signals and hardware

2. The Physical Layer of the OSI model is responsible for:

- a) Handling error correction and flow control
- b) Converting data into signals for transmission over a medium
- c) Ensuring reliable communication between devices
- d) Managing end-to-end communication

Answer: b) Converting data into signals for transmission over a medium

3. Which of the following does the Physical Layer NOT deal with?

- a) Electrical signals
- b) Data encryption
- c) Transmission medium
- d) Bit synchronization

Answer: b) Data encryption

4. Which of the following is a key responsibility of the Physical Layer in the OSI model?

- a) Establishing communication sessions
- b) Converting data into signals for transmission over physical media
- c) Encrypting data for secure transmission
- d) Determining the route to forward packets across networks

Answer: b) Converting data into signals for transmission over physical media

5. The Physical Layer operates directly with which of the following?

- a) Application software
- b) Devices such as routers and switches
- c) Physical transmission media like cables and wireless signals
- d) Routing protocols

Answer: c) Physical transmission media like cables and wireless signals

Physical Layer Characteristics

6. Which of the following describes a key characteristic of the Physical Layer?

- a) It deals with high-level data formatting
- b) It provides error detection and correction mechanisms
- c) It focuses on the transmission and reception of raw bit streams over a physical medium
- d) It defines the rules for data exchange between network devices

Answer: c) It focuses on the transmission and reception of raw bit streams over a physical medium

7. Which of the following is NOT a characteristic of the Physical Layer?

- a) Defines the mechanical, electrical, and procedural characteristics of the physical connection
- b) Defines the method of encoding data into signals for transmission
- c) Ensures that data is transmitted error-free across the network
- d) Specifies the types of cables and connectors used for network connections

Answer: c) Ensures that data is transmitted error-free across the network

8. The Physical Layer is responsible for all of the following except:

- a) Electrical specifications of the interface
- b) Bit rate control and synchronization
- c) Data encryption during transmission
- d) Signal modulation and demodulation

Answer: c) Data encryption during transmission

9. What type of data does the Physical Layer transmit?

- a) Encoded bits in the form of electrical, optical, or radio signals
- b) Packets of data in frames
- c) Segments of data from the Transport layer
- d) Logical addresses in the form of IP addresses

Answer: a) Encoded bits in the form of electrical, optical, or radio signals

10. Which of the following is NOT a Physical Layer characteristic related to data transmission?

- a) Data encoding schemes (e.g., Manchester encoding)
- b) Transmission speed (bit rate)
- c) Flow control
- d) Media types (e.g., fiber optic, copper wire, wireless)

Answer: c) Flow control

Copper Cabling

11. Which of the following is a type of copper cabling used in networking?

- a) Fiber optic cables
- b) Coaxial cables
- c) Wireless communication
- d) Air as a transmission medium

Answer: b) Coaxial cables

12. Twisted pair cables are widely used in networking. Which of the following is a typical characteristic of Unshielded Twisted Pair (UTP) cables?

- a) UTP cables have a built-in shielding to prevent electromagnetic interference
- b) UTP cables are commonly used for short-range wireless connections
- c) UTP cables consist of pairs of wires twisted together to reduce noise and interference
- d) UTP cables offer higher bandwidth than fiber optic cables

Answer: c) UTP cables consist of pairs of wires twisted together to reduce noise and interference

13. Which category of twisted pair cables is most commonly used for Ethernet connections in local area networks (LANs)?

- a) Category 3 (Cat 3)
- b) Category 5e (Cat 5e)
- c) Category 6 (Cat 6)
- d) Category 7 (Cat 7)

Answer: b) Category 5e (Cat 5e)

14. Which of the following cabling standards is known for providing higher bandwidth and reduced interference in networking environments?

- a) Coaxial cabling
- b) Fiber optic cabling
- c) Unshielded Twisted Pair (UTP)
- d) Shielded Twisted Pair (STP)

Answer: d) Shielded Twisted Pair (STP)

15. Which of the following is a limitation of copper cabling compared to fiber optic cabling?

- a) Copper cabling can transmit data over much longer distances without degradation.
- b) Copper cabling is more immune to electromagnetic interference.
- c) Copper cabling generally has lower bandwidth and is susceptible to electromagnetic interference (EMI).
- d) Copper cabling is more expensive than fiber optic cabling.

Answer: c) Copper cabling generally has lower bandwidth and is susceptible to electromagnetic interference (EMI).

16. What is the maximum distance for running Cat 5e UTP cabling for a 1000BASE-T Ethernet connection?

- a) 10 meters
- b) 50 meters
- c) 100 meters
- d) 500 meters

Answer: c) 100 meters

17. Which type of copper cabling is commonly used for high-speed data transmission in environments with higher interference, such as industrial settings?

- a) Unshielded Twisted Pair (UTP)
- b) Shielded Twisted Pair (STP)
- c) Coaxial cable
- d) Cat 3 UTP

Answer: b) Shielded Twisted Pair (STP)

18. Coaxial cables are typically used for which of the following applications?

- a) Telephone line communication
- b) High-speed Ethernet networking
- c) Cable television transmission
- d) Wireless network communication

Answer: c) Cable television transmission

19. Which of the following is an advantage of using fiber optic cables over copper cabling?

- a) Fiber optic cables are more affordable and easier to install.
- b) Fiber optic cables have higher bandwidth and are immune to electromagnetic interference.
- c) Copper cabling is better for long-distance data transmission.
- d) Fiber optic cables have less data loss over short distances.

Answer: b) Fiber optic cables have higher bandwidth and are immune to electromagnetic interference.

20. In networking, which type of copper cable is known for having a central copper conductor surrounded by an insulating layer and then a shielding layer to reduce electromagnetic interference?

- a) Coaxial cable
- b) Fiber optic cable
- c) Twisted pair cable
- d) Shielded Twisted Pair (STP) cable

Answer: a) Coaxial cable

UTP (Unshielded Twisted Pair) Cabling

21. Which of the following is a key characteristic of Unshielded Twisted Pair (UTP) cabling?

- a) Each wire pair is individually shielded
- b) It has a higher bandwidth than fiber optic cables
- c) The wires are twisted to reduce electromagnetic interference
- d) It uses light signals for data transmission

Answer: c) The wires are twisted to reduce electromagnetic interference

22. Which category of UTP cabling is commonly used for Ethernet networks, supporting speeds up to 1 Gbps?

- a) Cat 3
- b) Cat 5e
- c) Cat 6
- d) Cat 7

Answer: b) Cat 5e

23. Which of the following is NOT a typical use for UTP cabling?

- a) Ethernet networking
- b) Telephone line communication
- c) Connecting servers to fiber-optic cables
- d) Short-range wireless communication

Answer: d) Short-range wireless communication

24. What is the typical maximum transmission distance for Cat 5e UTP cabling used in Ethernet networks (1000BASE-T)?

- a) 10 meters
- b) 50 meters
- c) 100 meters
- d) 200 meters

Answer: c) 100 meters

25. Which category of UTP cable is recommended for high-speed network connections such as 10 Gigabit Ethernet?

- a) Cat 5
- b) Cat 5e
- c) Cat 6
- d) Cat 7

Answer: c) Cat 6

Fiber-Optic and Coaxial Cabling

26. Which of the following is the main advantage of fiber-optic cabling over copper cabling?

- a) Lower cost and easier installation
- b) Immune to electromagnetic interference (EMI) and higher bandwidth
- c) Can transmit over shorter distances
- d) Uses electrical signals for data transmission

Answer: b) Immune to electromagnetic interference (EMI) and higher bandwidth

27. Fiber-optic cables use which of the following to transmit data?

- a) Electrical signals
- b) Radio waves
- c) Light signals
- d) Microwaves

Answer: c) Light signals

28. Which of the following is a type of fiber-optic cable that uses a single fiber strand to transmit data in both directions?

- a) Single-mode fiber (SMF)
- b) Multi-mode fiber (MMF)
- c) Duplex fiber
- d) Coaxial fiber

Answer: a) Single-mode fiber (SMF)

29. Coaxial cables are primarily used for:

- a) Ethernet networking
- b) Video and audio signals, such as in cable TV systems
- c) Long-range telephone connections
- d) High-speed internet connections over long distances

Answer: b) Video and audio signals, such as in cable TV systems

30. Which of the following is a typical use for coaxial cables in networking?

- a) Gigabit Ethernet connections
- b) Connecting routers to wireless access points
- c) Cable television and internet connections
- d) Transmitting light signals in fiber networks

Answer: c) Cable television and internet connections

31. What is the primary difference between single-mode fiber and multi-mode fiber?

- a) Single-mode fiber uses multiple light sources, while multi-mode fiber uses only one
- b) Single-mode fiber is designed for longer distance transmission, while multi-mode fiber is for shorter distances
- c) Single-mode fiber has lower bandwidth than multi-mode fiber
- d) Multi-mode fiber uses electrical signals, while single-mode uses light signals

Answer: b) Single-mode fiber is designed for longer distance transmission, while multi-mode fiber is for shorter distances

32. Which of the following is a disadvantage of using fiber-optic cabling?

- a) Higher susceptibility to electromagnetic interference
- b) More expensive than copper cabling
- c) Lower data transmission speeds than copper
- d) Requires more maintenance than UTP cabling

Answer: b) More expensive than copper cabling

Wireless Media

33. Which of the following is a type of wireless communication used for short-range network access?

- a) Wi-Fi
- b) Bluetooth
- c) Microwave
- d) 5G

Answer: b) Bluetooth

34. Wi-Fi technology uses which of the following to transmit data wirelessly over a network?

- a) Radio waves
- b) Light waves
- c) Infrared signals
- d) Sound waves

Answer: a) Radio waves

35. Which of the following is the main limitation of wireless communication compared to wired networking?

- a) Lower cost and easier installation
- b) Limited range and higher potential for interference
- c) Higher data transmission rates
- d) Easier to scale for large networks

Answer: b) Limited range and higher potential for interference

36. What does Wi-Fi stand for?

- a) Wireless Fidelity
- b) Wide Frequency Interference
- c) Wireless Internet Function
- d) Worldwide Internet Federation

Answer: a) Wireless Fidelity

37. Microwave communication is commonly used for:

- a) Cellular communication
- b) Local area network (LAN) communication
- c) High-speed internet in remote areas
- d) High-frequency data transmission over short distances

Answer: c) High-speed internet in remote areas

38. Which of the following is a characteristic of wireless media in a network?

- a) It always provides faster speeds than copper or fiber cables
- b) It requires line-of-sight for high-frequency transmission
- c) It is immune to physical interference such as walls or buildings
- d) It is only used for cellular networks

Answer: b) It requires line-of-sight for high-frequency transmission

39. What type of wireless technology is commonly used in mobile networks to provide high-speed data services?

- a) Wi-Fi
- b) Bluetooth
- c) 4G/5G
- d) Zigbee

Answer: c) 4G/5G

40. Which of the following is a common disadvantage of wireless media over wired media in networking?

- a) Higher cost of deployment
- b) Greater security concerns and easier to intercept
- c) Lower bandwidth capacity
- d) Requires less maintenance and setup

Answer: b) Greater security concerns and easier to intercept

Binary Number System

41. What is the base of the Binary Number System?

- a) 2
- b) 8
- c) 10
- d) 16

Answer: a) 2

42. Which digits are used in the Binary Number System?

- a) 0, 1
- b) 0, 2
- c) 1, 2
- d) 1, 9

Answer: a) 0, 1

43. What is the binary equivalent of the decimal number 9?

- a) 100
- b) 101
- c) 110
- d) 111

Answer: b) 101

44. How do you convert the binary number 1011 to decimal?

- a) 10
- b) 11
- c) 12
- d) 13

Answer: d) 13

45. Which of the following binary operations is used to find the AND result of two binary numbers?

- a) OR
- b) AND
- c) XOR
- d) NOT

Answer: b) AND

46. What is the result of the binary addition of 1101 and 1011?

- a) 11000
- b) 10000
- c) 10100
- d) 11100

Answer: a) 11000

47. Which of the following represents the binary number 11101010 in decimal?

- a) 152
- b) 170
- c) 100
- d) 180

Answer: b) 170

48. How do you convert the decimal number 14 into binary?

- a) 1010
- b) 1111
- c) 1101
- d) 1110

Answer: d) 1110

49. What is the 2's complement of the binary number 1010?

- a) 0101
- b) 1101
- c) 0110
- d) 1011

Answer: b) 1101

50. What is the maximum decimal value that can be represented using an 8-bit binary number?

- a) 255
- b) 128
- c) 512
- d) 1024

Answer: a) 255

Hexadecimal Number System

51. What is the base of the Hexadecimal Number System?

- a) 2
- b) 8
- c) 10
- d) 16

Answer: d) 16

52. Which digits are used in the Hexadecimal Number System?

- a) 0-9 and A-F
- b) 0-9 and A-Z
- c) 0-7 and A-F
- d) 0-9 only

Answer: a) 0-9 and A-F

53. How do you convert the hexadecimal number 1A to decimal?

- a) 20
- b) 21
- c) 18
- d) 26

Answer: b) 26

54. Which of the following is the hexadecimal equivalent of the decimal number 255?

- a) 1FF
- b) FF
- c) F0
- d) 100

Answer: b) FF

55. What is the binary equivalent of the hexadecimal number A?

- a) 1011
- b) 1010
- c) 1100
- d) 1000

Answer: b) 1010

56. Convert the hexadecimal number B2 into decimal.

- a) 178
- b) 180
- c) 182
- d) 184

Answer: a) 178

57. How do you convert the binary number 1101 into hexadecimal?

- a) A
- b) B
- c) C
- d) D

Answer: d) D

58. What is the hexadecimal equivalent of the binary number 11111011?

- a) F7
- b) F8
- c) FB
- d) FE

Answer: c) FB

59. Which of the following is the hexadecimal equivalent of the binary number 101110110?

- a) 9B
- b) 5B
- c) 6A
- d) 7B

Answer: a) 9B

60. What is the decimal value of the hexadecimal number 7F?

- a) 120
- b) 125
- c) 127
- d) 130

Answer: c) 127

Conversion Between Binary, Decimal, and Hexadecimal

61. Convert the hexadecimal number 3E into binary.

- a) 110110
- b) 111110
- c) 100011
- d) 111011

Answer: b) 111110

62. How do you convert the decimal number 127 into hexadecimal?

- a) 7F
- b) 9F
- c) 8F
- d) A0

Answer: a) 7F

63. What is the binary equivalent of the hexadecimal number 9C?

- a) 10011100
- b) 10111000
- c) 11001100
- d) 11110000

Answer: a) 10011100

24. Convert the binary number 10101111 into hexadecimal.

64. Convert the binary number 10101111 into hexadecimal.

- a) AF
- b) AB
- c) A8
- d) F5

Answer: a) AF

65. Convert the hexadecimal number D5 into binary.

- a) 11010101
- b) 11110101
- c) 11011101
- d) 11100101

Answer: a) 11010101

Purpose of the Data Link Layer

66. What is the primary function of the Data Link Layer in the OSI model?

- a) Establishing, maintaining, and terminating network connections
- b) Providing end-to-end communication across different networks
- c) Managing access to the physical transmission medium and ensuring error-free data transfer
- d) Routing data packets between devices on different networks

Answer: c) Managing access to the physical transmission medium and ensuring error-free data transfer

67. Which of the following is NOT a responsibility of the Data Link Layer?

- a) Frame encapsulation
- b) Error detection and correction
- c) Routing of data packets
- d) Flow control

Answer: c) Routing of data packets

68. The Data Link Layer is responsible for converting raw bits from the Physical Layer into:

- a) Segments
- b) Packets
- c) Frames
- d) Messages

Answer: c) Frames

69. Which of the following are the two main sub-layers of the Data Link Layer?

- a) Physical and Network
- b) Transport and Network
- c) Logical Link Control (LLC) and Media Access Control (MAC)
- d) Application and Presentation

Answer: c) Logical Link Control (LLC) and Media Access Control (MAC)

70. Which of the following best describes the function of the Media Access Control (MAC) sub-layer of the Data Link Layer?

- a) Provides logical addressing for devices on the network
- b) Manages how devices on the network access the shared communication medium
- c) Provides flow control to prevent congestion
- d) Routes data between different networks

Answer: b) Manages how devices on the network access the shared communication medium

71. What does the Logical Link Control (LLC) sub-layer of the Data Link Layer provide?

- a) Error detection and correction
- b) Framing and addressing
- c) Flow control and error recovery
- d) Reliable data transfer

Answer: c) Flow control and error recovery

72. What is the role of the Data Link Layer in error detection?

- a) It uses checksums or CRC (Cyclic Redundancy Check) to detect errors in data frames.
- b) It encrypts the data to ensure secure transmission.
- c) It is responsible for retransmitting lost or corrupted packets.
- d) It ensures that data is routed efficiently across networks.

Answer: a) It uses checksums or CRC (Cyclic Redundancy Check) to detect errors in data frames.

73. The Data Link Layer is responsible for which of the following in terms of network communication?

- a) Defining the logical addressing scheme
- b) Defining the electrical and mechanical characteristics of the transmission medium
- c) Fragmenting data for transmission over the network
- d) Packaging raw bits into frames and ensuring reliable data transfer

Answer: d) Packaging raw bits into frames and ensuring reliable data transfer

74. Which of the following devices operates primarily at the Data Link Layer?

- a) Router
- b) Hub
- c) Switch
- d) Gateway

Answer: c) Switch

75. What kind of addressing does the Data Link Layer use for identifying devices on the local network?

- a) IP addresses
- b) MAC (Media Access Control) addresses
- c) Port numbers
- d) Logical addresses

Answer: b) MAC (Media Access Control) addresses

76. The Data Link Layer ensures that data is properly framed. Which of the following best describes this process?

- a) Data is broken into smaller pieces called frames and each frame is addressed with a unique identifier.
- b) Data is divided into smaller packets and passed to the Transport Layer for retransmission.
- c) Data is segmented into streams for better flow control.
- d) Data is stored temporarily in a buffer until the link is clear.

Answer: a) Data is broken into smaller pieces called frames and each frame is addressed with a unique identifier.

77. The Data Link Layer is responsible for flow control in data transmission. What does flow control do?

- a) Ensures that data is transmitted at the correct speed
- b) Prevents data loss due to network congestion
- c) Directs data to its final destination
- d) Ensures that each frame reaches the correct device on the network

Answer: b) Prevents data loss due to network congestion

78. Which of the following best describes a frame in the context of the Data Link Layer?

- a) A frame is a data unit that is encapsulated in a packet at the Network Layer.
- b) A frame is a unit of data that has a header, payload, and error-checking code, used for reliable communication over the physical medium.
- c) A frame is the raw electrical signal that transmits data across the medium.
- d) A frame is a type of error message sent when data transmission fails.

Answer: b) A frame is a unit of data that has a header, payload, and error-checking code, used for reliable communication over the physical medium.

79. What is the significance of the CRC (Cyclic Redundancy Check) in the Data Link Layer?

- a) It encrypts the data to ensure secure transmission.
- b) It checks for errors in the frame and requests retransmission if necessary.
- c) It assigns unique IP addresses to devices on the network.
- d) It controls the flow of data between devices to prevent congestion.

Answer: b) It checks for errors in the frame and requests retransmission if necessary.

80. The Data Link Layer operates between which two layers of the OSI model?

- a) Application Layer and Network Layer
- b) Transport Layer and Network Layer
- c) Physical Layer and Network Layer
- d) Physical Layer and Network Layer

Answer: d) Physical Layer and Network Layer

81. Which of the following best describes bridges and switches in the context of the Data Link Layer?

- a) Bridges and switches operate at the Network Layer to route traffic.
- b) Bridges and switches operate at the Data Link Layer to forward frames based on MAC addresses.
- c) Bridges and switches operate at the Transport Layer to ensure end-to-end communication.
- d) Bridges and switches operate at the Application Layer to translate data formats.

Answer: b) Bridges and switches operate at the Data Link Layer to forward frames based on MAC addresses.

82. What is frame sequencing at the Data Link Layer responsible for?

- a) Ensuring that frames are sent in the correct order and ensuring reliable delivery
- b) Splitting the data into smaller packets for transmission over the network
- c) Providing encryption and data security during transmission
- d) Managing the routing of data between different networks

Answer: a) Ensuring that frames are sent in the correct order and ensuring reliable delivery

83. What type of error correction mechanism does the Data Link Layer typically employ?

- a) Acknowledgments and retransmissions (ARQ)
- b) Encrypting data with cryptographic algorithms
- c) Compression of data to reduce size
- d) Partitioning large messages into smaller ones

Answer: a) Acknowledgments and retransmissions (ARQ)

84. Which of the following is a Data Link Layer protocol commonly used in local area networks (LANs)?

- a) TCP/IP
- b) IPX/SPX
- c) Ethernet
- d) HTTP

Answer: c) Ethernet

85. Which of the following best describes the Data Link Layer's role in frame synchronization?

- a) It defines the electrical signals and mechanical properties for communication over the network.
- b) It ensures that the beginning and end of each frame are identifiable to both the sender and receiver.
- c) It assigns logical IP addresses to the devices.
- d) It checks for errors in the data and discards corrupted frames.

Answer: b) It ensures that the beginning and end of each frame are identifiable to both the sender and receiver.

Network Topologies

86. Which of the following network topologies connects all devices to a central device, like a switch or hub?

- a) Bus topology
- b) Star topology
- c) Ring topology
- d) Mesh topology

Answer: b) Star topology

86. In a Bus topology, how are devices connected to each other?

- a) All devices are connected in a closed loop.
- b) Devices are connected in a straight line via a central hub.
- c) Devices share a single communication line with terminators at both ends.
- d) Devices are connected to each other with multiple connections.

Answer: c) Devices share a single communication line with terminators at both ends.

87. Which of the following is a key advantage of a Mesh topology?

- a) Low cost and easy to install
- b) Easy to troubleshoot
- c) Provides redundancy and fault tolerance
- d) Requires less cable than other topologies

Answer: c) Provides redundancy and fault tolerance

88. In which of the following network topologies does each device have two connections, forming a continuous loop?

- a) Star topology
- b) Ring topology
- c) Mesh topology
- d) Bus topology

Answer: b) Ring topology

89. A Hybrid topology is created by combining which of the following types of topologies?

- a) Star and Bus
- b) Mesh and Star
- c) Ring and Star
- d) Any two or more topologies combined together

Answer: d) Any two or more topologies combined together

90. In a Star topology, if the central hub fails, what will happen to the network?

- a) Only the devices connected to the hub will be affected, and the rest of the network remains functional.
- b) The entire network will go down as the hub is the central point.
- c) The devices will continue to communicate with each other, bypassing the hub.
- d) No devices will be able to send data.

Answer: b) The entire network will go down as the hub is the central point.

91. Which of the following topologies offers the least amount of redundancy?

- a) Mesh topology
- b) Star topology
- c) Bus topology
- d) Ring topology

Answer: c) Bus topology

92. What is the primary disadvantage of the Ring topology?

- a) Single point of failure: if one device or cable fails, the whole network can be affected.
- b) Requires more cables and devices than other topologies.
- c) Network traffic can become inefficient due to too many devices.
- d) Difficult to install and configure.

Answer: a) Single point of failure: if one device or cable fails, the whole network can be affected.

93. Which network topology is the most scalable and flexible?

- a) Bus topology
- b) Ring topology
- c) Mesh topology
- d) Star topology

Answer: d) Star topology

94. Which network topology requires the least amount of cabling and is most commonly used in small office/home office (SOHO) environments?

- a) Star topology
- b) Bus topology
- c) Mesh topology
- d) Ring topology

Answer: b) Bus topology

Data Link Frame

95. What is a Data Link Frame?

- a) A set of rules for transmitting data between devices on the network.
- b) A segment of data that is transmitted across a network, including control information and the data being sent.
- c) A type of error message sent when the data transfer fails.
- d) A unit of data that is sent over the physical medium without any header.

Answer: b) A segment of data that is transmitted across a network, including control information and the data being sent.

96. Which of the following is NOT part of a Data Link Layer Frame?

- a) Frame header
- b) Frame trailer
- c) Source and destination IP addresses
- d) Data payload

Answer: c) Source and destination IP addresses

97. What is the purpose of the frame header in a Data Link Layer Frame?

- a) To provide the data to be transmitted.
- b) To contain information for addressing and control, such as source and destination MAC addresses.
- c) To encode the data to be transmitted.
- d) To correct any errors that may occur during transmission.

Answer: b) To contain information for addressing and control, such as source and destination MAC addresses.

98. What is typically found in the frame trailer of a Data Link Layer Frame?

- a) The data payload
- b) The destination MAC address
- c) Error detection information, such as CRC (Cyclic Redundancy Check)
- d) The source IP address

Answer: c) Error detection information, such as CRC (Cyclic Redundancy Check)

99. The MAC address in a Data Link Frame is used for:

- a) Identifying the physical device on the network
- b) Addressing data at the network layer
- c) Routing data between different networks
- d) Ensuring data integrity during transmission

Answer: a) Identifying the physical device on the network

100. In a Data Link Layer Frame, what is the role of error detection?

- a) It ensures that the data is routed efficiently across the network.
- b) It detects errors in transmission and requests retransmission of the frame if necessary.
- c) It secures the data by encrypting it.
- d) It divides the data into smaller units for easier transmission.

Answer: b) It detects errors in transmission and requests retransmission of the frame if necessary.

101. Which type of error detection method is commonly used in the Data Link Layer Frame?

- a) Parity bit
- b) Checksum
- c) Cyclic Redundancy Check (CRC)
- d) Hamming code

Answer: c) Cyclic Redundancy Check (CRC)

102. What is the payload in a Data Link Frame?

- a) The header that contains addressing information
- b) The actual data being transmitted in the frame
- c) The error-checking code
- d) The part of the frame that defines the start and end of the data

Answer: b) The actual data being transmitted in the frame

103. Which of the following Data Link Layer protocols is most commonly used in Ethernet networks to define the format of a data frame?

- a) HTTP
- b) IP
- c) IEEE 802.3
- d) TCP

Answer: c) IEEE 802.3

104. What is the maximum size of a frame in Ethernet networks (using IEEE 802.3)?

- a) 1500 bytes
- b) 1518 bytes
- c) 64 bytes
- d) 1000 bytes

Answer: b) 1518 bytes

Ethernet Frame

105. What is the maximum size of an Ethernet frame (including the header and trailer)?

- a) 1500 bytes
- b) 1518 bytes
- c) 1600 bytes
- d) 2000 bytes

Answer: b) 1518 bytes

106. Which of the following is included in the Ethernet frame header?

- a) Destination and source IP addresses
- b) Destination and source MAC addresses
- c) Error-checking data (checksum)
- d) Both b and c

Answer: d) Both b and c

107. What is the primary purpose of the Ethernet Frame's trailer?

- a) To carry the data
- b) To provide error checking via the CRC (Cyclic Redundancy Check)
- c) To define the source and destination addresses
- d) To determine the type of protocol used in the frame

Answer: b) To provide error checking via the CRC (Cyclic Redundancy Check)

108. In the Ethernet frame, what is the function of the Type/Length field?

- a) To specify the size of the payload
- b) To identify the protocol encapsulated in the frame
- c) To store the source MAC address
- d) To check for errors in the frame

Answer: b) To identify the protocol encapsulated in the frame

109. The Ethernet frame format includes a Preamble field. What is the purpose of this field?

- a) It contains the source MAC address.
- b) It indicates the start of the frame and helps synchronize the transmission.
- c) It provides error detection information.
- d) It contains the destination MAC address.

Answer: b) It indicates the start of the frame and helps synchronize the transmission.

Ethernet MAC Address

110. An Ethernet MAC address is a 48-bit address. What is the format of a MAC address?

- a) A 16-character hexadecimal string
- b) A 12-character hexadecimal string
- c) A 48-bit binary string
- d) A 6-byte hexadecimal string

Answer: d) A 6-byte hexadecimal string

111. How many unique MAC addresses can be represented by a 48-bit MAC address?

- a) 256
- b) 65,536
- c) 16,777,216
- d) 281,474,976,710,656

Answer: d) 281,474,976,710,656

112. What is the purpose of the Ethernet MAC address?

- a) To identify devices on a network at the **Data Link Layer**
- b) To route packets between different networks at the **Network Layer**
- c) To manage IP addresses for devices on the network
- d) To encrypt data for secure communication

Answer: a) To identify devices on a network at the **Data Link Layer**

113. A multicast MAC address is typically used for which of the following?

- a) Sending data to all devices on the local network
- b) Sending data to a specific device on the network
- c) Sending data to a specific group of devices on the network
- d) Sending data to routers only

Answer: c) Sending data to a specific group of devices on the network

114. What is the special range of MAC addresses reserved for broadcasting?

- a) 00:00:00:00:00:00
- b) FF:FF:FF:FF:FF:FF
- c) 01:00:00:00:00:00
- d) 80:00:00:00:00:00

Answer: b) FF:FF:FF:FF:FF:FF

The MAC Address Table

115. What is the primary function of a MAC Address Table in a switch?

- a) To store the IP addresses of devices connected to the network
- b) To store the MAC addresses of devices connected to each port of the switch
- c) To manage network bandwidth
- d) To perform routing between different subnets

Answer: b) To store the MAC addresses of devices connected to each port of the switch

116. When a switch receives a frame with an unknown destination MAC address, what does it do?

- a) It discards the frame
- b) It floods the frame to all ports except the incoming port
- c) It sends an ARP request to resolve the address
- d) It forwards the frame to the router

Answer: b) It floods the frame to all ports except the incoming port

117. The MAC address table is also known as the:

- a) ARP table
- b) Routing table
- c) Forwarding table
- d) Address Resolution Protocol table

Answer: c) Forwarding table

118. How long do entries typically remain in a MAC address table before being aged out?

- a) 10 seconds
- b) 30 seconds
- c) 5 minutes
- d) 300 seconds (5 minutes)

Answer: d) 300 seconds (5 minutes)

119. What happens when a switch learns the MAC address of a device on a certain port?

- a) The switch removes the MAC address from the table
- b) The switch adds the MAC address to its MAC address table, associating it with the port
- c) The switch sends the frame directly to the device with the correct MAC address
- d) The switch sends a broadcast frame to all ports

Answer: b) The switch adds the MAC address to its MAC address table, associating it with the port

Switch Speeds and Forwarding Methods

200. What is the maximum speed supported by Gigabit Ethernet (1000BASE-T)?

- a) 10 Mbps
- b) 100 Mbps
- c) 1 Gbps
- d) 10 Gbps

Answer: c) 1 Gbps

201. Which of the following forwarding methods requires a switch to examine the destination MAC address before making a forwarding decision?

- a) Cut-through forwarding
- b) Store-and-forward forwarding
- c) Fragment-free forwarding
- d) Both a and b

Answer: d) Both a and b

202. In store-and-forward switching, what happens to the frame before it is forwarded?

- a) The frame is forwarded immediately, without any checks.
- b) The switch buffers the entire frame, checks for errors, and then forwards it.
- c) The frame is divided into smaller segments before forwarding.
- d) The frame is forwarded without looking at the destination address.

Answer: b) The switch buffers the entire frame, checks for errors, and then forwards it.

203. Which of the following is the fastest switching method?

- a) Store-and-forward
- b) Cut-through
- c) Fragment-free
- d) Adaptive switching

Answer: b) Cut-through

204. In cut-through switching, what is the main advantage over store-and-forward switching?

- a) Lower latency because the switch starts forwarding the frame as soon as it reads the destination MAC address
- b) More error checking and correction
- c) Greater compatibility with high-speed links
- d) The ability to handle larger frames

Answer: a) Lower latency because the switch starts forwarding the frame as soon as it reads the destination MAC address