**Chapter 1 - Network Models**

**TRUE/FALSE**

[QUESTION]

1. Two systems on the same network may have NICs with the same MAC address.

Ans: F

Page: 6

Difficulty: Moderate

[QUESTION]

2. In a wired network, a charge on a wire represents a zero while no charge represents a one.

Ans: F

Page: 8

Difficulty: Easy

[QUESTION]

3. A NIC reads the data portion of a frame to determine the address of the receiving system.

Ans: F

Page: 9

Difficulty: Easy

[QUESTION]

4. The FCS uses a type of binary math called a cyclic redundancy check (CRC) that the receiving NIC uses to verify that the data arrived intact.

Ans: T

Page: 9

Difficulty: Moderate

[QUESTION]

5. When a frame arrives at the switch, the switch makes an exact copy of the frame and sends it to every other system on the network.

Ans: F

Page: 10

Difficulty: Easy

[QUESTION]

6. When a NIC sends a frame that contains the broadcast address, every NIC on the network processes that frame.

Ans: T

Page: 11

Difficulty: Easy

[QUESTION]

7. A network protocol is special software that allows a network to use logical addressing in order to move data from one subnet to another.

Ans: T

Page: 14

Difficulty: Easy

[QUESTION]

8. No two systems on the same network can share the same IP address.

Ans: T

Page: 15

Difficulty: Moderate

[QUESTION]

9. Routers use logical addresses to forward data.

Ans: T

Page: 15

Difficulty: Easy

[QUESTION]

10. The TCP/IP model consists of six layers.

Ans: F

Page: 22

Difficulty: Easy

[QUESTION]

11. Cabling, physical addresses, NICs, and switches are included in the Link layer of the TCP/IP model.

Ans: T

Page: 23

Difficulty: Easy

[QUESTION]

12. The Network Interface layer of the TCP/IP model maps to the Network layer of the OSI model.

Ans: F

Page: 23

Difficulty: Moderate

[QUESTION]

13. The Transport layer of the TCP/IP model uses both connection-oriented and connectionless protocols.

Ans: T

Page: 24

Difficulty: Easy

[QUESTION]

14. TCP is a connection-oriented protocol.

Ans: T

Page: 25

Difficulty: Easy

[QUESTION]

15. The Link layer of the TCP/IP model combines features of the top three layers of the OSI model.

Ans: F

Page: 26

Difficulty: Moderate

**MULTIPLE CHOICE**

[QUESTION]

16. How many layers does the OSI model contain?

A. 3

B. 5

C. 7

D. 9

Ans: C

Page: 3

Difficulty: Easy

[QUESTION]

17. Which standards organization is named for the Greek word for “equal”?

A. OSI

B. ISO

C. Cisco

D. IEEE

Ans: B

Page: 3

Difficulty: Easy

[QUESTION]

18. Which layer of the OSI model defines a method of moving radio waves?

A. Application

B. Session

C. Presentation

D. Physical

Ans: D

Page: 5

Difficulty: Easy

[QUESTION]

19. Which layer of the OSI model is associated with moving data between computers?

A. Layer 1

B. Layer 2

C. Layer 3

D. Layer 4

Ans: A

Page: 5

Difficulty: Easy

[QUESTION]

20. How long is a MAC address?

A. 12 hexadecimal characters

B. 48 bytes

C. 6 pairs of binary digits

D. 32 bits

Ans: A

Page: 6

Difficulty: Easy

[QUESTION]

21. Which two parts are included in a MAC address?

A. The network address and the node address

B. The computer name and the node address

C. The Organizationally Unique Identifier and the device ID of the NIC

D. The IP address and the NIC’s serial number

Ans: C

Page: 7

Difficulty: Moderate

[QUESTION]

22. A MAC address is also known as a(n) \_\_\_\_\_\_\_\_\_\_ address.

A. physical

B. logical

C. IP

D. router

Ans: A

Page: 7

Difficulty: Easy

[QUESTION]

23. An oscilloscope is a powerful tool that enables a technician to see \_\_\_\_\_\_\_\_\_\_.

A. electrical pulses

B. radio waves

C. gamma rays

D. light

Ans: A

Page: 8

Difficulty: Easy

[QUESTION]

24. All NICs on the same network must use the same \_\_\_\_\_\_\_\_\_\_, or they will not be able to communicate with other NICs.

A. frame check sequence

B. MAC address

C. frame type

D. IP address

Ans: C

Page: 9

Difficulty: Moderate

[QUESTION]

25. Where does the CRC originate in a network frame?

A. The sending NIC attaches it.

B. The receiving NIC attaches it.

C. The network operating system generates it and attaches it.

D. The network administrator attaches it

Ans: A

Page: 9

Difficulty: Moderate

[QUESTION]

26. Which layer of the OSI model adds source and destination MAC addresses to frames?

A. Network

B. Data Link

C. Transport

D. Presentation

Ans: B

Page: 9

Difficulty: Easy

[QUESTION]

27. Frames in most wired networks hold at most \_\_\_\_\_\_\_\_\_\_.

A. 150 bytes of data

B. 1024 bytes of data

C. 1500 bytes of data

D. 48 bytes of data

Ans: C

Page: 10

Difficulty: Easy

[QUESTION]

28. What statement describes a function of a NIC?

A. It provides a standard way for programmer to extend application capabilities.

B. It utilizes network protocols for data transfer between the PC and the network.

C. It assigns logical IP addresses.

D. It uses the CRC to verify the data within each frame.

Ans: D

Page: 11

Difficulty: Moderate

[QUESTION]

29. How are incoming frames handled by a switch?

A. The frames are sent only to the interface associated with the destination MAC address.

B. The frames are received by every NIC, but only the NIC with the matching MAC address processes the frame.

C. The switch forwards the frames to every device on the network.

D. The switch broadcasts the contents of the frames to every device on the network.

Ans: A

Page: 11

Difficulty: Easy

[QUESTION]

30. How does the receiving station on a network use the CRC to verify that it received accurate data?

A. It uses a new divisor to find a new remainder.

B. It uses the same divisor as the sending station to find the same remainder.

C. It uses the same divisor as the sending station to find a different remainder.

D. It adds its key to that of the sending station to find the total.

Ans: B

Page: 11

Difficulty: Hard

[QUESTION]

31. Which of the following is a broadcast MAC address?

A. 255.255.255.255

B. FF-FF-FF-FF-FF-FF

C. 256

D. 1000

Ans: B

Page: 11

Difficulty: Easy

[QUESTION]

32. Which statement best describes Logical Link Control (LLC)?

A. It is a Layer 1 protocol.

B. It is a sublayer of the Data Link layer.

C. It remembers the NIC’s MAC address.

D. It controls open network sessions.

Ans: B

Page: 13

Difficulty: Easy

[QUESTION]

33. Which layer of the OSI model is the only layer divided into two sublayers?

A. Transport

B. Network

C. Data Link

D. Physical

Ans: C

Page: 13

Difficulty: Easy

[QUESTION]

34. Which statement describes an IP address?

A. It is a unique identifier burned into the NIC when it is manufactured.

B. It is a unique dotted decimal number assigned to every network device.

C. It is a number shared by all computers on the same network.

D. It is a number assigned only to routers, identifying their priority ratings.

Ans: B

Page: 15

Difficulty: Easy

[QUESTION]

35. Which layer of the OSI model assembles the data it receives into pieces called packets?

A. Data Link

B. Physical

C. Network

D. Transport

Ans: C

Page: 15

Difficulty: Easy

[QUESTION]

36. What device splits a large network into subnets?

A. NIC

B. Bridge

C. Router

D. MAC address

Ans: C

Page: 15

Difficulty: Easy

[QUESTION]

37. What unique numeric identifier is assigned to each device on the network by the IP protocol in the OSI model’s Network layer?

A. IP address

B. MAC address

C. Router name

D. Port number

Ans: A

Page: 15

Difficulty: Easy

[QUESTION]

38. Routers function at which layer of the OSI model?

A. Physical

B. Data Link

C. Network

D. Transport

Ans: C

Page: 15

Difficulty: Easy

[QUESTION]

39. Which statement describes a capability of routers?

A. Routers allow a MAC address to be assigned to each computer.

B. Routers use the computer name to forward data.

C. Routers allow network connections across data lines that do not use Ethernet.

D. Routers allow a network administrator to configure hardware settings.

Ans: C

Page: 15-16

Difficulty: Moderate

[QUESTION]

40. Which layer of the OSI model uses routers and IP addresses to ensure that packets arrive at the correct system?

A. Presentation

B. Application

C. Network

D. Data Link

Ans: C

Page: 17

Difficulty: Easy

[QUESTION]

41. Which OSI model layer initializes requests for packets that were not received in good order?

A. Application

B. Network

C. Transport

D. Session

Ans: C

Page: 18

Difficulty: Hard

[QUESTION]

42. Which layer of the OSI model manages connecting applications to applications?

A. Application

B. Session

C. Data Link

D. Transport

Ans: B

Page: 19

Difficulty: Easy

[QUESTION]

43. Which layer of the OSI model refers to the code built into operating systems that enables network-aware applications?

A. Application

B. Transport

C. Session

D. Presentation

Ans: A

Page: 21

Difficulty: Easy

[QUESTION]

44. Which statement best describes an Application Programming Interface?

A. It is the GUI interface that Windows uses to interact with the user.

B. It is the top layer of the OSI model of networking.

C. It provides programmers with a standard way to extend an application’s capabilities.

D. It is a protocol that allows Web browsers to request data from a Web server.

Ans: C

Page: 22

Difficulty: Moderate

[QUESTION]

45. Routers function at which layer of the TCP/IP model?

A. Internet

B. Application

C. Link

D. Transport

Ans: A

Page: 23

Difficulty: Easy

[QUESTION]

46. Which layer of the TCP/IP model is mapped to the bottom two layers of the OSI model?

A. Link

B. Internet

C. Application

D. Transport

Ans: A

Page: 23

Difficulty: Easy

[QUESTION]

47. Which layer of the TCP/IP model performs IP addressing functions?

A. Internet

B. Link

C. Internet

D. Application

Ans: C

Page: 23

Difficulty: Easy

[QUESTION]

48. Which layer of the TCP/IP model uses connection-oriented protocols?

A. Internet

B. Application

C. Link

D. Transport

Ans: D

Page: 24

Difficulty: Easy

[QUESTION]

49. Which layer of the TCP/IP model is mapped to the top three layers of the OSI model?

A. Internet

B. Link

C. Transport

D. Application

Ans: D

Page: 26

Difficulty: Easy

[QUESTION]

50. For a network technician, one benefit of understanding the OSI seven-layer model and how traffic in an actual network works through the model is applying this knowledge to \_\_\_\_\_\_\_\_\_\_.

A. purchasing NICs

B. connecting PCs to the Internet

C. troubleshooting networks

D. securing a PC

Ans: C

Page: 28

Difficulty: Moderate

**COMPLETION**

[QUESTION]

51. Each layer in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ seven-layer model defines an important function in computer networking, and the protocols that operate at that layer offer solutions to those functions.

Ans: Open Systems Interconnection (OSI)

OSI

Open Systems Interconnection

Page: 3

Difficulty: Easy

[QUESTION]

52. The organization responsible for developing the OSI model of networking is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Ans: International Organization for Standardization (ISO)

International Organization for Standardization

ISO

Page: 3

Difficulty: Easy

53. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cabling usually contains four pairs of wires that can transmit and receive data.

Ans: Unshielded twisted pair (UTP)

UTP

Unshielded twisted pair

Page: 5

Difficulty: Easy

[QUESTION]

54. The unique identifier burned into a ROM chip in the NIC is known as the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ address.

Ans: Media Access Control (MAC)

MAC

Media Access Control

Page: 6

Difficulty: Easy

[QUESTION]

55. A MAC address is usually written in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ notation.

Ans: hexadecimal

hex

Page: 6

Difficulty: Easy

[QUESTION]

56. If you have a Windows system, type \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the command prompt to display the MAC address for your computer.

Ans: ipconfig

ipconfig /all

Page: 7

Difficulty: Moderate

[QUESTION]

57. The current term for the MAC address numbering name space, as defined by the IEEE, is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Ans: EUI-48

Page: 7

Difficulty: Moderate

[QUESTION]

58. A(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a tool that enables a technician to see electrical pulses.

Ans: oscilloscope

Page: 8

Difficulty: Easy

[QUESTION]

59. A container created at the OSI Data Link layer for carrying discrete chunks of data across a network is called a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Ans: frame

Page: 8

Difficulty: Easy

[QUESTION]

60. Computer data is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which means it is made up of streams of ones and zeroes.

Ans: binary

Page: 8

Difficulty: Easy

[QUESTION]

61. Different types of networks use different types of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Ans: frames

Page: 9

Difficulty: Moderate

[QUESTION]

62. All FCSs are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bytes long.

Ans: four

4

Page: 11

Difficulty: Easy

[QUESTION]

63. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ creates the CRC by using binary arithmetic.

Ans: network interface card (NIC)

network interface card

NIC

source NIC

Page: 11

Difficulty: Moderate

[QUESTION]

64. By using the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ MAC address, a NIC can send a frame that every other NIC on the network will process.

Ans: broadcast

FF-FF-FF-FF-FF-FF

Page: 11

Difficulty: Easy

[QUESTION]

65. A sublayer of the OSI seven-layer model, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ describes the function of a NIC that talks to the network operating system, handles multiple network protocols and provides flow control.

Ans: Logical Link Control (LLC)

Logical Link Control

LLC

Page: 13

Difficulty: Easy

[QUESTION]

66. Switches handle traffic using \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ addresses, so they operate at Layer 2.

Ans: Media Access Control

MAC

Media Access Control (MAC)

Page: 13

Difficulty: Moderate

[QUESTION]

67. Any device that deals with a MAC address is part of the OSI model’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ layer.

Ans: Data Link

Page: 13

Difficulty: Easy

[QUESTION]

68. Although one may argue that the NIC operates at more than one layer of the OSI model, the generally accepted answer is that this device belongs at the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ layer.

Ans: Data Link

Page: 14

Difficulty: Easy

[QUESTION]

69. Named after two protocols, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is really a protocol suite designed to work together.

Ans: TCP/IP

Transmission Control Protocol/Internet Protocol

Page: 15

Difficulty: Easy

[QUESTION]

70. The decimal value for each 8-bit portion of an IP address can range from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Ans: 0; 255

Page: 15

Difficulty: Easy

[QUESTION]

71. In a TCP/IP network, each system has two unique identifiers: the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ address (physical address) and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ address (logical address).

Ans: MAC; IP

Page: 16

Difficulty: Easy

[QUESTION]

72. When handed to the NIC, each IP packet is enclosed in a regular \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Ans: frame

Page: 17

Difficulty: Easy

[QUESTION]

73. In a TCP/IP network, an IP \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ includes the destination IP address, the source IP address, and the data.

Ans: packet

Page: 17

Difficulty: Easy

[QUESTION]

74. The OSI model’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ layer uses sequencing numbers determine the total number of segments and how to put them back together.

Ans: Transport

Page: 18

Difficulty: Easy

[QUESTION]

75. If you want to see how many sessions are running on a TCP/IP network, you should use the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ program from the command prompt.

Ans: netstat

netstat -a

Page: 20

Difficulty: Moderate

[QUESTION]

76. The OSI model’s Session layer initiates sessions, accepts incoming sessions, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ existing sessions.

Ans: opens; closes

closes; opens

Page: 20

Difficulty: Moderate

[QUESTION]

77. The OSI model’s Presentation layer translates data from lower layers into a format usable by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ layer, and vice versa.

Ans: Application

Page: 20

Difficulty: Easy

[QUESTION]

78. Layer 6 of the OSI model is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ layer.

Ans: Presentation

Page: 20

Difficulty: Easy

[QUESTION]

79. All operating systems have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that programmers can use to make their programs network aware.

Ans: Application Programming Interfaces (APIs)

APIs

Application Programming Interfaces

Page: 21

Difficulty: Moderate

[QUESTION]

80. In the OSI model, the Application layer refers to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ built into all operating systems that enable network aware applications.

Ans: code

Page: 21

Difficulty: Moderate

[QUESTION]

81. The TCP/IP model is a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ layer model.

Ans: four

4

Page: 22

Difficulty: Easy

[QUESTION]

82. The Link layer of the TCP/IP model is also sometimes called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ layer.

Ans: Network Interface

Page: 23

Difficulty: Easy

[QUESTION]

83. A(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a number between 1-65,536 and it is a logical value assigned to specific applications or services.

Ans: port

Page: 25

Difficulty: Easy

[QUESTION]

84. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ layer of the TCP/IP model uses segments and datagrams as its Protocol Data Units.

Ans: Transport

Page: 25-26

Difficulty: Moderate

[QUESTION]

85. Layer 6 of the OSI model is included in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ layer of the TCP/IP model.

Ans: Application

Page: 26

Difficulty: Moderate

**ESSAY**

[QUESTION]

86. In general terms, what is the purpose of a model and what should it include?

Ans: A model is a simplified representation of the real thing. A model must have at least all the major functions of the real item, but what constitutes a major rather than a minor function is open to opinion.

Page: 2

Difficulty: Easy

[QUESTION]

87. The creation of the OSI model eliminated what problematic situation existing in early networks?

Ans: In the early days of networking, different manufacturers made unique types of networks that functioned well. Part of the reason they worked was that every network manufacturer made everything. Back then, a single manufacturer provided everything for a customer when the customer purchased a network solution: all the hardware and all the software in one complete and expensive package. Although these networks worked fine as stand-alone networks, the proprietary nature of the hardware and software made it difficult - to put it mildly - to connect networks of multiple manufacturers. To interconnect networks and therefore improve the networking industry, someone needed to create a guide, a model that described the functions of a network. Using this model, the people who made hardware and software could work together to make networks that worked together well.

Page: 2-3

Difficulty: Moderate

[QUESTION]

88. As related to networking, what are protocols?

Ans: Protocols are sets of clearly defined rules, regulations, standards, and procedures that enable hardware and software developers to make devices and applications that function properly at a particular layer.

Page: 3

Difficulty: Moderate

[QUESTION]

89. Name the seven layers of the OSI model of networking in order from Layer 7 to Layer 1.

Ans:

7 - Application

6 - Presentation

5 - Session

4 - Transport

3 - Network

2 - Data Link

1 - Physical

Page: 3

Difficulty: Easy

[QUESTION]

90. What is a mnemonic presented in the text as a way to memorize the layers of the OSI model?

Ans: Two mnemonics were provided to help memorize the OSI seven layer model:

“Please Do Not Throw Sausage Pizza Away.” or from top down, “All People Seem To Need Data Processing.”

Page: 4

Difficulty: Easy

[QUESTION]

91. What does the acronym NIC stand for and what interface does a NIC provide?

Ans: NIC stands for network interface card. A NIC provides the interface between a PC and a network.

Page: 5

Difficulty: Easy

[QUESTION]

92. Briefly describe the hexadecimal numbering system, including the digits it uses to represent values.

Ans: A hexadecimal numbering system uses base 16 for representing numbers - that would be 0-15 (in base 10 values). Contrast this with the more common decimal numbering system, numbered 0-9. Just as with decimal, people who work with hexadecimal need a single character to represent each number for the 16 values. Using 0-9 makes sense, but then hex is represented in letter form for the values 10–15 (A, B, C, D, E, F).

Page: 6

Difficulty: Moderate

[QUESTION]

93. What are the two parts of a MAC address?

Ans: A MAC address consists of 12 hexadecimal characters. The first six digits represent the number of the NIC manufacturer. Once the IEEE issues those six hex digits to a manufacturer - referred to as the Organizationally Unique Identifier (OUI) - no other manufacturer may use them. The last six digits are the manufacturer’s unique serial number for that NIC; this portion of the MAC is often referred to as the device ID.

Page: 7

Difficulty: Moderate

[QUESTION]

94. Name the five parts that make up a generic frame.

Ans: The five parts that make up a generic frame are:

(1) the recipient’s MAC address

(2) the sender’s MAC address

(3) the Type field

(4) the data

(5) the frame check sequence (FCS)

Page: 9

Difficulty: Moderate

[QUESTION]

95. A frame can hold only a certain amount of data. What happens when the data to be sent is larger than the frame size?

Ans: The sending system’s software must chop the data up into frame-sized chunks, which it then hands to the NIC for sending. As the receiving system begins to accept the incoming frames, the receiving system’s software recombines the data chunks as they come in from the network.

Page: 10

Difficulty: Moderate

[QUESTION]

96. Explain how a CRC is used to figure out whether the data received is accurate or not.

Ans: The NIC sending the frame does a little math to make the CRC. Using binary arithmetic, it works a division problem on the data using a divisor called a key. The result of this division is the CRC. When the frame gets to the receiving NIC, it divides the data by the same key. If the receiving NIC’s answer is the same as the CRC, it knows the data is good; if it is not good, the frame is dropped.

Page: 11

Difficulty: Moderate

[QUESTION]

97. What happens if the sending NIC does not know the MAC address of the NIC that is to receive data?

Ans: If it doesn’t already know the MAC address, a NIC may send a broadcast onto the network to ask for it. The MAC address of FF-FF-FF-FF-FF-FF is the Layer 2 broadcast address - if a NIC sends a frame using the broadcast address, every single NIC on the network will process that frame. That broadcast frame’s data will contain a request for a system’s MAC address. Without knowing the MAC address to begin with, the requesting computer will use an IP address to pick the target computer out of the crowd. The system with the MAC address the system is seeking will read the request in the broadcast frame and respond with its MAC address.

Page: 11

Difficulty: Hard

[QUESTION]

98. Explain what a switch does when it receives a frame from a NIC.

Ans: Switches filter traffic by MAC address. Rather than sending all incoming frames to all network devices connected to it, a switch sends the frame only to the interface associated with the destination MAC address.

Page: 11

Difficulty: Easy

[QUESTION]

99. What network device (found on every computer connected to a network) creates outgoing frames, reads incoming frames, and attaches MAC addresses?

Ans: The network device is a NIC. The many steps a NIC performs to keep data moving - sending and receiving frames over the wire, creating outgoing frames, reading incoming frames, and attaching MAC addresses—are classically broken down into two distinct jobs. The first job is called the Logical Link Control (LLC). The second job is called the Media Access Control (MAC).

Page: 13

Difficulty: Hard

[QUESTION]

100. Briefly describe the two distinct jobs a NIC performs to keep data moving.

Ans: The many steps a NIC performs to keep data moving are classically broken down into two distinct jobs. The first job is called the Logical Link Control (LLC). The LLC is the aspect of the NIC that talks to the system’s operating system (usually via device drivers). The LLC handles multiple network protocols and provides flow control. The second job is called the Media Access Control (MAC), which creates and addresses the frame. It adds the NIC’s own MAC address and attaches MAC addresses to the frames.

Page: 13

Difficulty: Hard

[QUESTION]

101. Describe the functions of the OSI model’s Logical Link Control (LLC) sublayer.

Ans: The Logical Link Control (LLC) is the aspect of the NIC that talks to the system’s operating system (usually via device drivers). The LLC handles multiple network protocols and provides flow control.

Page: 13

Difficulty: Moderate

[QUESTION]

102. Describe the functions of the OSI model’s MAC sublayer.

Ans: The Media Access Control (MAC) creates and addresses the frame. It adds the NIC’s own MAC address and attaches MAC addresses to the frames. Each frame the NIC creates must include both the sender’s and recipient’s MAC addresses. The MAC sublayer adds or checks the FCS. The MAC also ensures that the frames, now complete with their MAC addresses, are then sent along the network cabling.

Page: 13-14

Difficulty: Moderate

[QUESTION]

103. Briefly describe how the Internet Protocol makes sure that a piece of data gets to its intended destination on the network.

Ans: The Internet Protocol is the primary logical addressing protocol for TCP/IP. IP makes sure that a piece of data gets to where it needs to go on the network. It does this by giving each device on the network a unique numeric identifier called an IP address. An IP address is known as a logical address to distinguish it from the physical address, the MAC address of the NIC.

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Difficulty: Hard

[QUESTION]

104. Briefly describe the IP naming convention. Give an example of an IP address.

Ans: IP uses a rather unique dotted decimal notation (sometimes referred to as a dotted-octet numbering system) based on four 8-bit numbers. Each 8-bit number ranges from 0 to 255, and the four numbers are separated by periods. A typical IP address might look like this: 192.168.4.232

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Difficulty: Easy

[QUESTION]

105. Briefly describe the beginnings of TCP/IP (i.e., what research work led to the development of TCP/IP)?

Ans: In the early 1970s, two researchers at the U.S. Defense Advanced Research Projects Agency (DARPA), Robert E. Kahn and Vinton Cerf, worked out the basic parameters of what would become TCP/IP. TCP/ IP offered amazing robustness in its design and eventual implementation. Government research at its most profound and world shaping!

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Difficulty: Moderate

[QUESTION]

106. Describe the two unique identifiers of each system in a TCP/IP network.

Ans: In a TCP/IP network, each system has two unique identifiers: the MAC address and the IP address. The MAC address (the physical address) is literally burned into the chips on the NIC, whereas the IP address (the logical address) is simply stored in the system’s software. MAC addresses come with the NIC, so you don’t configure MAC addresses, whereas you must configure IP addresses using software.

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Difficulty: Moderate

[QUESTION]

107. Describe what happens at each router as data is sent from one computer to another on a TCP/IP network such as the Internet.

Ans: When data is sent from one computer to another on a TCP/IP network such as the Internet that data can go through many routers before it reaches its destination. Each router strips off the incoming frame, determines where to send the data according to the IP address in the packet, creates a new frame, and then sends the packet within a frame on its merry way. The new frame type will be the appropriate technology for whatever connection technology connects to the next router. That could be a cable or DSL network connection, for example. The IP packet, on the other hand, remains unchanged.

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Difficulty: Moderate

[QUESTION]

108. Explain what happens to a packet when it reaches the destination subnet router.

Ans: Once the packet reaches the destination subnet’s router, that router will strip off the incoming frame - no matter what type - look at the destination IP address, and then add a frame with the appropriate destination MAC address that matches the destination IP address.

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Difficulty: Moderate

[QUESTION]

109. What is the role of the NIC’s driver software?

Ans: The NIC’s driver software is the interconnection between the hardware and the software. The NIC driver knows how to communicate with the NIC to send and receive frames, but it can’t do anything with the packet. Instead, the NIC driver hands the packet off to other services that know how to deal with all the separate packets and turn them into Web pages, e-mail messages, files, and so forth.

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Difficulty: Moderate

[QUESTION]

110 Explain the function of the OSI model’s Transport layer.

Ans: Segmentation and reassembly occur at Layer 4, the Transport Layer. Because most chunks of data are much larger than a single packet, they must be chopped up before they can be sent across a network. When a serving computer receives a request for some data, it must be able to chop the requested data into chunks that will fit into a packet (and eventually into the NIC’s frame), organize the packets for the benefit of the receiving system, and hand them to the NIC for sending. This is called segmentation. The receiving system does the reassembly of the packets. It must recognize a series of incoming packets as one data transmission, reassemble the packets correctly based on information included in the packets by the sending system, and verify that all the packets for that piece of data arrived in good shape.

The transport protocol breaks up the data into chunks called segments or datagrams (depending on the specific transport protocol used) and gives each segment some type of sequence number. (Datagrams are simpler and don’t get sequence numbers.)

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Difficulty: Hard

[QUESTION]

111. How does the destination system know how to put packets in the correct order?

Ans: A computer sending data on a network embeds a sequencing number into the data of each packet containing a segment. By reading the sequencing numbers, the receiving system knows both the total number of segments and how to put them back together.

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Difficulty: Moderate

[QUESTION]

112. In terms of the OSI model, explain why a user who knows nothing about any of the parts of a network is still able to use a network. Give at least one example of how such a user may use a network.

Ans: The last and most visible part of any network is the software applications that use it. If a user wants to copy a file residing on another system in the network, the user needs an application like Network in Windows 10 that enables the user to access files on remote systems. If the user wants to view Web pages, he or she will need a Web browser like Google Chrome or Mozilla Firefox. The people who use a network, experience it through an application. A user who knows nothing about all the other parts of a network may still know how to open an e-mail application to retrieve mail.

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Difficulty: Hard

[QUESTION]

113. Briefly describe what is meant by encapsulation.

Ans: The term encapsulation encompasses the entire process of preparing data to go onto a network. This includes all the steps from the application to the Application, Presentation, Session, Transport, Network, and Data Link layers. Each layer adds more information so that the data gets to the correct recipient and the recipient knows what to do with the data.

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Difficulty: Moderate

[QUESTION]

114. Briefly describe what is meant by de-encapsulation.

Ans: When de-encapsulation occurs, the receiving computer reverses the encapsulation process, stripping all the extra header information out as the data goes up the stack.

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Difficulty: Easy

[QUESTION]

115. Describe how the encapsulation and de-encapsulation processes are used in the Transport, Network and Data Link layers.

Ans: The Transport layer creates a segment or datagram and hands it down to the Network layer. That layer adds IP information, encapsulating the segment or datagram. The Data Link layer wraps all that goodness up, encapsulating the packet in a frame for delivery over the network.

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Difficulty: Hard

[QUESTION]

116. Provide an example of the lack of standardization with the TCP/IP model.

Ans: It’s important to appreciate that the TCP/IP model doesn’t have a standards body to define the layers. Because of this, there are a surprising number of variations on the TCP/IP model.

A great example of this lack of standardization is the Link layer. Without a standardizing body, there is no agreement on the name. While “Link layer” is extremely common, the term “Network Interface layer” is equally popular. A good tech knows both of these terms and understands that they are interchangeable. Notice also that, unlike the OSI model, the TCP/IP model does not identify each layer with a number.

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Difficulty: Hard

[QUESTION]

117. Name the four layers of the TCP/IP model, and their corresponding layers in the OSI model.

Ans: The four layers are:

* the Link (Network Interface) layer, which corresponds to the Physical and Data Link layers of the OSI model
* the Internet layer, which corresponds to the Network layer of the OSI model
* the Transport layer, which corresponds to the Transport layer of the OSI model
* the Application layer, which corresponds to the Session, Presentation, and Application layers of the OSI model

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Difficulty: Moderate

[QUESTION]

118. Describe the Transport layer of the TCP/IP model.

Ans: The Transport layer combines features of the OSI Transport and Session layers with a dash of Application layer just for flavor. While the TCP/ IP model is certainly involved with the assembly and disassembly of data, it also defines other functions, such as connection-oriented and connectionless communication.

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Difficulty: Moderate

[QUESTION]

119. What fields comprise a UDP datagram?

Ans: A UDP datagram is comprised of the following fields:

* Destination port
* Source port
* Length
* Checksum
* Data

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Difficulty: Moderate

[QUESTION]

120. Briefly explain the power of the TCP/IP model in its ability to describe what happens at each layer to the data that goes form one computer to another.

Ans: The TCP/IP model shows its power in its ability to describe what happens at each layer to the data that goes from one computer to another. The Application layer programs create the data. The Transport layer breaks the data into chunks, putting those chunks into TCP segments or UDP datagrams. The Internet layer adds the IP addressing and creates the IP packets. The Link layer wraps the IP packet into a frame, with the MAC address information and a frame check sequence (FCS). Now the data is ready to hit the wire (or airwaves, if you’re in a café).

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Difficulty: Hard